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Factors of price convergence and its estimated level in Hungary

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Péter Bauer

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The views expressed here are those of the authors and do not necessarily reflect the official view of the central bank of Hungary (Magyar Nemzeti Bank).

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Abstract

The study analyses the relationship between real economy convergence and the convergence of relative prices. Similar to its peers in the CEE region, a significant part of Hungary's price convergence with developed Western European countries can be attributed to the convergence of the real economy. The crisis, however, impeded catching-up in the entire region, leaving relative prices largely unchanged in the subsequent periods. In addition to decelerating real convergence, this may also have resulted from depreciating nominal exchange rates. The relationship between relative price levels and economic development is often explained by the Balassa-Samuelson effect; according to the findings, however, this effect accounts for only a part of the real appreciation observed in the region over the past one-and-a-half decades. This may have resulted primarily from problems concerning the data required for the estimation of the Balassa-Samuelson effect. Thus, in interpreting the findings, the main focus is a direct estimation of the relationship between relative price levels and economic development. The rate of expected price convergence in Hungary can be calculated from assumptions about future economic growth, relying on estimates pertaining to the relationship between relative price levels and economic development. According to our estimates, real convergence may be accompanied by price convergence of 0.5–1 per cent per annum. This calculation, however, involves significant uncertainty. The lower growth rate of regulated prices may lead to lower convergence rates, while higher economic growth compared to the euro area may drive faster price convergence.

JEL code: E31
Keywords: price convergence, Balassa-Samuelson effect, real appreciation

Executive summary

The favourable growth data registered in recent quarters suggest that, following the downturn accompanying the crisis, Hungary's real convergence with the economically developed countries of the world may continue. In international comparison, there is a close relationship between economic development and relative price levels. Accordingly, real convergence has a positive impact on relative price levels. In the long run, price convergence with developed countries is determined by the convergence of the economy.

The close relationship between economic development and relative price levels is traditionally explained by the Balassa-Samuelson effect, i.e. the difference between the productivity growth of sectors producing traded goods (typically industrial goods) and non-traded goods (typically services). According to our findings, however, the Balassa-Samuelson effect only accounts for a part of the price convergence observed in CEE countries at the aggregate level, while indirect evidence suggests that the impact mechanism prevails at the disaggregate level. In Hungary, price convergence affected nearly all product groups in the past, and it was precisely among non-traded goods that the highest increases were registered. Therefore, the low estimated value of the Balassa-Samuelson effect is likely due to data problems stemming from the difficulty of classifying products and sectors into the traded and non-traded categories. Thus, in interpreting the findings, our main focus is a direct estimation of the relationship between relative price levels and economic development.

The crisis impeded catching-up in the entire region, leaving relative prices largely unchanged in the years thereafter. In addition to decelerating real convergence, this may also have resulted from depreciating nominal exchange rates.

The rate of expected real appreciation in Hungary can be calculated from assumptions about future growth, relying on estimates pertaining to the relationship between relative price levels and economic development. Based on current projections in respect of Hungarian and euro-area potential growth, in the baseline scenario, Hungary's economic growth surplus compared to the euro area may amount to around 1 per cent per year over the long term which, according to our estimates, may entail price convergence of 0.5–1 per cent annually. It should be stressed that this calculation involves significant uncertainty. For instance, price convergence may prove to be slower if the increase in regulated prices remains below the historical average for a sustained period relative to the other products in the consumer basket. If the relative level of regulated prices does not increase compared to advanced EU Member States in future, in our estimates, the increase in relative price levels will be lower by 0.1–0.3 percentage points. The estimated 1 per cent value for Hungary's growth surplus also involves uncertainty. Faster real convergence may lead to accelerated price convergence.

1 Introduction

We investigate the phenomenon of price convergence occurring in parallel with economic convergence because it is one of the main reasons why inflation may be higher in emerging countries than in developed economies. The real exchange rate is understood as the relative price of a product or product group (generally the consumer basket) expressed in a common currency. As such, a change in the real exchange rate can be decomposed into the sum of the nominal exchange rate change and the inflation differential.[1] Therefore, price convergence entails appreciation of the nominal exchange rate and/or excess inflation.

Evidence shows that the comparative price level (expressed in a common currency) of higher-income, more developed countries is higher. Thus, improving levels of development in emerging countries entail real appreciation. This means that, as measured in a common currency, the price level gradually approaches the price levels of more developed countries.

The relationship between economic development and price levels is widely discussed in the literature, primarily in the context of the Balassa-Samuelson effect. Similarly, numerous papers have been devoted to the Central and Eastern European region, including Hungary, such as Égert (2007), Égert (2011), Égert, Halpern, MacDonald (2006) and Darvas, Szapáry (2008). Oblath (2014) is one of the latest Hungarian studies on the topic. It provides an assessment of Hungarian wages versus prices in the context of relative economic development.

The purpose of this study is to examine, through a variety of methods, the relationship between Hungarian price convergence and economic development both at the aggregate level and at more disaggregated levels, relying on more up-to-date data than those used in previous papers. We also attempt to put these results in a regional context and offer some guidance on the expected rate of price convergence looking ahead.

The study is structured as follows: The data underlying our analysis are presented in Chapter 2. Chapter 3 provides an analysis of the relationship between economic development and the relative price level for EU Member States in general and CEE countries in particular. In Chapter 4 we address the most frequently cited explanation for the close link between the two variables, the Balassa-Samuelson effect, and its estimation. Chapter 5 is dedicated to the price convergence of certain product groups in the consumer basket, with a separate discussion on price developments concerning regulated-price goods and products subject to excise duty. Finally, the main conclusions of the study are presented in Chapter 6.

[1] The real exchange rate is calculated by multiplying the nominal exchange rate and the quotient of the price levels: $rexch = nexch * P / P^{**}$, where *rexch* and *nexch* are the real exchange rate and the nominal exchange rate, and *P* and *P** are the domestic and foreign consumer price levels expressed in the relevant currencies. Accordingly, $\Delta rexch = \Delta nexch + \pi - \pi^*$, where $\pi - \pi^*$ is the difference between domestic and foreign inflation, and D is the logarithmic change.

2 Data

In examining the relationship between economic development and price levels, we relied on Eurostat's annual PPP (purchasing power parity) database. Comparative price levels are provided by the price level indices, expressed in terms of the EU15 as the "base country" (EU15=100). The use of the EU15 was justified by the data available. The EU15 includes Member States joining the European Union before 2004; therefore, in practical terms, it corresponds to the group of advanced EU Member States. Most of these countries are also members of the euro area (except Denmark, the United Kingdom and Sweden).

The Price Level Index expresses in euros the price level of a representative consumer basket of a given country relative to the EU15 average. The consumer basket takes into account the structure of final individual consumption and, for the disaggregated analyses we also relied on data on the sub-groups of final individual consumption. In Box 1 we explain in detail that consumption thus defined also includes non-purchased goods, the prices of which are determined by statistical offices by imputation.

We determine the development levels of individual countries using nominal GDP per capita, expressed in an artificial currency. The GDP per capita values thus received are expressed in PPS (Purchasing Power Standard). The artificial currency ensures that the GDP per capita figure is adjusted for the price-level differences existing among the countries concerned. This is calculated by dividing the nominal GDP per capita value by the PPP value. In the case of Hungary, for instance, the latter shows the forint amount for which a product basket worth EUR 1 in the reference country can be purchased in Hungary. Similarly to price level data, we rely on data calculated in comparison to the EU15 average. In line with the above definition, the GDP per capita figure expressed in PPS shows the amount of representative product baskets that can be purchased in the given country for the nominal GDP per capita amount. We compare this value to the EU15 average. The latter interpretation also points out an important fact: while a change in the nominal exchange rate, by definition, may exert a direct impact on the comparative price level (provided that domestic prices do not adjust immediately), economic development is not affected directly.[2]

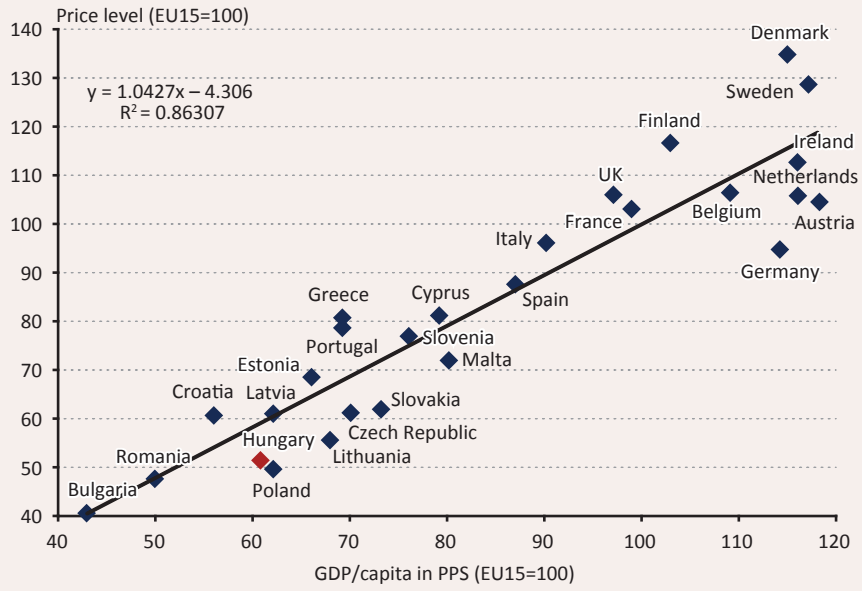
It is also important to take note of an important characteristic of the data: PPP data are primarily suitable for comparisons made in a given year between different countries. At the same time, the data can be arranged in a time series or a panel database. Data used as time series, however, should be treated with caution: changes over time may reflect changes both in the product basket and in the methodology. Thus, for example, the composition effect of the product basket may distort the results. Consequently, PPP data, national accounts data and HICP (Harmonised Index of Consumer Prices) figures are not entirely consistent. One possible solution to this problem may be to calculate the data starting from a fixed base year, on the basis of the shifts observed over time in GDP per capita and in the inflation differential adjusted for the nominal exchange rate. An advantage of this method is that it ensures comparability over the entire time horizon, as well as comparability between countries in the base year. Its disadvantage, however, is the distortion of geographical comparability in years other than the base year. In reality, total geographical and chronological comparability cannot be ensured simultaneously. In view of these aspects, we did not apply the adjustment mentioned above in this paper.

[2] Obviously, the nominal exchange rate may have an indirect effect on GDP as a result of the economy's adjustment to the changed exchange rate.

3 Relationship between economic development and price levels

According to the purchasing power parity hypothesis, measured in the same currency, the price of consumer baskets is the same in all countries; in other words, the value of the real exchange rate (i.e. the relative price of a consumer basket expressed in the consumer basket of another country) is 1. The observation that there are systematic deviations from the purchasing power parity hypothesis goes back to the 1950s. It is a generally recognised phenomenon that comparative price levels (i.e. as expressed in the same currency) tend to be higher in more developed countries with higher-income households. The relationship between economic development and comparative price levels in EU Member States for 2013 (both values relative to the EU15) is shown in Chart 1. Economic development is captured by the domestic purchasing power of GDP per capita (i.e. GDP per capita expressed in terms of PPS) compared to the average of the EU15. As the chart shows, there is a close relationship between economic development and price levels; according to the regression results, the level of development accounts for nearly 90 per cent of the difference between the price levels prevailing in different countries. The slope of the regression line points to a nearly one-for-one relationship between the two variables; in other words, in the linear relationship described for the two variables the coefficient of development does not deviate significantly from 1. In 2013, the level of economic development in Hungary was 61 per cent of the EU15, while the Hungarian price level stood at 56 per cent. Thus, similar to its peers in the region, the position of Hungary was somewhat below the regression line that captures the relationship between economic development and price levels, which means that the country's price level was slightly lower than warranted by its level of development.

Chart 1
Relative price levels as a function of economic development, 2013
(EU15=100, level of development expressed as the purchasing power of GDP per capita)



Source: Eurostat
Note: EU28 excluding Luxembourg

3.1 ESTIMATIONS OF THE RELATIONSHIP BETWEEN ECONOMIC DEVELOPMENT AND RELATIVE PRICE LEVELS

Before presenting a more detailed econometric analysis of the relationship between the relative price level and economic development, it is worth addressing a technical matter: namely, that it is expedient to transform the variables by taking a logarithm. This is justified by two reasons. Firstly, taking logarithms allows the changes (both in economic development and price level) to be interpreted in terms of percentages, while without logging the variables, changes can be interpreted in percentage points only. The problem with the latter is the fact that, for example, 10-percentage point growth in development will mean something utterly different when it entails an increase from 50 per cent of the EU15 to 60 per cent, compared to an increase from 80 per cent to 90 per cent. Indeed, in the latter case a lower-percentage growth is required. Logarithmic transformation helps to avoid this problem. The second argument for the transformation is the fact that in the case of logging, the result of the regression between economic development and price levels will be independent of the country or group of countries to which the comparison is made: this will be reflected in the estimated constant term, with no impact on the coefficient estimation. With that in mind, henceforth we will rely on the logarithm of economic development and price level.

Accordingly, we estimate the following equation, which is the regression presented above estimated in logarithm:

$$\log\left(price_i\right)=\alpha+\beta\log\left(gdp_i\right)+\varepsilon_i\ ,$$

where *i* denotes the country, *price* denotes the relative price level, and *gdp* means the relative level of development. According to the results, the estimated coefficients are very similar to the case where no logarithm was applied; that is, there is a strong, nearly one-to-one relationship between economic development and price level (Table 1).[3] The result remains robust even when we estimate the relationship for earlier years. Accordingly, 1 per cent real convergence will entail 1 per cent price level convergence.

Taking advantage of the availability of data for several countries and several years simultaneously, we also ran panel estimations for data between 1995 and 2013 using both of these dimensions. The four specifications according to which the estimations were performed are as follows:

$$\log\left(price_{it}\right)=\alpha+\beta\log\left(gdp_{it}\right)+\delta_t+\varepsilon_{it} \quad (1)$$

$$\log\left(price_{it}\right)=\alpha+\beta\log\left(gdp_{it}\right)+\delta_t+\lambda_i+\varepsilon_{it} \quad (2)$$

$$\log\left(price_{it}\right)=\alpha+\beta\log\left(gdp_{it}\right)+\sum_{k=0}^{3}\gamma_k\log\left(er_{it-k}\right)+\delta_t+\lambda_i+\varepsilon_{it} \quad (3)$$

$$\Delta\log\left(price_{it}\right)=\alpha+\sum_{k=0}^{2}\beta_k\Delta\log\left(gdp_{it-k}\right)+\sum_{k=0}^{2}\gamma_k\Delta\log\left(er_{it-k}\right)+\delta_t+\varepsilon_{it} \quad (4)$$

In this case, *i* denotes the country and *t* denotes the year, while *price* means the relative price level, *gdp* means level of development, and *er* indicates the nominal exchange rate relative to the euro (the higher this value is, the higher the appreciation of the given currency). Among the explanatory variables, in each case we included the dummy variable for the given year, i.e. the so-called year fixed effect (δ). With this variable, we took into account factors that equally affect the price levels of all countries in a given year; in addition, it also includes the effect of the choice of the reference country. The results are shown in Table 2.[4]

Based on specification (1), the results are similar to those that would have been received for a cross-section estimate: once again, the relationship between economic development and price level produced a result close

[3] In this regard, Luxembourg is considered an outlier and as such, it is henceforth excluded from the countries used for the purposes of this paper.
[4] Due to the low number of observations, we present the OLS standard errors; however, even by using standard errors clustered by country, the results remained equally significant.

to 1. Specifications (2) and (3) also included the country fixed effect (λ); i.e. we took into account all factors that are constant in time characterising a country. This mitigates the risk of bias stemming from omitted variables, which materialises when there are variables other than economic development that have an impact both on the price level and the level of development. At the same time, with the inclusion of the country fixed effect we lose the information to be gained from the dispersion of the general price levels of the countries which, in case of a small sample, could be a problem. The estimates produced on the basis of specifications (2) and (3) yielded coefficients as low as around 0.5. Specifications (3) and (4) also include the nominal exchange rate, given its possible short-term effect on the relative price level. More details on this are presented below in the sub-chapter dedicated to the price convergence of CEE countries. Specification (4) is different from the others in that in this case, we estimated in differences; i.e. we explained *changes* in price levels by *changes* in economic development. In this case we automatically eliminated the country fixed effect, thus it is not used in these estimates. In this specification we found that the effect of economic development was even lower than 0.5 (in this case, the long-term effect of economic development can be determined as the sum of the β_k coefficients). However, this specification will only be correct if there is no cointegration between the variables; i.e. there is no long-term relationship between economic development and price levels to which the variables adjust over time. Since we strongly suspect based on theory that such a long-term relationship exists, we consider the results of the equations using level estimates (namely, specifications (1), (2) and (3)) more reliable.

Thus, the estimates taking into account the country fixed effect yielded lower coefficient estimates of around 0.5; this is the extent to which the relative price level depends on the level of development. This may point to country-specific factors that entail higher development and price levels simultaneously, and when these factors are disregarded, we attribute a more significant role to economic development than it actually has. Having said that, it is very difficult to find a factor with this feature (for instance, the openness of countries to foreign trade will produce the exact opposite effect). It is also possible that, given the small sample available to us, data pertaining to certain countries have a decisive impact on the estimates. Finally, this phenomenon may also be explained by a possible non-linear (or more precisely, non log-linear) relationship between price levels and economic development. Since none of the above explanations can be ruled out, we accept the uncertainty that the real coefficient of the relationship between price levels and economic development is located somewhere in the range of 0.5 and 1.

Table 1
Relationship between price level and economic development, 2013

dependent variable: log(price)	R squared: 0.88	
	Coefficient	Std. Error
log(gdp)	1.070***	0.079
constant	–0.326	0.347

Table 2
Relationship between price level and economic development, panel regressions, 1995–2013

dependent variable: log(price)	(1)	(2)	(3)	(4)
log(gdp)	0.887***	0.508***	0.480***	0.357***
std. error	0.016	0.032	0.026	0.049
year dummy	yes	yes	yes	yes
country dummy	no	yes	yes	no
exchange rate	no	no	yes (0-3 lags)	yes (0-3 lags)
in difference	no	no	no	yes

*Note: *** indicates significant parameters at the 1 per cent level.*

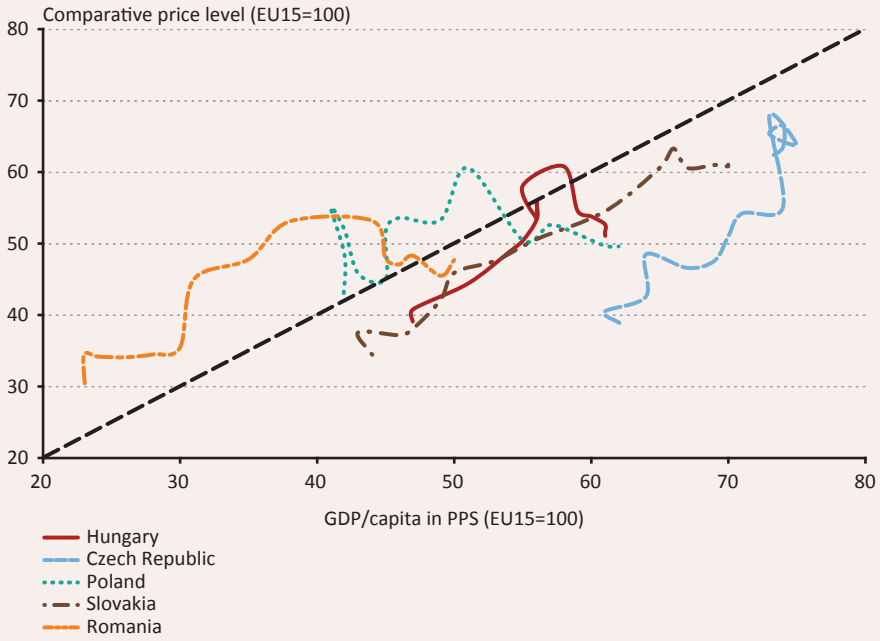
A previous analysis by Darvas – Szapáry (2008), a panel regression of relative price level determination for level of development, performed on similar data found a coefficient of 1, i.e. it yielded a similar result to that described above.

According to our findings, if the (per capita) growth differential is 1 per cent per year, then the resulting real appreciation should be in the range of 0.5–1 per cent per year; implying excess inflation of 0.5–1 per cent with an unchanged nominal exchange rate.

3.2 CONVERGENCE EXPERIENCES IN THE REGION (1999–2013)

The Hungarian price level convergence – in other words, real exchange rate appreciation – is worth examining in relation to other countries in the CEE region. Indeed, these countries resemble each other both in terms of the structural features of the economy and historical heritage. We performed the analysis for the period 1999–2013 based on data pertaining to the past one and a half decades (Chart 2). Economic convergence had been largely continuous in each country in the region until the onset of the crisis in 2008. Real convergence entailed an increase in relative price levels. The crisis triggered a turnaround in this regard: on the one hand, real convergence slowed in 2009, and on the other hand, partly reflecting the depreciation of the nominal exchange rate, price level convergence reversed.[5] Unless it is immediately and completely incorporated into domestic prices, a depreciation of the nominal exchange rate reduces relative price levels. This is supported by the observation that, of the countries under review, Slovakia recorded the smallest decline in price level – due to Slovakia's accession to the euro area, exchange rate depreciation compared to the euro was not possible after 2009.

Chart 2
Price convergence of CEE countries as a function of economic development, 1999–2013
(compared to the EU15)



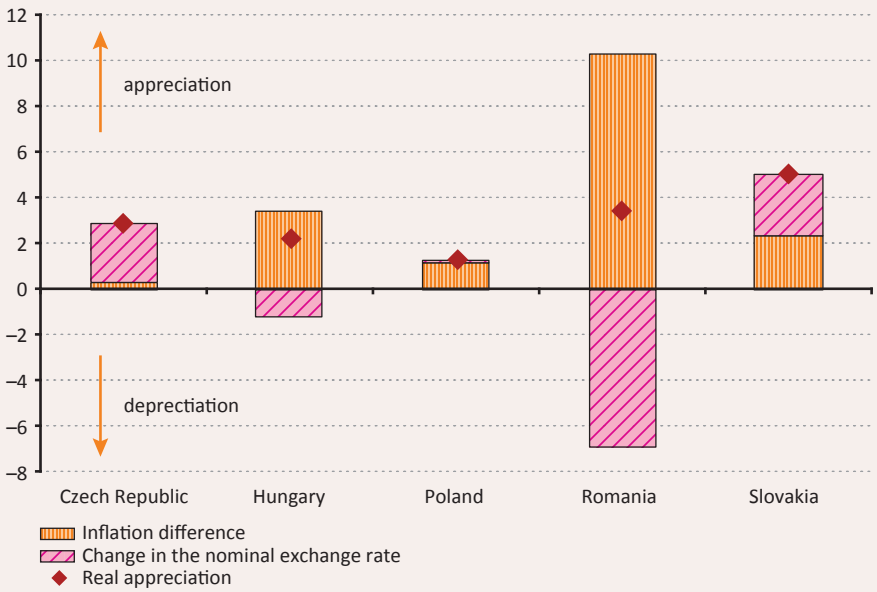
Source: Eurostat

[5] Once again, it should be noted that, while a change in relative economic development, in theory, corresponds to the growth differential of real GDP per capita, due to the reasons described in Chapter 2 on the data applied, these two values are not exactly equal in practice. Therefore, according to data based on PPP statistics, although Hungary continued to show a small measure of development convergence even during the crisis, based on national accounts data, the downturn observed in Hungary in 2009 surpassed that seen in the EU15.

It is also important to examine the extent to which nominal appreciation and the inflation differential accounted for price level convergence, i.e. real appreciation observed in the region (Chart 3).[6] Indeed, provided that prices expressed in the domestic currency remain unchanged, appreciation of the nominal exchange rate increases the price level expressed in the common currency. On the other hand, with the nominal exchange rate level unchanged, a faster increase in domestic prices relative to the reference country (i.e. excess inflation) also raises the relative price level. At the same time, changes in the nominal exchange rate and domestic prices are obviously not independent of one another; for instance, nominal appreciation will be reflected in domestic prices over time, exerting a downward pressure on inflation. In the region, the appreciation of the nominal exchange rate in the sample period contributed to the appreciation of the real exchange rate in the case of the Czech Republic and Slovakia. By contrast, most of the real appreciation observed in Hungary, Poland and Romania was attributable to higher inflation relative to the EU15. For instance, annual real appreciation of 2 per cent was recorded in Hungary in the context of excess inflation of nearly 3 per cent, and annual nominal exchange rate depreciation of 1 per cent.

Thus, while we found substantial real appreciation in all regional countries, the appreciation materialised in different ways. While lasting nominal exchange rate appreciation or depreciation may be sustainable, the level of price convergence is predominantly determined by the level of real convergence.

Chart 3
Decomposition of the real appreciation of regional countries
(1999–2013, annual percentage changes relative to the EU15)



Source: Eurostat, own calculation

[6] For the analysis we relied on nominal exchange rate data and HICP figures. Due to methodological differences, the real exchange rate changes calculated from this data are not completely identical with the changes in relative price levels computed from the PPP statistics; however, the difference amounts to only a few tenths of a per cent.

4 Reasons for the strong correlation between price levels and economic development – the Balassa-Samuelson effect

As we demonstrated above, there is a strong statistical relationship between the level of economic development and price levels. The question arises as to what reasons and underlying factors are behind this correlation. If we can offer a structural explanation for the correlation observed, we will be able to provide more reliable projections in respect of expected future real appreciation, and can reduce the uncertainty of the relevance of historical correlations.

The positive correlation between price level and economic development is typically explained by the Balassa-Samuelson effect (Balassa [1964] and Samuelson [1964]).[7] Before addressing this topic in detail, we wish to point out a number of other possible reasons (discussed in more detail in Égert [2011]). One of the reasons is the fact that, as incomes increase, consumers and producers tend to turn to higher-quality products and services. The consumer basket comprising higher-quality products is more expensive. For lack of data pertaining to quality, this explanation is less open to scrutiny. It should also be noted that this explanation is ultimately based on a statistical error: for an adequate comparison of the countries concerned, we should either compare products of the same quality, or adjust them for any differences. As far as we know, no studies have been prepared examining such bias in PPP data; however, several papers attempt to assess the extent to which changes in quality distort the measurement of inflation. Most of these papers examine developed countries and estimate quality bias to be in the range of 0.1 and 0.6 percentage points annually. Special attention is due to the article in which Filer and Hanousek (2003) provide an analysis pertaining to the experiences of a CEE country, the Czech Republic. On the one hand, the paper refers to the findings of a previous research, in which the authors estimated quality bias in the 1990s at around 1 percentage point per year – a result comparable to those of developed countries. On the other hand, in the article – which, as opposed to the authors' previous research, was based on a consumer opinion survey – the bias estimated by the authors is far higher than previously, amounting to 3.9 percentage points. During this period (1990–1999), average measured inflation was more than 13 per cent in the Czech Republic. Based on the fact that regional countries typically recorded far lower inflation rates in later periods, it can be assumed that the value of quality bias was far lower. Accordingly, although the role of quality convergence in price convergence cannot be ruled out completely, it is likely to account for only a fraction of the price level convergence observed following the 1990s.

According to another explanation, corporations may price their products differently in different countries, depending on the level of disposable income ("pricing-to-market"). Prices may converge in line with the narrowing of the income gap. Obviously, this explanation may affect only a limited range of products, accounting for only a minor change in the convergence of aggregate price levels.

The literature also cites the convergence of regulated prices as a possible explanation, primarily in relation to the price convergence of CEE countries. It is unclear, however, to what extent this can be attributed to economic

[7] It is also referred to as Harrod-Balassa-Samuelson effect.

development or to an extraordinary event, such as the transition from a planned to a market economy. The topic of regulated prices is discussed in more detail below.

The Balassa-Samuelson effect (hereinafter: B-S effect) explains the positive correlation between economic development and price levels with the difference between the productivity growth of traded goods (typically items included in international trade) and non-traded products (generally services outside of international trade). The B-S effect is based on the following assumptions:[8]

(1) emerging countries converge primarily through improvement in traded productivity, while non-traded productivity can be increased to a lesser degree. Examples include hairdressing and automobile production. Through the use of more advanced technologies, the productivity of automobile production – as a sector producing traded goods – can be improved significantly, while the productivity of hairdressing – a non-traded service – is likely to be very similar in developed and undeveloped countries.

(2) expressed in the same currency, traded prices are identical in all countries. The assumption is only valid if trade is completely free of charge and the quality of products is totally identical. If trade is costly (as it is in reality), the only thing that can be assumed is the co-movement of prices over the long run; for the B-S effect to take hold, however, even this is sufficient.

(3) wages are equalised between the traded and non-traded sectors. This concept is based on the assumption that the labour force can move freely between the two sectors (but not between countries). In reality, the two sectors may require different sets of skills, which may justify different wage levels. For the B-S effect to be valid, however, the long-term co-movement of wages is sufficient, which is a less restrictive assumption.

As a result of the above assumptions, improved traded productivity will lead to a rise in wages within the sector (as prices are fixed internationally), which will spill over to the non-traded sector. In this sector, however, productivity grows at a slower rate than in the traded sector, and the resulting wage pressure pushes up prices. In other words, prices in the non-traded sector increase in comparison to those in the traded sector. The higher the productivity growth differential between the two sectors, the higher the traded/non-traded inflation differential will be. The higher excess productivity growth in the traded sector in emerging countries leads to higher inflation differential between non-tradables and tradables. The latter, in turn, entails real appreciation as, expressed in the common currency, traded prices are identical, while non-traded prices increase faster in emerging countries.

Regarding the theory it should be mentioned that, given the significant structural changes in the economies in the past 50 years, it may have become questionable whether the assumptions – simplistic, as they are in any case – can hold true in modern economies. One of the most important comments in this regard observes that the B-S effect is strongly reliant on the divisibility of the economies into domestic traded and non-traded sectors. The past few decades saw a sharp increase in the complexity of the goods produced. As a result of this process, the two sectors have become increasingly intertwined, and in reality it is hard to find any internationally traded product the value added of which is not linked to some important content produced by the services sector. Thus, while at the beginning of the product chain research and development, as well as planning have great significance, at the end of it the items incorporated into the final price of the product are the costs of marketing, transport, warehousing and sales. Clearly, instead of traditional products for consumption purposes, a substantial part of the services sector provides business services requiring high technology. There is at least as much room for productivity growth concerning these services as in the traditional traded sector. Another feature of modern global economy is the formation of global value chains; that is, certain stages of the production of goods are located in different countries.

[8] In addition to those listed, another (technical) assumption asserts that the output of the two sectors can be characterised by Cobb-Douglas production functions of constant returns-to-scale.

All of this demonstrates that the assumption that a given consumption item can be clearly classified into the traded or non-traded sector has become even more simplistic than it was decades ago, rendering it difficult to link price changes to the productivity of the relevant sector.

Nevertheless, if the assumptions hold true, from the formal derivation of the B-S effect (e.g. Égert et al., 2006) it follows that the differential between traded/non-traded productivity growth will yield precisely the same excess in non-traded inflation compared to traded inflation. Accordingly, the excess inflation attributable to the B-S effect will be as follows:

$$\alpha_N\left(\Delta\log Prod_T - \Delta\log Prod_N\right), \qquad (5)$$

where α_N denotes the share of non-traded goods in the consumer basket, and the brackets contain the productivity growth differential of the two sectors. The real appreciation (price level convergence) attributable to the B-S effect is received from the difference of the former expression relative to the reference country (group of countries). It should be noted that the theoretical coefficient of the link between economic development and price level may not be deduced from this expression without the introduction of further, highly restrictive assumptions; thus the estimated value of 1 (or 0.5) described above cannot be deduced from the Balassa-Samuelson effect.

Before attempting to define the magnitude of the B-S effect in Hungary and other CEE countries, it is worth examining the findings of previous studies. The B-S effect has been estimated for emerging countries in numerous papers (e.g. Égert [2007], Égert et al. [2006]). The estimates are intended to gauge the extent to which the sectoral inflation differential depends on the productivity growth differential. The findings confirm the theoretical conclusions if the estimated coefficient is close to 1. However, the coefficient estimated according to the above is generally significantly lower than the value of 1 that would be expected on the basis of the theory. Therefore, in their calculations, several studies rely on the theoretical coefficient of 1, instead of the estimated coefficient; in other words, they simply take formula (5) to calculate the magnitude of the B-S effect. This approach is often referred to as the “accounting” method. However, in the case of emerging CEE countries even these calculations found that the B-S effect accounts for only a fraction of real appreciation.

This negative result may be attributed to several reasons. Developments in traded and non-traded productivity, for instance, are not consistent with the baseline of the theory in reality. Indeed, in emerging countries it was not only the traded sector that demonstrated substantial productivity gains, but also the non-traded sector. This should not be overly surprising in consideration of the fact that, as pointed out above, in addition to the provision of traditional services, the modern services sector also performs highly innovative business service activities, the productivity of which leaves ample room for improvement. Furthermore, traded productivity grows noticeably even in developed countries, which puts downward pressure on relative productivity growth. Another reason for the low value of the B-S effect is the fact that it only explains convergence through non-traded prices, while the share of non-traded goods in the consumer baskets of emerging countries is less pronounced.

It would follow from this that real appreciation can be primarily attributed to factors other than the B-S effect. At the same time, there is another explanation for the negative results, according to which the B-S effect works in theory; however, the data available for the estimates are not suitable for confirming this theory. As pointed out above, it is not always self-evident in practice as to which sectors should be considered traded and non-traded. It is particularly problematic that we rely on the production data of sectors in order to produce productivity data, while calculations for the inflation differential are typically based on consumer price index data. At the same time, the traded/non-traded classification of sectoral and CPI data cannot be completely harmonised. For instance, from the production side, the retail trade sector is traditionally considered to be a part of the services sector, while from the aspect of prices it can be established that most traded goods are distributed by the retail trade sector. On the other hand, foodstuffs used in restaurant services, for example, are processed in the food industry, which is traditionally classified into the traded sector. In practice, therefore, the traded and non-traded sectors participate together in the production of goods and services; therefore, their separation into two categories will inevitably be arbitrary to a certain degree. Finally, it is unclear whether

regulated prices should be included in the calculation of the B-S effect (even though they are usually composed of services), as their prices are not necessarily determined by supply and demand conditions.

4.1 ESTIMATION OF THE BALASSA-SAMUELSON EFFECT

We have estimated the B-S effect based on the data available (EU Member States, 2001–2013) as follows. The B-S effect can be also estimated for total factor productivity (TFP); however, the application of labour productivity is preferable as it can be observed directly, while TFP can only be produced by estimation. Accordingly, the formalised B-S effect is as follows (Égert et al., [2006]):

$$\log P_N - \log P_T = constant + \left(\log Prod_T - \log Prod_N\right),$$

where P_N and P_T denote non-traded and traded prices (expressed in domestic currency), while $Prod_T$ and $Prod_N$ indicate the labour productivity of the traded and non-traded sectors.

The above relationship is usually written in difference:

$$\Delta\log P_N - \Delta\log P_T = \Delta\log Prod_T - \Delta\log Prod_N, \qquad (6)$$

where Δ denotes the change compared to the previous period. Logarithmic difference roughly indicates percentage changes; thus, on the left side the non-traded/traded inflation differential is shown, while the right side presents the traded sector's labour productivity growth surplus relative to the non-traded sector. As we can see, in theory, the B-S effect means that the inflation differential is the same as the productivity differential between the two sectors that causes it. Consequently, the total excess inflation attributable to the B-S effect is expression (5) shown above.

Below we estimate the B-S effect on the data of EU Member States. Our baseline is the following equation:

$$\Delta\log P_N - \Delta\log P_T = \alpha + \beta\left(\Delta\log Prod_T - \Delta\log Prod_N\right) + \varepsilon, \qquad (7)$$

which is an estimable version of equation (6). We do not take the theoretical assumption that the productivity differential is fully manifested as inflation differential; instead, we allow proportions other than 1. Obviously, the theory would be confirmed if the estimated b coefficient was close to 1.

We need traded and non-traded productivity and inflation for the estimate. We calculated traded productivity for the manufacturing sector, and non-traded productivity for the sectors of trade, transportation, hotels and restaurants, telecommunications, finance, real estate and professional services. By traded inflation we mean the inflation of industrial goods, and non-traded inflation is understood as the inflation of market services. Productivity is calculated from the value added and employment data of the national accounts, while inflation is derived from detailed HICP data. Inflation data are adjusted for changes in the VAT rate. For the purposes of the estimate, we used average productivity growth and inflation pertaining to the period 2001–2013.[9]

We found that the correlation between the productivity growth differential and the inflation differential is weak; the estimated coefficient is 0.3 and marginally significant in statistical terms (Table 3 and Chart 4). Once we introduce the restriction that the correlation may not include a constant term (i.e. a=0), the estimated b coefficient is close to 1; however, the explanatory power of the regression will be even weaker than earlier. In line with the usual findings of the literature it appears, therefore, that the B-S effect is not supported by strong empirical evidence. At the same time, we are unable to offer any convincing, alternative theories to explain the strong correlation between economic development and relative price levels. Thus, it could be due to the already mentioned data problems that we failed to find direct, strong evidence for the B-S effect.

[9] Comparable consumer price index data in the traded/non-traded composition used for the estimate are only available from 2001 for all EU Member States.

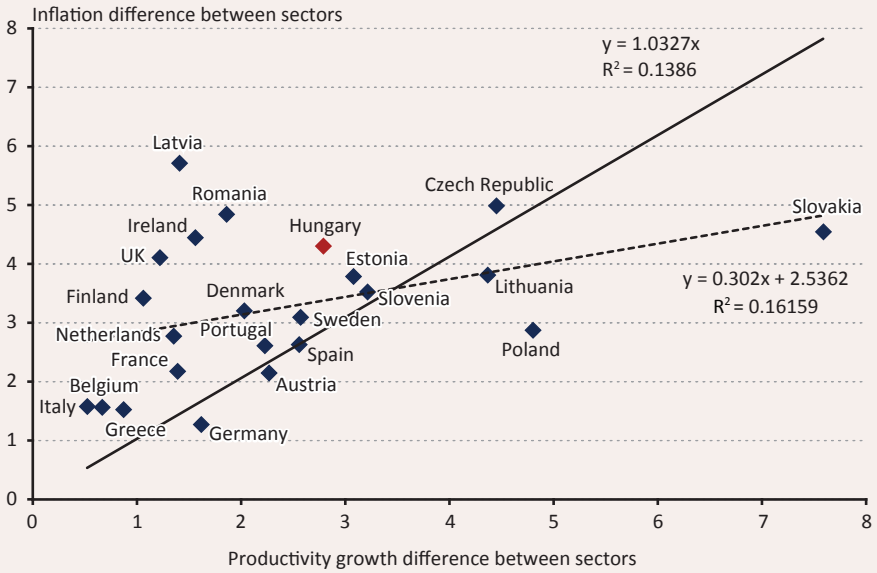
Table 3
Estimates of the B-S effect with and without a constant term

dependent variable: inflation difference	R squared: 0.16	
	Coefficient	Std.error
productivity growth difference	0.302*	0.15
constant	2.536	0.434
dependent variable: inflation difference	**R squared: 0.14**	
	Coefficient	**Std.error**
productivity growth difference	1.033***	0.131

*Note: * indicates coefficients significant at the 10 per cent level, while *** indicates coefficients significant at the 1 per cent level.*

In the following, consistent with the literature, our calculations are based on the "accounting" method; i.e. we calculate the B-S effect for Hungary and CEE countries on the basis of the theoretical relationship.

Chart 4
Non-traded/traded inflation differential as a function of traded/non-traded productivity differential
(2001–2013, annual growth differential in percentages)



Source: Eurostat, own calculation
Note: Excluding Luxembourg and Cyprus

4.2 DECOMPOSITION OF PRICE LEVEL CONVERGENCE

As pointed out before, in calculating the B-S effect our baseline is formula (5). In quantifying the weight of the non-traded sectors, we take account of two scenarios: we recognise the weight of market services only, or we also add the weight of regulated prices. We performed the calculation for 1999–2013 and for 1999–2008, i.e. the period leading up to the crisis (Chart 5). Apparently, the contribution of the B-S effect to real appreciation was only marginal in CEE countries, except in Slovakia and, in respect of the period including the crisis, in Poland. The significance of the B-S effect was minimal in Hungary in both sample periods. It should also be noted that without the inclusion of regulated prices, the role of the B-S effect is practically negligible in all countries.

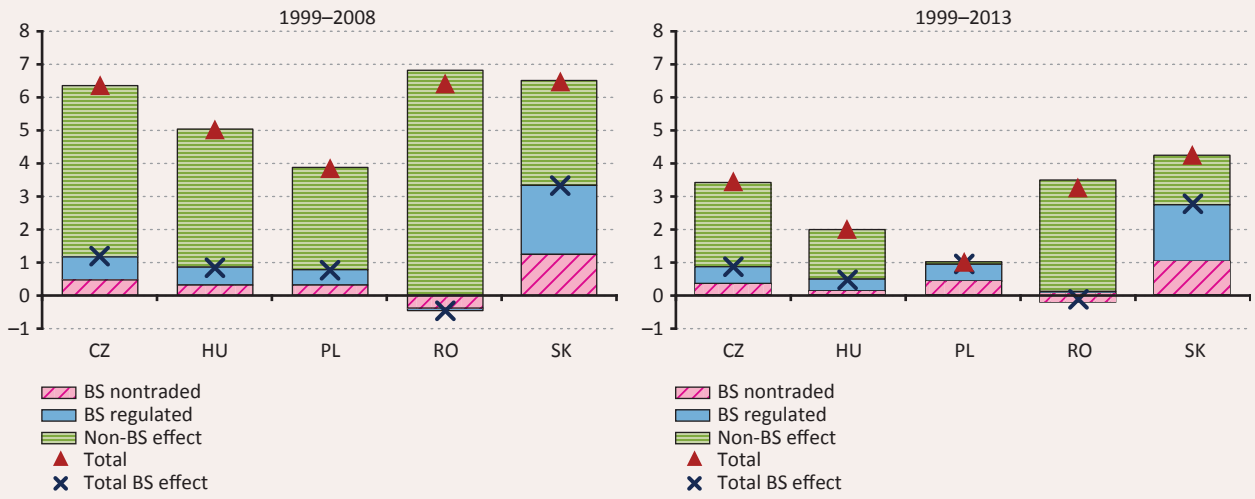
We also performed another decomposition: we can also show the effect of changes in development levels based on the estimates presented in Chapter 3. Our baseline is the estimate which shows that the relative price level increases completely in line with the relative level of development. We found (Chart 6) that, despite having failed to identify sufficient empirical evidence in support of the B-S effect, economic convergence plays

a significant role in price level convergence overall. This is especially true for the average calculated for the period including the crisis; as regards the pre-crisis period, the unexplained part of the price level convergence is higher. This may suggest that the real appreciation materialising in the CEE region (except for Romania) in the pre-crisis period exceeded the equilibrium level.

Based on these findings, the link between economic development and price levels – even though it contributed significantly to the price convergence of regional countries – is only weakly explained in empirical terms by the B-S effect, which relies on the convergence of non-traded prices.

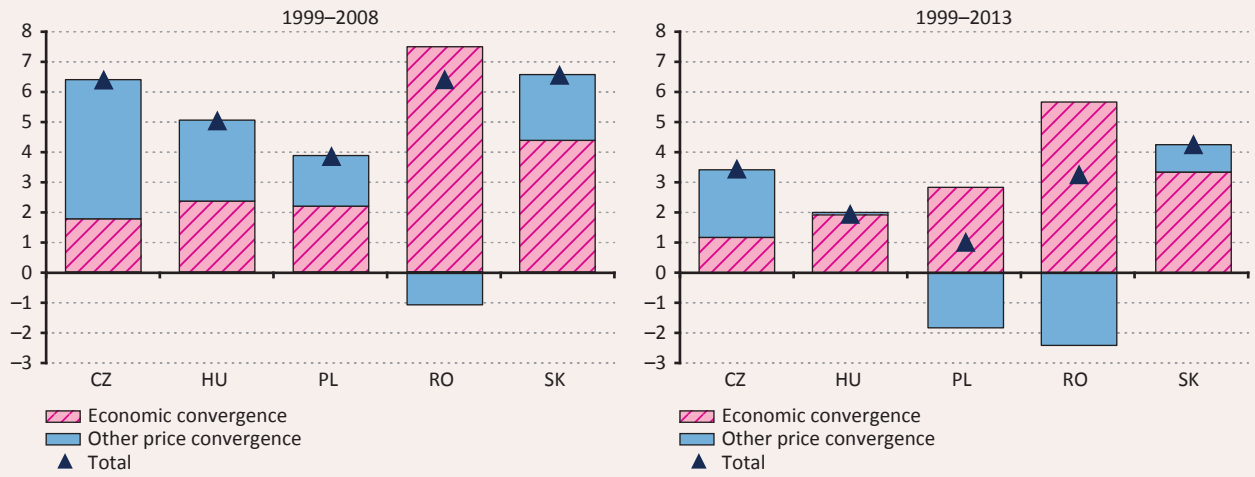
At the same time, as we have indicated, the classification used in the analysis described above (in which we identify non-traded prices with the prices of services) is not self-evident; therefore, we also examine price developments in disaggregated groups of the consumer basket relative to developed EU countries.

Chart 5
Contribution of the Balassa-Samuelson effect to price level convergence
(1999–2008 and 1999–2013, annual percentage changes relative to the EU15)



Source: Eurostat, own calculation

Chart 6
Contribution of economic convergence to price level convergence
(1999–2008 and 1999–2013, annual percentage changes relative to the EU15)



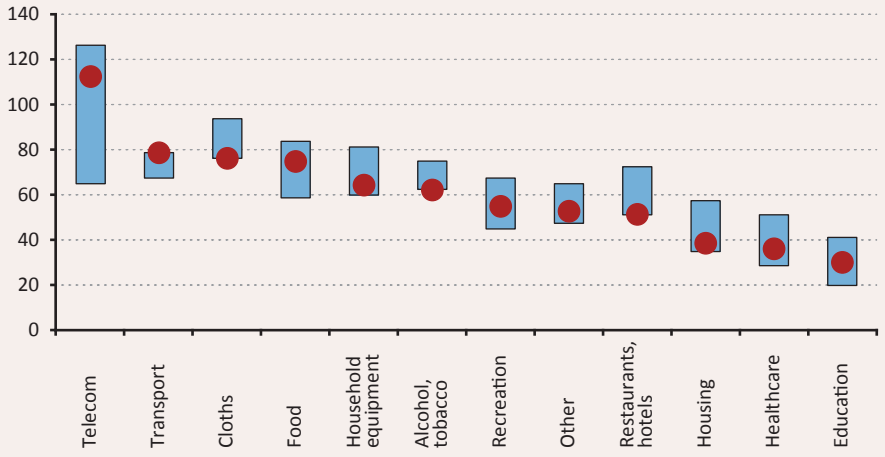
Source: Eurostat, own calculation

5 Price convergence of certain product groups of the consumer basket

5.1 RELATIVE PRICE LEVEL OF THE 12 MAIN GROUPS OF THE CONSUMER BASKET

This and the next sub-chapter analyses the price convergence of the 12 main groups of the consumer basket according to the COICOP classification. Before analysing the link between prices and level of development, we examine the relative price level of each product group in Hungary compared to the EU15 (Chart 7). The chart shows maximum and minimum CEE values as well. Our first observation is that Hungarian prices for most product groups are among those considered relatively cheap in the region. We found in general that the price levels of mostly traded products are closer to those prevailing in developed countries compared to the price levels of non-traded products. This indicates that the Balassa-Samuelson effect might be at work at some level as, according to the theory, development lags are reflected precisely in cheaper non-traded prices. It should be stressed that these figures also include the imputed prices of non-purchased consumption, the role of which will be addressed in Box 1. We should note that, in addition to transportation services, the "transport" group also includes the price indices of fuels and motor vehicles (and thus contains a significant traded component), while communications also cover communication devices and equipment in addition to the service itself. That notwithstanding, the fact that communications are more expensive than the EU15 average can be mainly attributed to market structure and the regulatory environment. This may also be supported by the fact that, in this product group, the price levels of CEE countries are far more widely dispersed than for the rest of the products.

Chart 7
Price level of the 12 main groups of the consumer basket in Hungary and in the CEE region, 2013
(red circle: Hungary, column: regional maximum and minimum, EU15=100)



Source: Eurostat

Box 1

The role of non-purchased consumption in relative price developments

Remarkably, while at the aggregate level the Hungarian price level stood at 51 per cent of the EU15 in 2013, most of the 12 product groups mentioned above had higher relative price levels, while health and education had conspicuously low relative price levels. What might explain this phenomenon?

It can be explained by the fact that above we decomposed the price level of the so-called final individual consumption, given that this was the only item for which statistical data were available at the disaggregate level. In addition to purchased consumption, this includes the imputed rental fees of owner-occupied houses on the one hand, and social transfers in kind provided by the government on the other hand.

Imputed rental fees reflect the housing service provided by owner-occupied houses. The consumer basket does not include house purchases, as houses are not "consumed" upon purchase; instead, the service provided by such houses is consumed continuously for years. In case of an extensive rental market, imputed rental fees are estimated by means of actual rental fees, otherwise they are estimated by means of various other methods, such as the purchase price of flats or the prices of goods and services required for the maintenance of the homes.

Social transfers in kind include education and health services provided by the government to households; in statistics, their prices are generally computed from the costs incurred during their production, mainly from the relevant wages.

The low relative price level of health and education, therefore, primarily reflects the wage levels, which significantly fall short of those seen in Western Europe; in addition, the relative wage level prevailing in these sectors is lower than average.[10] In the remaining product groups, prices are fundamentally determined by wage costs, productivity and exposure to international competition. The generally low wage level – which can be mainly attributed to lower average productivity – is less reflected in the prices of product groups with more pronounced participation in international trade. In their case, domestic prices cannot deviate substantially from international prices. Most product groups participate in international trade at least to some degree, which reduces the gap between prices (despite the fact that, for example, while hotels, cafes and restaurants are services, tourism affects the international equalisation of prices). This effect, by definition, cannot materialise in the education and health product groups, which may also explain why these groups lag farthest behind the EU15 average in terms of price level.[11]

The inclusion of imputed rental fees may also reduce the aggregated relative price level, both in the region and in Hungary. This is because estimates tend to use non-traded prices; thus the effect of the lower domestic wage level is reflected more strongly in prices.

Although comparative price statistics are available for consumption excluding social transfers in kind, they cannot be decomposed further. This is the consumption expenditure of households which, however, still includes imputed rental fees. Although the latter is non-purchased consumption, once it is considered, the relative price level may reflect the costs of obtaining owner-occupied houses, which differ from country to country. It should also be noted that until 2012 the Hungarian consumer price statistics include the imputed rental fees of owner-occupied houses as well.

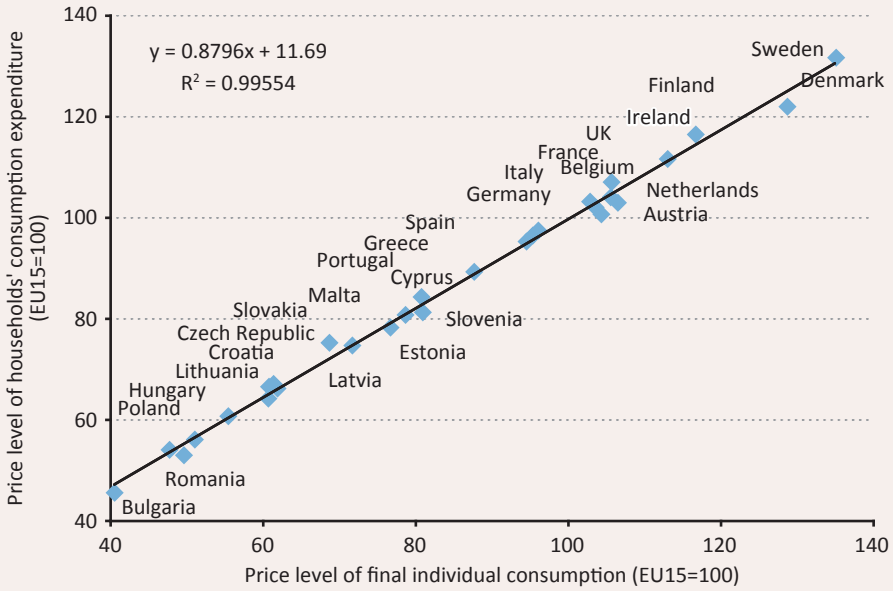
For the reasons discussed above, it should not be surprising that the price level of households' consumption expenditure relative to the EU15 is slightly higher than the relative price level containing social transfers in kind as well. In Hungary, for instance, this relative price level stood at 56 per cent of the EU15 in 2013, 5 percentage points higher than the relative price level containing the imputed value of education and health services as well.

[10] According to Eurostat data, in 2013 Hungarian hourly labour costs were around one fourth of the EU average in the sectors of education, health, recreation and culture and roughly one third of the EU average in the private sector.

[11] It appears likely that due to their strongly non-traded nature, these product groups would have the lowest relative price level even priced on the market.

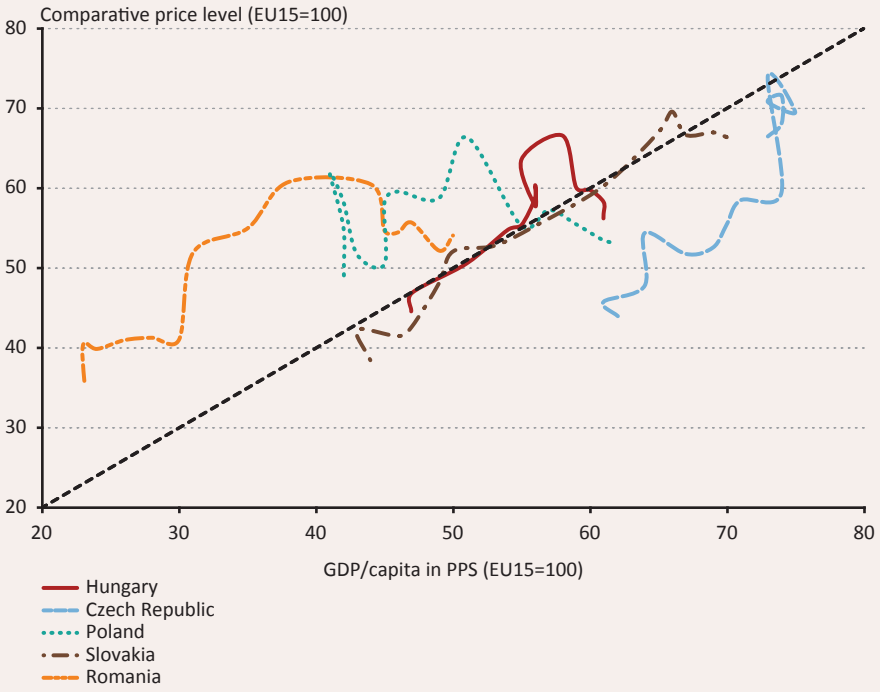
The previously mentioned estimates for the relationship between relative price levels and economic development may also be performed by means of the relative price level based on households' consumption expenditure excluding social transfers in kind. Without discussing the results in detail, we present the relationship of the price levels calculated by using the two methods, the cross-plot for EU Member States (Chart 8) and the price convergence of CEE countries as a function of economic development in 1999–2013 (Chart 9). Evidently, there is an extremely close linear

Chart 8
Price level of households' consumption expenditure as a function of the price level of final individual consumption, 2013



Source: Eurostat, own calculation

Chart 9
Price convergence of CEE countries as a function of economic development, 1999–2013
(EU15=100, price level of households' consumption expenditure)



Source: Eurostat

relationship between the price levels reflecting the two different calculation methods; the omission of social transfers in kind only has a slight impact on relative price levels. Similarly, estimates performed on cross-sectional and panel data also confirm our previous results, i.e. that the coefficient expressing the relationship between the relative price level and economic development is in the range of 0.5 to 1. Even the dynamics of price convergence show close similarities in CEE countries; in essence, dynamics only shifted upwards compared to Chart 2 above.

Above, we decomposed the relative price of final individual consumption based on the available statistics for the 12 main groups. In our analysis, education and health not only include services purchased (e.g. language course, pharmaceutical products), but also services provided free of charge by the state. The price convergence of these groups, therefore, is in part hinges upon the wage convergence of those employed in education and healthcare. Finally, imputed rental fees are included among housing costs; their convergence, however, is determined by the actual price convergence, as observed prices are used to estimate their values in most countries.

On the whole, we found that taking into account social transfers in kind does not significantly change our view on price convergence. However, in order to interpret the data of the detailed decomposition, it is absolutely necessary to be aware of the methods used for the calculation of the relative price level of education and healthcare.

As in Chapter 3, we seek to gain an insight into the relationship between the price level and economic development, but in the next section we examine it at the disaggregate level for the 12 main groups of consumer prices.

5.2 ESTIMATION OF THE RELATIONSHIP BETWEEN PRICE LEVEL AND ECONOMIC DEVELOPMENT FOR THE 12 MAIN GROUPS OF CONSUMER PRICES

In the following, we estimate similar equations to those presented in sub-chapter 3.1, performing a panel regression analysis using the time and cross-sectional dimensions of the data available. The only difference is that in this case, the data are more disaggregated: in contrast to the previous analysis where we examined the convergence of the aggregate price level, we now seek to determine the extent to which the level of development of the countries concerned influence the comparable prices of individual product groups. Our approach is similar to that applied by Pellényi (2014), with the exception that Pellényi's equations included further controls which, in our judgment, are largely explained by the country fixed effects. For instance, we assume that the openness of the countries did not change perceivably during the sample period. Another difference in comparison to the paper mentioned is the fact that our estimates based on a sample also including the crisis period.

The equations to be estimated are as follows:

$$\log\left(price_{ijt}\right)=\beta_j \log\left(gdp_{it}\right)+\nu_j+\delta_t+u_{ijt} \tag{8}$$

$$\log\left(price_{ijt}\right)=\beta_j \log\left(gdp_{it}\right)+\nu_j+\delta_t+\lambda_i+u_{ijt} \tag{9}$$

$$\log\left(price_{ijt}\right)=\beta_j \log\left(gdp_{it}\right)+\nu_j+\kappa_{jt}+\lambda_i+u_{ijt} \tag{10}$$

$$\log\left(price_{ijt}\right)=\beta_j \log\left(gdp_{it}\right)+\nu_j+\kappa_{jt}+\gamma_{ij}+u_{ijt} \tag{11}$$

where i, j and t denotes the country, product and time dimensions, ν, δ, λ are the product, year and country fixed effects, while κ, γ are product-year and country-product fixed effects. β may differ by product, while *gdp* changes only in the country-year dimension. The difference between individual equations lies in the fixed effects we control for. The last equation can be considered as if we separately estimated a model with a year fixed effect and a country fixed effect for each individual product. Table 4 shows the estimates of β in individual specifications. Their weighted average is practically identical to those received in the aggregate estimates (it is close to 0.5 and 1).

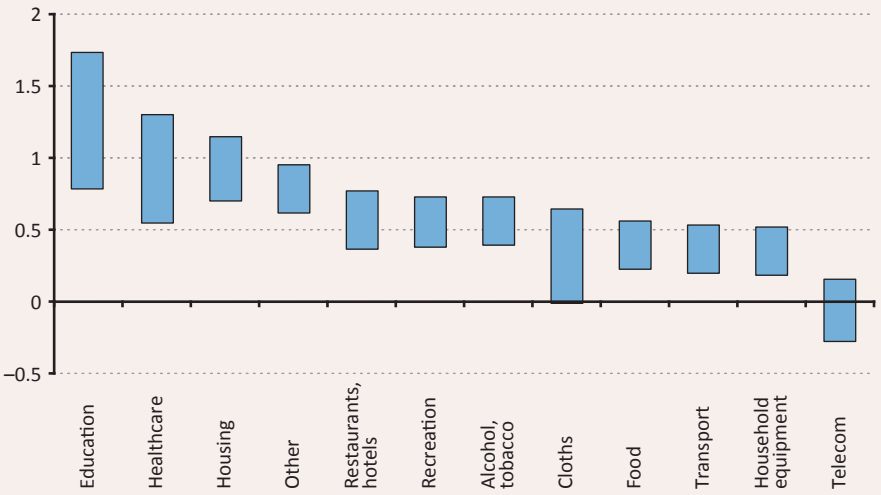
Table 4
Sensitivity of prices to level of development among the main groups of the consumer basket
(estimated β coefficients)

	(8)	(9)	(10)	(11)
Food	0.567	0.236	0.232	0.408
Alcohol, tobacco	0.728	0.398	0.399	0.563
Cloths	0.330	–0.001§	–0.014§	0.642
Housing	1.150	0.819	0.823	0.703
Household equipment	0.522	0.192	0.190	0.309
Healthcare	1.299	0.969	0.971	0.554
Transport	0.538	0.208	0.206	0.391
Telecom	0.156	–0.174	–0.167	–0.273
Recreation	0.736	0.406	0.408	0.379
Education	1.733	1.403	1.412	0.790
Restaurants, hotels	0.776	0.446	0.446	0.368
Other	0.951	0.621	0.615	0.686
Weighted average	**0.887**	**0.557**	**0.557**	**0.523**

Note: each coefficient is significant at the level of 1 per cent, except for cases marked with §.

Summing up the contents of Table 4, for each main group Chart 10 shows the percentage by which a 1 per cent change in development raises the price level of the group concerned. We presented the range determined by the minimum and maximum values of the estimates received on the basis of the different methodologies.

Chart 10
Sensitivity of prices to level of development among the main groups of the consumer basket
*(minimum and maximum values of the estimated coefficients)**



Source: Eurostat, own calculation
** The values of the coefficients show the percentage by which a 1 per cent change in development raises the relative price level of the group concerned.*

It can be seen that the sensitivity of prices to development level varies significantly for each product group. This may be because the degree to which individual product groups can be considered non-traded is different and, based on the logic of the Balassa-Samuelson effect, the prices of mostly non-traded products tend to be more sensitive to level of development. Indeed, as we examine the estimation results, we find that services are mainly located on the left side of the chart with higher estimated coefficients, while the right side shows

mainly industrial goods. Accordingly, it is the price level of education, health and housing that grows more closely with the improvement in development, and these product groups can be rather clearly classified as being non-traded, although in many countries they are partly subject to administrative regulations.[12] By contrast, the smallest estimated coefficients were received for the groups of clothing, household equipment and food. Except for foodstuffs, these products are clearly classified as traded, although even foods are partly considered as traded goods. As we have mentioned above, the transport group also includes fuels and motor vehicles, with the latter representing a large weight among traded goods. As regards fuels, their price convergence is mainly driven by tax content rather than level of development, as will be shown in a sub-section below. Once again, the group of communications is somewhat set apart from the rest of the products, even though we are aware that it also includes the traded category of communication devices. In examining relative price developments in CEE countries in the sector of communications (see Annex), we find that some CEE countries have already exceeded the average of the EU15 after a period of continuous appreciation, while prices have declined in Poland and Romania since the early 2000s and are still far below the level of the EU15. Divergence in these countries explains, on the one hand, why the estimated coefficient is close to zero and, on the other hand, suggests that differences in market structure and regulatory environment have a fundamental impact on price developments.

Disaggregated analyses underpin, therefore, that – albeit not entirely in its theoretical form – the B-S effect may contribute to price convergence if we acknowledge that some products cannot be clearly classified into either the traded or the non-traded category.

5.3 REGULATED PRICES

In this and subsequent sub-chapters we study the convergence of prices which are subject to significant state influence, i.e. regulated prices and the prices of products subject to excise duty.

The analysis of regulated prices is particularly warranted in view of the large weight of this product group, which accounts for around 20 per cent of the consumer basket in Hungary. Its weight is generally higher in CEE countries than in more developed economies. It is a special product range as, by definition, the prices of the products concerned do not develop in line with supply and demand conditions but are determined by regulatory decisions. This is usually justified by the fact that they can be seen as “natural monopolies”: due to their nature, competition is either impossible or restricted in their market. In establishing the framework of price controls, social policy and cost considerations may also play a role. Among the associated costs, regulatory authorities may consider the prices of the commodities used for the production of the given regulated service or article, trends in wages and cost of capital as well. Consequently, based on the logic of the Balassa-Samuelson effect, a rise in wages may well be reflected in prices over time, provided that the growth rate of productivity lags behind. We presented this latter channel when we considered the weight of regulated prices in the weight of non-traded products in one of the calculations estimating the B-S effect.

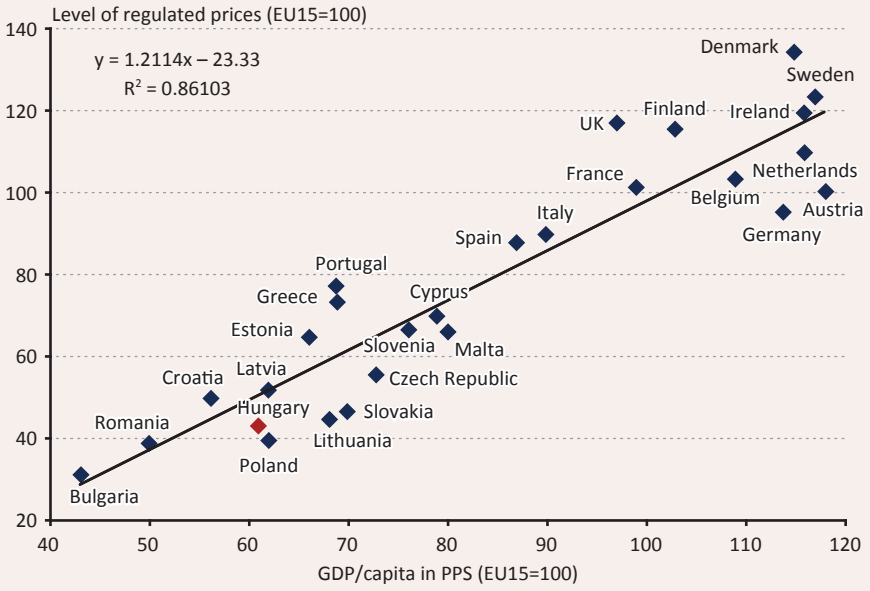
The convergence of regulated prices in the CEE region has been influenced by factors independent of economic development as well. In the early stage of convergence, subdued prices had to converge to levels more in line with costs. In Hungary, the gradual reduction of the price subsidisation of regulated energy prices played a role in this as late as the 2000s. In the wake of the political transition, prices had to be adjusted to the rising costs, as the socialist regimes of the region previously had access to certain commodities at more favourable prices than the prevailing global prices. Subsequently, the costs associated with substantial developments in the utilities sector may also have contributed to the increase in the price level.[13] Moreover, the regulatory environment may also have contributed to price increases. For instance, according to Égert (2011), the cost-based regulation applied in the new EU Member States did not properly encourage cost-efficiency.

In summary, besides cost developments, the convergence of regulated prices was also affected by the regulatory environment.

[12] We should also consider that they also include non-purchased consumption (Box 1).
[13] Some of the projects were financed by EU funds, which required the consideration of the return on investment in pricing.

In the following, we examine the relationship between economic development and the comparative price level of regulated prices relative to the EU.[14] We find a similarly strong correlation between regulated prices and level of development (Chart 11) as seen in the case of the total consumer basket; in fact, the coefficient in this case is significantly higher than 1 (in 2013). Relying on data covering several years, the coefficient estimated using different methods fell within the range of 0.6 and 1.4.

Chart 11
Level of regulated prices in function of economic development, 2013
(as percentage of the EU15)

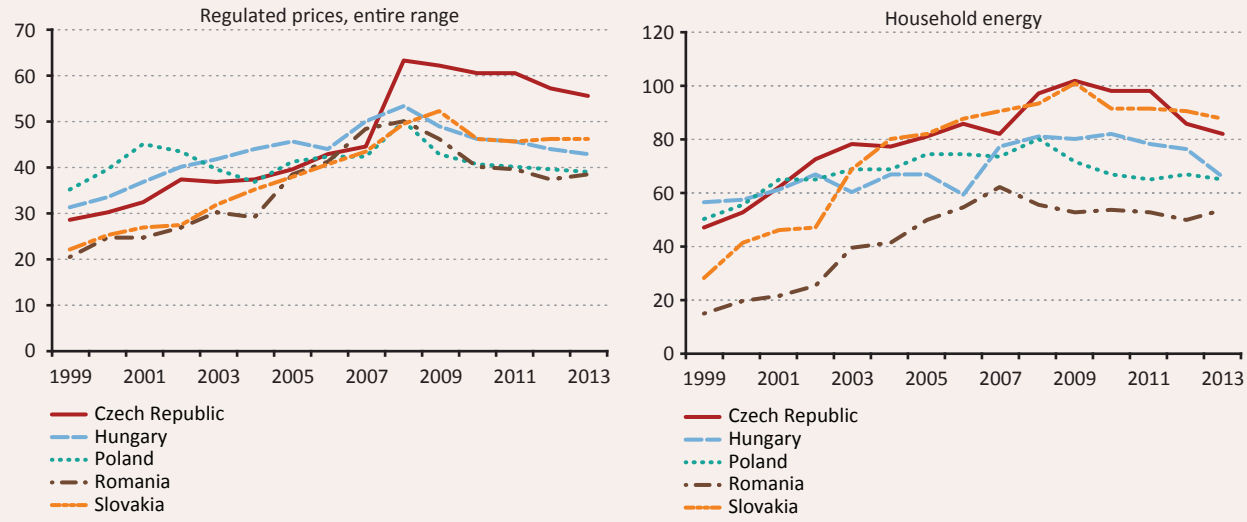


Source: Eurostat, own calculation
Note: EU28 excluding Luxembourg

We examined regulated price developments over time for CEE countries, focusing solely on developments in household energy prices (Chart 12). Both charts point to a significant shortfall at the end of the 1990s compared to the price level of the EU15, followed by significant convergence up until the crisis. In 2008, most CEE countries stood at 50 per cent of the EU15 in respect of the entire range of regulated prices (with the Czech Republic recording a value above 60 per cent) compared to the values ranging between 20 and 35 per cent in 1999. Household energy prices show significant dispersion, rising to a range between 60 and 100 per cent by 2008 compared to 20 and 60 per cent in 1999. The increase in regulated prices came to a halt after 2008, partly because of nominal depreciation, and partly due to the price reductions expressed in domestic currency in several countries, with Hungary recording the highest cuts in household energy prices.

[14] From the available group decompositions of international data, we approximated comparable regulated prices by consolidating housing, transportation and healthcare costs. As a result, we covered a large portion of regulated prices, including household energy prices, the prices of utility services, public transportation and medication prices. It is important to note, however, that we are unable to offer an exact calculation for the entire range of actually regulated prices. One of the most important reasons for this is the fact that some of the prices considered in accordance with the above are not regulated; for instance, healthcare also includes social transfers in kind, while imputed rental fees are a part of housing.

Chart 12
Changes in the level of regulated prices across the region
(entire product range vs. household energy, as percentage of the EU15)



Source: Eurostat, own calculation

Box 2

Regulated prices in Hungary in the period 1999–2013

In Hungary, the price level of regulated prices relative to the EU15 rose by more than 50 per cent between 1999 and 2008 (Chart 12, left panel). Between 2003 and 2007 Hungary consistently recorded the highest relative price level in the region, with a nearly 10-percentage point increase in value during the period, while the country's relative development level stagnated. The decline in relative price levels was set off by the onset of the crisis. As a combined effect of nominal exchange rate depreciation and the reduction of forint-denominated regulated prices, by 2013 the regulated price level edged up to the value recorded 10 years before.

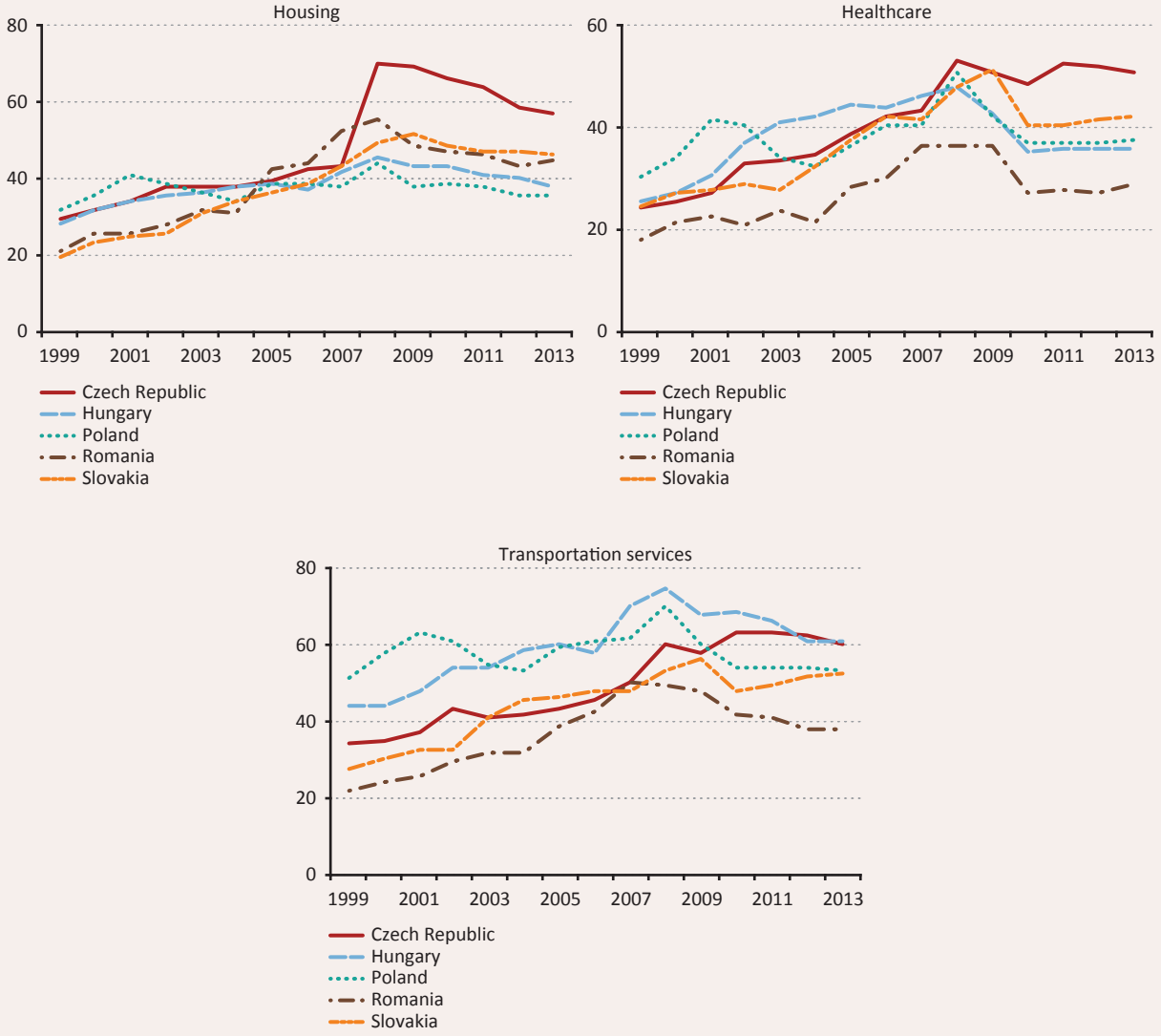
In the foregoing, we approximated regulated prices by using the average of prices of housing, healthcare, and transportation services weighted with consumption (Chart 13). Healthcare prices may reflect, in part, trends in regulated pharmaceutical prices, while transportation services indicate price developments in regulated local and long-distance transportation.[15] We found that the relatively high level of Hungarian regulated prices in the period 2003–2007 can be largely attributed to healthcare prices and, to a lesser degree, to the prices of transportation services. After 2008, the relative level of healthcare prices embarked on a sharp decline before it started to stagnate, partly as a result of the blind bidding scheme introduced in pharmaceutical pricing in 2011. Consequently, by 2013 the relative price for the product group was counted among the lowest prices in the region. By contrast, since 2008 the relative price of transportation services has been the highest, or one of the highest prices in the region.

As regards housing costs, before 2013 the relative price of household energy (electricity, gas, district heating) stood roughly in the middle by regional standards (Chart 12, right panel). 2007 saw a steep rise, partly as a result of the reduction of household energy subsidies. A more marked reduction in relative prices took place in 2013, in the context of the government's administered energy price cuts. As a result, compared to the EU15, the relative price level dropped to levels preceding the price increase in 2007.

[15] Once again, it should be noted that healthcare services include social transfers in kind.

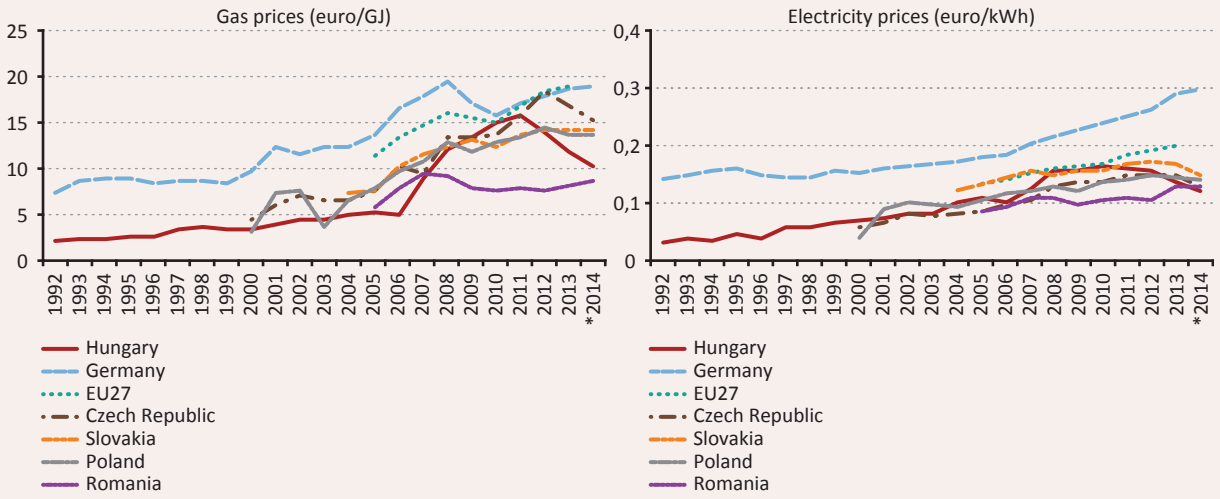
Changes in gas and electricity prices within household energy prices can be also examined separately (Chart 14). Expressed in euro, gas and electricity prices were significantly lower than those in Germany at the beginning of the 1990s. German prices were 3 to 4-times higher compared to Hungarian prices at the time. As regards gas prices, the increase in 2007 in Hungary narrowed the gap somewhat, with prices rising simultaneously to the level prevailing in the CEE region. By 2010, Hungarian prices reached the EU average, primarily because of the fact that the effect of the oil price reduction in 2009 was reflected in international prices without affecting prices in Hungary. By 2014 H1, the price cuts after 2010 rendered Hungarian household gas prices some of the cheapest in Europe expressed in euro. Germany records one of the highest price levels in the EU in respect of electricity; therefore, wherever the availability of data allows, it is more reasonable to make comparisons to the EU average instead. Electricity prices had moved in tandem with regional prices up until 2007 before they edged up to the level of the EU average, representing one of the highest prices recorded in the region. Following the price reductions, by 2014 Hungarian electricity prices also dropped to one of the lowest levels registered in Europe.

Chart 13
Developments in relative price levels across the region
(EU15=100)



Source: Eurostat

Chart 14
Household energy prices
(medium consumption category, annual averages)



Source: Eurostat
** Values for 2014 pertain to H1*

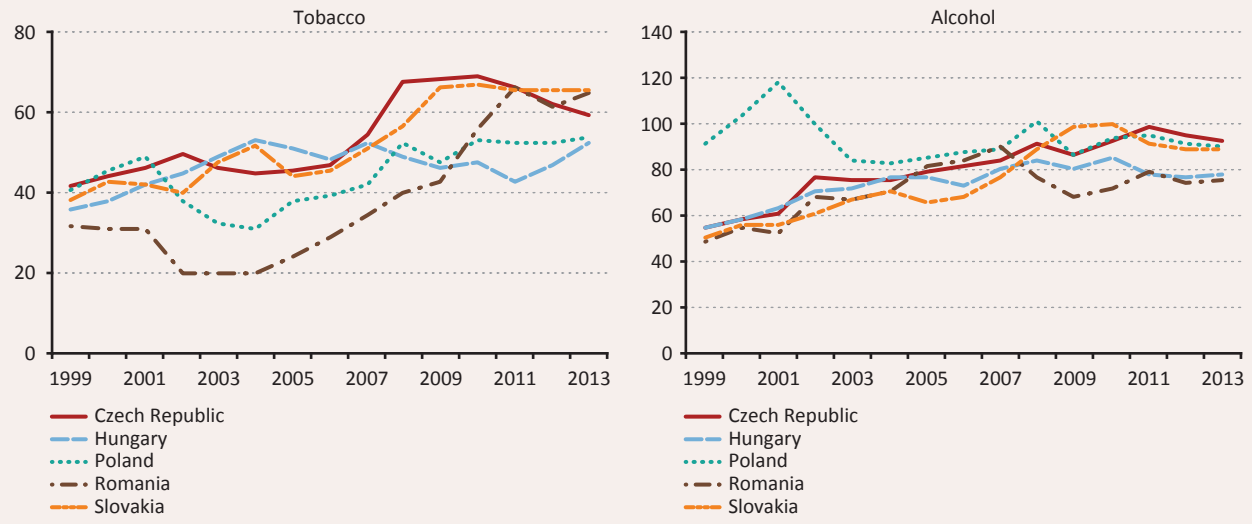
As regards the current level of regulated prices and in consideration of the above correlation between economic development and price levels, in parallel with further economic convergence, regulated prices may also approach the average level of the EU15. Based on the estimates described above (coefficients ranging between 0.6 and 1.4 for the relationship between regulated price levels and level of development), we can produce a projection in respect of the convergence of regulated prices. We assume real convergence of 1 per cent annually compared to the euro area. Given that the inflation of euro-area regulated prices has been 3 per cent on average since 2002, historical trends warrant regulated price inflation of 3.6–4.4 per cent, assuming an unchanged nominal exchange rate. This also means that, based on the 20 per cent weight of regulated prices, the convergence of regulated prices may raise overall inflation by 0.1–0.3 percentage points in itself, compared to the case of unchanged relative price levels. It should be stressed that the materialisation of the above effect hinges on regulatory decisions.

5.4 PRODUCTS SUBJECT TO EXCISE DUTY

In this section, we examine the price convergence of products subject to excise duty, such as tobacco and alcohol. Hungary's lag with respect to EU regulations on excise duty is rather small, and the country was granted a derogation until 2018 to reach the expected level. This, however, can only entail price increases of a few percentage points. In fact, there has been no price convergence regarding tobacco and alcohol since the mid-2000s; in 2013 Hungary was among the cheapest countries in respect of both products. The bulk of tobacco prices reflects taxes in any case; further price convergence could only be generated by an increase in tax items and in the lack of such a step, any increase in relative prices appears improbable. A smaller portion of alcohol prices represents taxes, and prices are already close to the level of the EU15 (approximately 80 per cent). There is not much room for further price convergence in this area. The data sources for gasoline and diesel fuels are different from those used before (we relied on World Bank data), and in consideration of the data available, the benchmark was Germany at this time. We have nearly reached the level of Germany in regard to both gasoline and diesel prices; however, practically the same can be said of the entire region. Further price convergence, therefore, cannot be expected in the area of fuels.

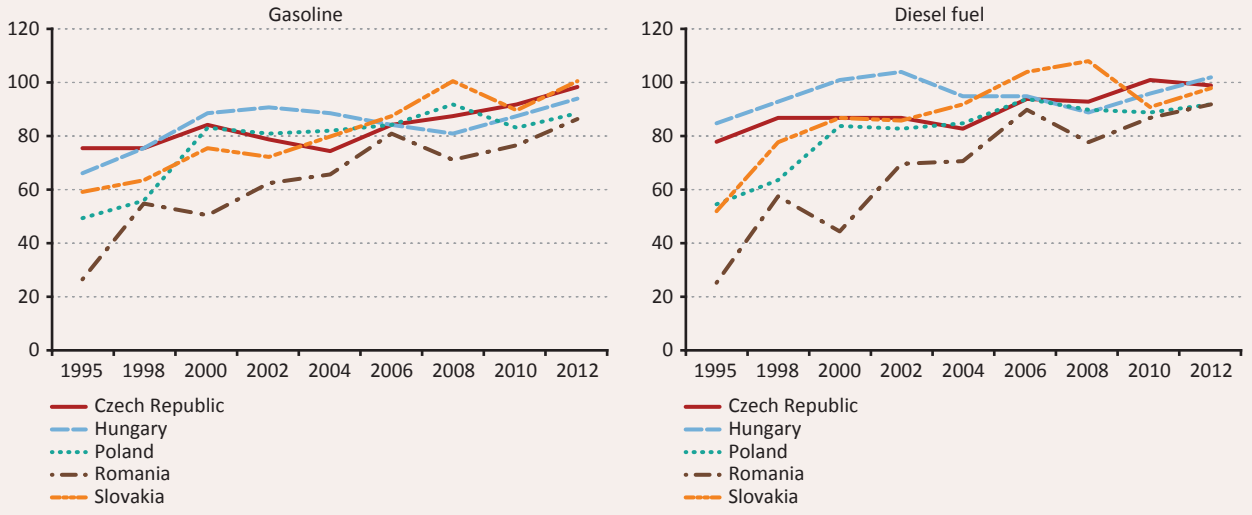
In summary, relative price levels may increase in line with real convergence in the case of regulated prices, but this fact has already been considered in previous B-S effect calculations. It appears that further convergence is unlikely in the case of products subject to excise duty; this could only be warranted by a sharp increase in tax items, but Hungary has no international obligation to raise prices further.

Chart 15
Developments in the price levels of tobacco and alcohol in the CEE region
(EU15=100)



Source: Eurostat

Chart 16
Developments in the price levels of gasoline and diesel fuel
(as percentage of Germany)



Source: World Bank

6 Conclusions

There is a strong correlation between economic development and relative price levels, which is traditionally explained by the Balassa-Samuelson effect. However, at the aggregate level, the Balassa-Samuelson effect failed to provide sufficient explanation to the real appreciation observed in the countries and time periods under review, while indirect evidence at the disaggregate level points to the functioning of the impact mechanism. In Hungary, price convergence affected nearly all product groups in the past, with the highest increases registered among services which are less traded internationally. Based on the above, it is probable, that the estimation of the Balassa-Samuelson effect is significantly biased due to the difficulty of classifying products into the traded and non-traded categories.

The crisis set back price convergence across the region and brought about stagnation in the years to follow. In addition to decelerating real convergence, this may also have resulted from depreciating nominal exchange rates.

Based on projections in respect of Hungarian and euro-area potential growth, Hungary's economic growth surplus may amount to around 1 per cent per year over the long term (see MNB [2014]) which, according to our estimates, may entail price convergence of 0.5–1 per cent annually. This calculation is subject to uncertainty in several respects. For instance, price convergence may prove to be slower if the increase in regulated prices remains below the historical average for a sustained period relative to the other products in the consumer basket. If the relative level of regulated prices does not increase in future, in our estimates, the increase in relative price levels will be reduced by 0.1–0.3 percentage points. Our assumption on Hungary's growth surplus – 1 per cent – involves further uncertainty. In case of faster real convergence, the rate of price convergence may also accelerate.

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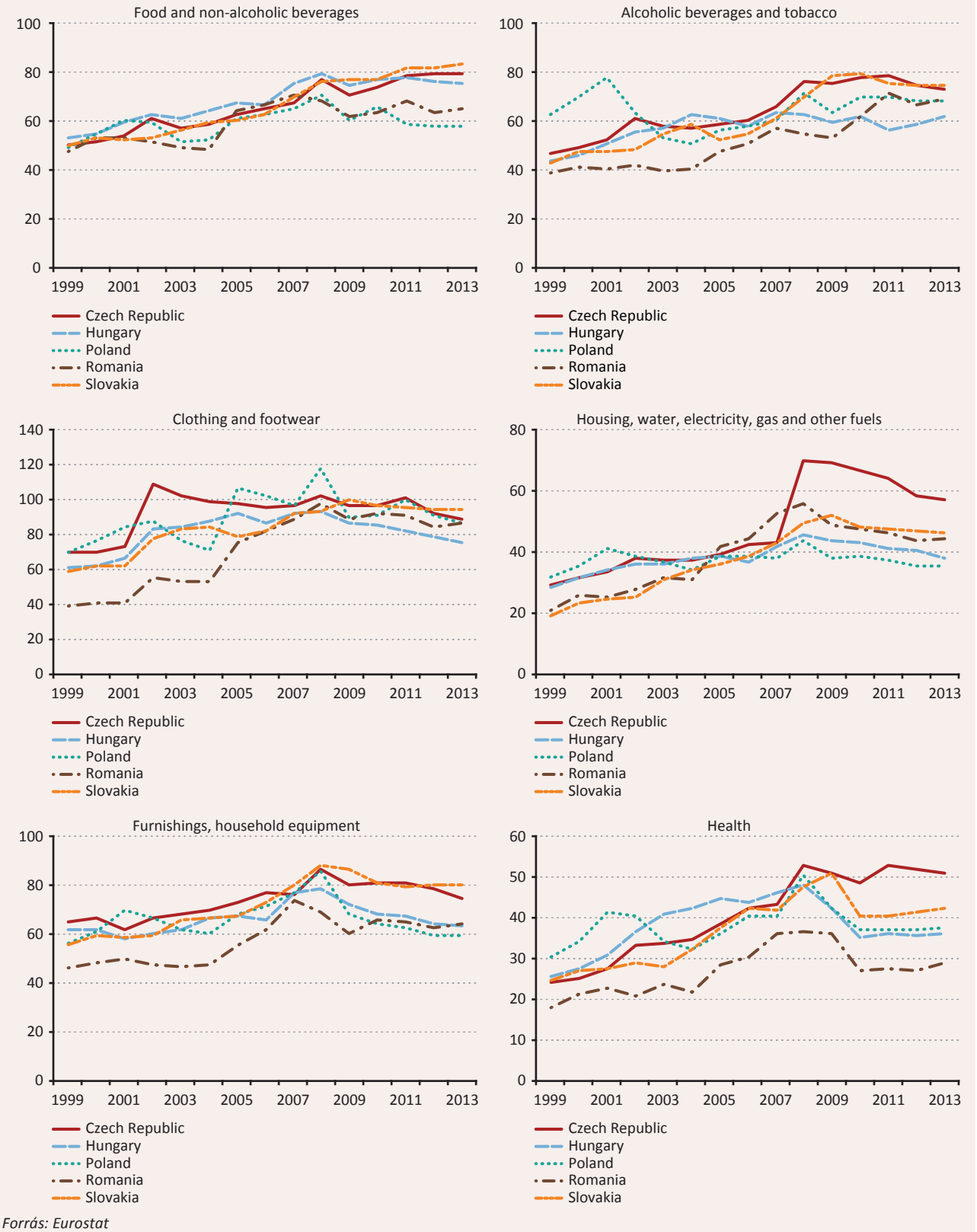
Annex: Price level convergence for the 12 main groups in the region – EU15=100



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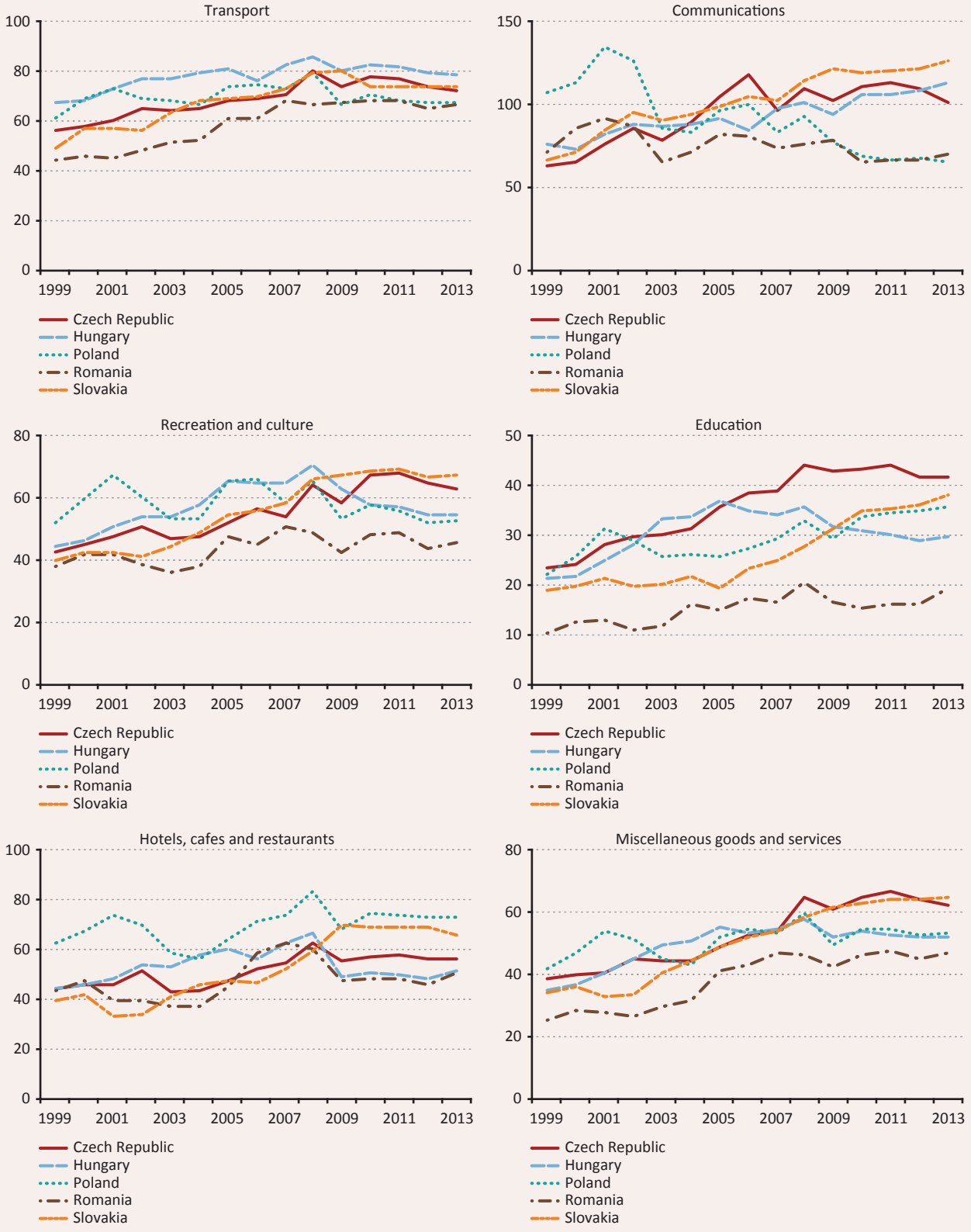

Forrás: Eurostat

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