Structural Inflation and Real Exchange Rate Appreciation in Visegrad-4 Countries: Balassa-Samuelson or Something Else?

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Persisting differences in the levels of economic development within the euro area have revived interest in significant differences between European economies, especially the catching-up economies' higher inflation rates. These differences are growing in importance as the recent pickup in inflation rates worldwide is hitting catching-up economies to a large extent.

Fast growing economies like Spain and Ireland have exhibited above-average inflation rates over the last decade and Slovenia has been also struggling with high inflation rates since adopting the euro in 2007. According to conventional economic convergence theory and the view of many economists (see e.g. Daniel, 2008), this is due to the so-called Balassa-Samuelson effect that stems from productivity growth in non-tradable sectors lagging behind important productivity gains in the tradable sectors.

However, drawing from an example of Visegrad-4 countries, i.e. the Czech Republic, Hungary, Poland, and Slovakia, the relevant literature over the past five years failed to quantify a sizable Balassa-Samuelson effect, with the average effect from 20 recent studies accounting at best for one-third of the actual real exchange rate appreciation of more than 30% from 1995 to 2006.

Thus, against the background of the small empirical Balassa-Samuelson effect, commonly associated with structural convergence, the recent strong real exchange rate appreciation might be interpreted as a cyclical development that poses policy challenges (especially in relation to the euro area entry). The 'Traffic Light Analysis' recently heralded by Danske Bank (2007) associates recent economic developments in the majority of

the new EU member states of central and eastern Europe with the first phase of a boom-bust cycle. This seems to be also suggested by some of the ECB executive board members, who emphasized the challenge of cyclical overheating for the region (Bini Smaghi, 2007).

In this Policy Insight, we first summarize the arguments for the weak Balassa-Samuelson effect and further suggest that the strong real exchange rate appreciation in Visegrad-4 countries is likely not a sign of cyclical overheating but a structural phenomenon of a different kind not predicted by conventional economic convergence theory.

The weak Balassa-Samuelson effect

The Balassa-Samuelson effect arises when productivity growth of the tradable sector exceeds that in the non-tradable sector. In that case, productivity gains in the tradable sector lead to higher real wages in that sector without harming competitiveness provided relative Purchasing Power Parity (PPP) holds for the tradable sector, that is, if the real exchange rate for tradable goods is stable over time. If wages equalize between the tradable and the nontradable sectors, prices in the latter sector will rise, triggering higher overall inflation rates and eventually an overall (CPI-based) real exchange rate appreciation.

Thus, there are three key assumptions that secure a proportionate pass-through from productivity gains in the tradable sector to the relative price of nontradables to that of tradables:

- First, productivity growth in the tradable sector drives real wages in the same sector;
- Second, wage growth in the tradable sector spreads to the rest of the economy;
- Third, productivity growth is zero in the nontrad-

Figure 1 The Balassa-Samuelson effect and inflation rates
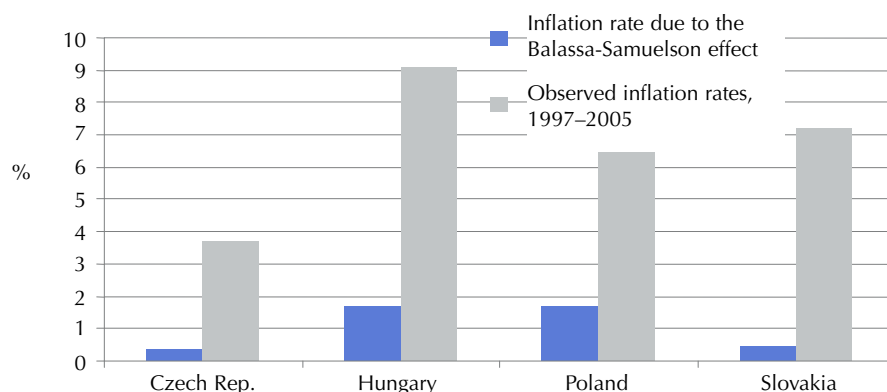
Source: Égert (2007)

Figure 2 FDI inflow (average over Visegrad-4 countries)
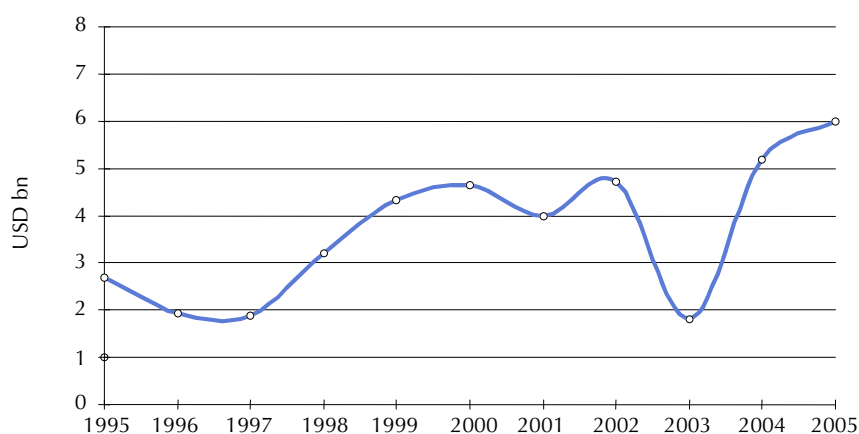
Source: IMF Statistics

able sector so that wage increases in that sector fully translate into higher prices.

The extent to which relative prices feed into overall inflation hinges upon the share of nontradables in the inflation basket. Finally, a high inflation rate due to the Balassa-Samuelson can explain the evolution of the real exchange rate only if PPP holds for tradable goods.

Since an economic convergence is usually connected with significant gains in the productivity in the tradable sector, the relatively simple propositions of the Balassa-Samuelson effect are commonly used by policymakers to explain persistent inflation differentials between catching-up and mature market economies. This also motivates the trend appreciation of the (CPI-based) real exchange rate of the catching-up economies.

However, there are two issues that make this theory of convergence difficult to apply to the countries of central and eastern Europe (CEE) that recently joined the European Union, in particular the Visegrad-4 countries (the Czech Republic, Hungary, Poland and Slovakia). First, there is increasing and robust empirical evidence - surveyed, for instance, in Égert, Halpern and MacDonald (2006) and in Mihaljek (2006) - that the Balassa-Samuelson effect is not the main driving force of the observed high inflation rates and the real exchange rate appreciation in Visegrad-4 countries, the latter ranging between 3-4% annually. Figure 1 shows the average implied annual Balassa-Samuelson effects, which are substantially lower than the inflation rates.

The second puzzle is why the substantial productivity growth in the tradable sectors observed over the last ten years or so did not lead to correspondingly high inflation rates. In fact, high productivity growth in Visegrad-4 countries is the result of the transformation from command economy into a fully functioning market economy starting in the early 1990s. Privatisation, geographical proximity to western Europe, available infrastructure, and pre-World War II traditions of economic cooperation have triggered substantial inflows of foreign direct investment (see Figure 2), which shaped the restructuring processes and dominantly contributed to productivity gains.[1,2]

Here we seek to explain the second puzzle and assume that this could alleviate the first puzzle as well. We start by reviewing whether the three key assumptions of the Balassa-Samuelson effect are validated by the data.

First, there may be a disconnection between productivity growth and real wages in the manufacturing sector. For example, this may be true if large subsectoral dispersion is behind strong productivity growth in the tradable sector. Indeed, high-tech industries recorded enormous gains (around 30% per annum) while low-tech industries exhibited very little productivity gains.

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1   Economic transformation primarily involved the unification of the law standards with the developed Europe and the introduction of free market principles such as private ownership, entrepreneurship, and stock-market financing.

2   In the Czech Republic, for instance, 90% of Czech export has been facilitated by foreign owned companies in 2006, adding on average higher value added, despite accounting for only about a third companies in the Czech Republic.

Figure 3 Dispersion of productivity growth in manufacturing, 1995–2005
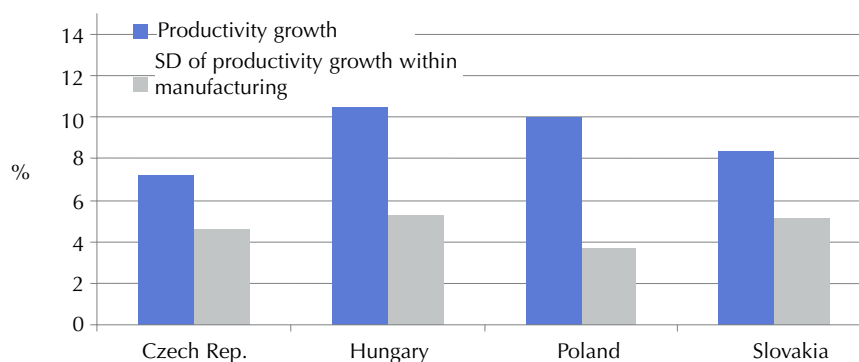
Source: Égert (2007)

Figure 4 The differential of annual gross nominal wage growth in market services and manufacturing, 1995-2005
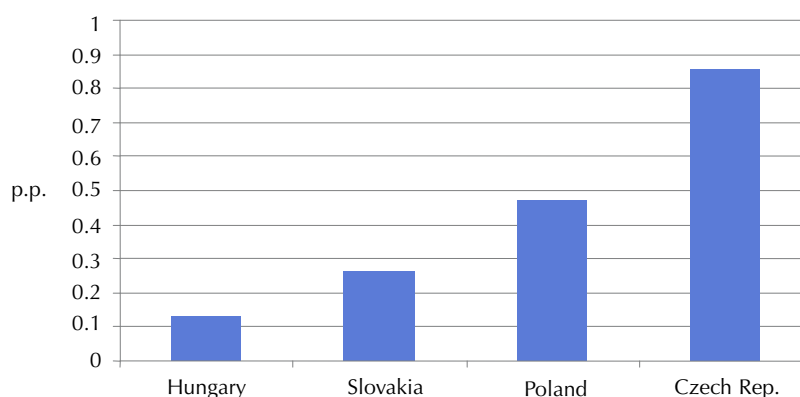
Source: Égert (2007)

Very large productivity gains are unlikely to be proportionately reflected in real wages and therefore real wage increases will be lower than the productivity growth at the industry level. The data depicted in Figure 3 indicate that in manufacturing, high productivity growth goes hand in hand with an increased standard deviation in productivity growth.

Second, if wage equalisation is not complete between the sectors, i.e. if wages turn out to increase faster in the tradable sector than in the nontradable sector, there is an incomplete pass-through from tradable wages to non-tradable wages. By contrast, if wages rise more rapidly in the nontradable sector, then wages in that sector are not set by wage developments in the tradable sector. Figure 4 below shows that proportionate wage equalisation holds only for Hungary and Slovakia.

Third, even if no one would expect productivity gains in nontradables to be zero, productivity gains in the nontradable sector were surprisingly strong in Visegrad-4 countries and offset the effect of productivity gains of the tradable sector on the relative price of non-tradables. As Figure 5 shows, nontradable sector productivity rose by more than 4% annually in the Czech Republic and Poland.

Even if there was a proportionate relationship between the productivity differential and the relative price of nontradables, the final impact on the inflation rate depends on the share of nontradables in the CPI. Strictly speaking, only those nontradables for which prices are determined in the market (as opposed to administered prices such as water, sewage, electricity, gas, and road transportation) should matter for the Balassa-Samuelson effect. As a matter of fact, in 2005, the share of market services accounted for 20% of the HICP in Visegrad-4 countries (Figure 6). This means that a productivity differential of as high as 5% a year would only amount to a Balassa-Samuelson effect of 1%, provided relative prices are fully correlated with the productivity differential.

Finally, it seems that Purchasing Power Parity does not hold in the Visegrad-4 countries since the extent of the real effective exchange rate appreciation is practically the same for both the producer price index and the consumption price index (containing also the ratio of non-tradable good prices). This implies that the real effective exchange rate appreciation is driven by the tradable good sector. Therefore, it is unsurprising that empirical estimates of the Balassa-Samuelson effect are relatively small and insufficient by far for the explanation of the observed annual real effective exchange rate appreciation of 3.5% during 1995-2005 (see Figure 7).

An alternative explanation: the Quality Bias Hypothesis

One plausible explanation for high structural inflation rates and real exchange rate appreciation in catching-up economies not due to the Balassa-Samuelson effect is the quality bias hypothesis. Quality has two facets: it concerns the quality of the goods consumed by final consumers and it also concerns the quality of the goods and services produced in the economy.

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Figure 5 Annual productivity gains in the tradeable and nontradeable sectors, 1995–2005
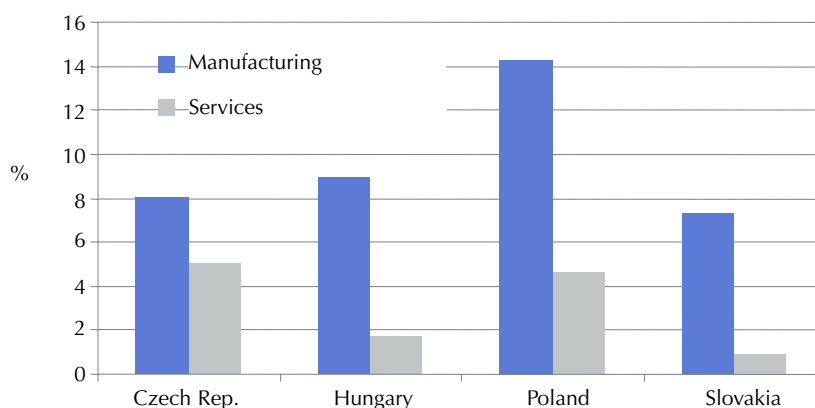
Source: Égert (2007)

Figure 6 The share of market nontradeables in the HICP, 1995–2005
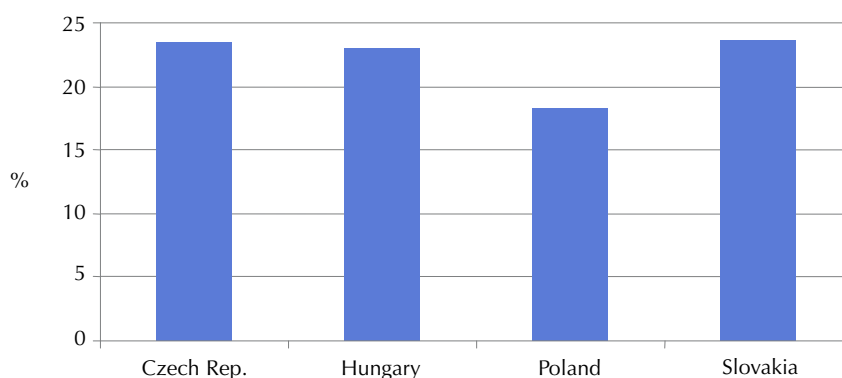
Source: Égert (2007)

The consumer side

An increase in quality is a prominent feature of final consumption in fast catching-up economies. Compared to richer households, poorer households usually consume lower quality goods that have lower prices, but switch to higher quality goods as their disposable income increases. This could be thought of as an extension of Engel's Law, which says that less wealthy households spend more of their budget on foodstuff than wealthy households do.

Obviously, rapid catching-up affects an important proportion of households. As a result of this at the macroeconomic level, the rise in wealth of the population does not only imply a shift away from foodstuff in private household expenditures but also an upgrade of the quality of the goods (including foodstuff) included in the consumption basket as wealthier consumers become more quality sensitive.

Clearly, quality effects should not show up in inflation rates. In practice, however, filtering out quality effects is difficult even for developed countries, let alone the cases where those changes happen more rapidly.

The producer side

The increase in demand for higher quality products from the consumer side goes hand-in-hand with supply responses, most importantly foreign direct investment. About half of total foreign direct investment in the Visegrad-4 economies has been directed into the tradable goods sector, mainly manufacturing of high quality differentiated products. The share of high- and medi-

um-tech products in Visegrad-4 exports increased by roughly 15 percentage points from 1995 to 2004 (Figure 7).

Particularly surprising is that the real effective exchange rate appreciation is observed (almost exclusively) in the tradable goods sector. In fact, if the Visegrad-4 countries had just improved their productivity and continued producing goods with unchanged characteristics, the prices of tradable products in the international market would have actually declined as the goods would have became less scarce. However, the opposite occurred. The relative prices of tradable goods have been rising, i.e. the real effective exchange rates of Visegrad-4 countries have appreciated.

The answer to the puzzle is related to the changes in the product mix. The foreign direct investment inflow brought advanced know-how and raised potential production capacities to western European standards. This spurred rapid product innovation and the market value of the products has increased (with a move up the ladder from low quality to the higher-end market). Thus, the trade balances of Visegrad-4 countries improved much less in real than in nominal terms.

The unit value ratio (a ratio of export unit value of Visegrad-4 countries over the unit value of export of the rest of the world) increased substantially: 60% from 1995 to 2004. Fabrizio et al. (2007) argue that this increase in unit value of export is the unique source of the Visegrad-4 countries' gains in international market shares since 1994. This is to be attributed to quality increase as the alternative explanation of pricing to market effects is much smaller; Cincibuch and Podpiera (2006) found that pricing-to-market can justify a pro-

Figure 7 Average statistics for Visegard-4 countries
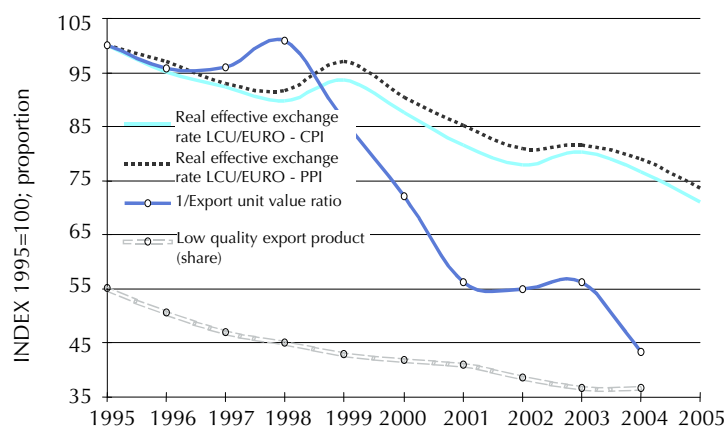
Source: IMF Statistics, Local statistical offices and Fabrizio et al. (2007).

longed disparity between export and producer prices of up to 10%.

At the same time, adjusting price indices to account for product quality improvements is not a trivial task. In fact, it is very complicated to assess, for instance, by how much a price of a new type of Škoda car can reflect quality improvements in the absence of hedonic price measurements. Thus, under the circumstances of frequent introduction of a large number of products of higher sophistication and manufacturing excellence, any reporting of quality adjusted prices is only an approximation at best.

Therefore it is not surprising that many statistical offices use an approximation, roughly half of a price increase is attributed to inflation and half to quality improvement. This is basically confirmed by the measure of unit value ratio in export and the real effective exchange rate, which correlate fifty percent, even though it might be more intuitive to believe that in internationally-traded goods, every increase in prices should be adequately supported by product innovation and thus practically the entire price increase would be due to quality improvements (Figure 7).

Thus, the real effective exchange rate contains a part of the quality improvements because quality is not accounted for fully in the measurement of price indices. Hanousek and Filer (2006) for instance argue that the quality bias of the consumer price index in the Czech Republic might be as large as 5 percentage points a year in the first decade of the economic transformation. Thus, if there is more dynamic accumulation of quality in Visegrad-4 countries than in their trade partners, it is likely that the real effective exchange rate of Visegrad-4 countries would appreciate. Recent dynamic general equilibrium models with explicit investment to quality (endogenous quality investment decisions - the vertical investment margin) such as by Bruha and Podpiera (2007) or models with aggregate quality shocks such as by Dury and Oomen (2007) show a positive relation between real exchange rate appreciation and product quality increases. Égert, Lommatzsch and Lahrèche-Révil (2006) provide strong empirical evidence for this effect in central and eastern Europe.

Conclusions

The evidence suggests that the trend real effective exchange rate appreciation in the Visgrad-4 economies is most likely due to structural changes in the production of tradable goods and not the Balassa-Samuelson effect. Namely, a shift towards higher quality (value) products increases reported price indices and causes a real effective exchange rate appreciation because there is incomplete quality adjustment in price indices by national statistical offices.

Nevertheless, it is not easy to say whether the price indices are inadequately measured. If the quality would be fully accounted for by statistical offices (for instance by hedonic price indices) it would imply that the real gross domestic product grew faster. This is, however, to say that quality is a substitute for quantity, which might be problematic. Quality clearly makes consumers pay more, and there is a well known proverb 'I am not so rich to buy cheap goods' that suggests that one might indeed prefer buying more expensive but more durable alternatives to cheap products that last substantially less. In this sense, product quality (manufacturing and materials) might be a substitute for quantity. But it is less apparent if one considers a product innovation. An improved design or packaging that makes consumers buy the more expensive product is hardly a substitute for quantity. Therefore, the actual (consensual) practice by statisticians might actually be appropriate in this regard.

Lastly, the known positive correlation between the degree of economic development and the measured price level is another indirect clue that the measured price indices are to some extent driven by improvements in quality of products. It would thus support the proposed explanation of a quality driven real effective exchange rate appreciation of the Visegrad-4 countries.

References

Bini Smaghi, Lorenzo (2007), 'Real convergence in Central, Eastern and South-Eastern Europe', http://www.ecb.int/press/key/date/2007/html/sp0710 01_2.en.html

Bruha, J. and J. Podpiera (2007), 'Transition Economy Convergence in a Two-Country Model: Implications

for Monetary Integration', ECB Working Paper 740.

Cincibuch, M. and J. Podpiera (2006), 'Beyond Balassa-Samuelson: Real Appreciation in Tradables in Transition Countries', *Economics of Transition* 14(3) 2006, pp. 547-573.

Daniel, Jean-Marc (2008), 'Inflation et "effet Balassa-Samuelson"', *Le Monde*, 1 February 2008.

Danske Bank (2007) 'Traffic Light Analysis', *www.danskebank.dk/research*

Dury, K. and O. Oomen (2007), 'The real exchange rate and quality improvements', Bank of England Working Paper no. 320.

Égert, B. (2007), 'Real convergence, price level convergence and inflation differentials in Europe', CESifo Working Paper no. 2127.

Égert B., Lommatzsch, K. and A. Lahrèche-Révil (2006), 'Real exchange rates in small open OECD and transition economies: Comparing apples with oranges?' *Journal of Banking and Finance*, 30(12), 3393-3406.

Fabrizio, S., Igan, D. and A. Mody (2007), 'The Dynamics of Product Quality and International Competitiveness', IMF Working Paper WP/07/97.

Hanousek J. and R. Filer (2004), 'Consumers' Opinion of Inflation Bias Due to Quality Improvements', William Davidson Institute WP 681.

IMF Statistics (2006), *International Financial Statistics*, International Monetary Fund.

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