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Balassa-Samuelson Effects in the CEEC: Are they Obstacles for Joining the EMU?

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Balassa-Samuelson Effects in the CEEC: Are they Obstacles for Joining the EMU?

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Abstract

A phantom is haunting the EU enlargement process. Some fear that the Balassa-Samuelson (B-S) effect might be a major obstacle for the Central and Eastern European countries (CEEC) to become members of the Economic and Monetary Union (EMU). A review of the relevant literature reveals that most estimations of the B-S effect in the EU acceding countries are flawed by one kind or the other. Either they do not estimate correctly the B-S propositions, or if they measure it they use a variety of measures for the variables needed. Additionally, the B-S effect is only a special case of a broader approach towards equilibrium real exchange rates. Lastly the B-S effect is studied in a CGE multi-country world in order to detect possible spillover effects. After describing the "official" road map towards the EMU, it is concluded that the uncertainties in measuring the B-S are much too high in order to see in it (alone) a major hindrance for the CEEC to become early members of the EMU. Moreover, real exchange rate appreciations that reflect productivity gains in the tradable sector are an equilibrium phenomenon and do not require a policy response. They are a natural phenomena in catching-up countries like the CEEC. Furthermore, the official doctrine for entering the EMU by the EU/ECB only interdicts depreciations but not appreciations for potential EMU members.

Keywords: Balassa-Samuelson effect, real exchange rate, EMU, EU enlargement, Euro, model simulations
JEL-Classification: C23, C53, E5, F11, F15, F31, F36.

1. Introduction

The European Council in Copenhagen has decided in December 2002 that 10 new countries will join the EU-15 in May 1, 2004. The newcomers will enter the EU on the basis of the Single Market and may only later enter the euro zone. The entrance criteria (convergence criteria) for the euro zone are the same as those for the present EU member states. However, one out of the five convergence criteria is inflation. As EU enlargement is an integration of mainly rich countries (the 15 incumbents of the EU) with primarily poor countries (the 10 acceding countries – mainly transition economies[1] of Eastern Europe plus Malta and Cyprus), there is still a big gap between GDP per capita, measured at current exchange rates and by PPPs. This is what Samuelson (1994) in his review of the Balassa-Samuelson (B-S) effect "thirty years later" calls the K-H-S[2] effect – or *Penn effect*. This phenomenon can be explained in terms of what is nowadays referred to as a "productivity-differential" model, which has been offered – according to Samuelson (1994, p. 206) at various times by Ricardo (1817), Viner (1937), Harrod (1933, 1957), and lastly by Balassa (1964) and Samuelson (1964) and later Bhagwati (1984). Therefore Samuelson is inclined to speak of a "Ricardo-Viner-Harrod-Balassa-Samuelson-Penn-Bhagwati-et al. effect". Obstfeld-Rogoff (1996, p. 210) speak of a Harrod-Balassa-Samuelson effect. We do not go so far and stick to the simple B-S effect[3].

The B-S effect has gone through a variety of changes, adding to the original only supply side oriented interpretation by Balassa and Samuelson (see Rogoff, 1996; Obstfeld-Rogoff, 1996) also demand side explanations (see Bergstrand, 1991) of the relative price changes of non-tradable to tradable goods sector prices (or real appreciation). Lastly, the B-S effect was embedded in a more general theory of equilibrium exchange rates (see Stein-Lim, 2002), resulting in estimations of the equilibrium real exchange rates in the BEER (Behavioral Equilibrium Real Exchange Rate; developed by Clark-MacDonald, 1999) or the NATREX (Natural Real Exchange Rate) approaches (see Stein, 2002b). On the one hand the Bergstrand extension paved the way for several studies estimating this more general structural approach first with data for industrial countries (see De Gregorio et al., 1994; Canzoneri et al., 1999)

[1] In the following we use the term "transition economies" or "economies in transformation" interchangeably. Both characterize economies in the process of changing from planned to market economies. The European Bank for Reconstruction and Development (EBRD) prefers the term "transition economies" in its annual "Transition reports".

[2] The teams of Irving Kravis (Kravis et al., 1978), Kravis, Alan Heston, and Robert Summers (1978, 1983), and Summers and Heston (1991), as well as Kravis-Lipsey (1988) have documented in repeated Penn studies this effect.

[3] When looking at the original articles by Balassa and Samuelson of the year 1964, Balassa's exposition is the clearer one, so we would be inclined to call the "productivity-differential" effect only the Balassa effect. But it is usual in the literature at least to call it B-S effect, so we will do it here.

and more recently, also for economies in transformation. On the other hand there are studies estimating equilibrium real exchange rates (NATREX approach; see Alberola et al, 1999 and Hansen-Roeger, 2001) for industrial countries. The opening up of Eastern Europe since 1989 also broadened the "battle field" for the B-S effect. Today we are confronted with a flood of B-S studies with a varying scope of transition economies, using different time periods as well as definitions of non-traded and traded goods sector and their prices, mainly concentrating on the explanation of the real appreciation of the EU accession countries by structural factors (differences in productivity changes of the non-trade goods relative to the traded goods sector). Primarily, all these studies rely on the approach proposed by De Gregorio et al. (1994) which combines supply side with demand side effects plus some other structural elements. The Deutsche Bundesbank (2001, p. 25) guesses that the B-S effect is responsible for roughly one-half of the annual change of average real appreciation in the 10 Central and Eastern European countries (CEEC) of around 4% in the years 1997 to 1999 (over the period 1995-2001 on average the annual real appreciation amounted already to 7 ½%). However the degree of the B-S effect in explaining the change of the real appreciation changes might be, the CEEC will be confronted with a trade-off between exchange rate stability and the inflation target.

Here we discuss first the specific situation in the new EU accession countries, which are (with the exception of Malta and Cyprus) all transition economies. After looking at the exchange rate development and different regimes in the CEEC, we evaluate the relevance of the B-S effect for these countries. Via simulations with the GTAP5 model possible spillover effects of the B-S effect are studied. After embedding the B-S effect in the general theory of equilibrium exchange rates, the "official" road map to the EMU is discussed. The policy conclusion is that the B-S effect is no obstacle for the CEEC joining the EMU.

2. Are Transition Economies Different from "Normal" Market Economies?

Early literature on this topic (like Sachs, 1996; Halpern-Wyplosz, 1997) describe the enormous problems which the CEEC faced when transforming from a planned to a market economy. There are huge structural changes, with very large movement of relative prices and productivity, so that traditional indicators of a country's international competitiveness (e.g., relative unit labor costs, relative producer prices) provide a very imprecise guide for policy. Like many other countries in the developing world, these countries are experiencing large inflows and outflows of capital and are therefore increasingly subject to shocks emanating from world capital markets. Sachs (1996, p. 147) therefore suggested that there are good

reasons for countries at the start of stabilization and liberalization programs to adopt a pegged exchange rate regime as part of the initial policy. In the meantime, their policy in this respect changed several times and now the CEEC have a heterogeneous system of exchange rate regimes. All acceding EU countries have by now fulfilled the criteria of full capital market liberalization, avoidance of restrictions on currency payments, avoidance of discriminatory currency practices and convertibility of foreign-held balances (Art. VIII of the Agreement of the IMF)

Halpern-Wyplosz (1997, p. 432 ff.) characterized the early start of the transition economies in Eastern Europe by the following stylized facts (see Figure 1). The actual real exchange rate initially depreciates and overshoots its equilibrium path so that there is at first a sizeable undervaluation. Over time the real exchange rate appreciates for two reasons. First, the initial undervaluation is gradually corrected. Second, the REER (real effective exchange rate) itself appreciates as a result of the transformation process. The rate of equilibrium appreciation is higher the more complete the market system is and the faster capital is accumulated. The CPI-based real exchange rate ("the real exchange rate") exhibited strikingly similar features across all countries for which the authors collected data (Albania, Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Poland, Romania, Russia, Slovak Republic and Slovenia), irrespective of the exchange rate regime. The relative price of non-traded and traded goods generally followed the same pattern although the trend rate of appreciation was lower than for the real exchanger rate. The exception were Russia, where the ratio actually depreciated, and Hungary and Slovenia, where the trend rate of appreciation was larger than for the real exchange rate.

- Figure 1 -

In Figure 2 we can see this pattern when comparing the actual Euro exchange rates of the candidate CEEC over the period 1989-2001 with their PPPs. At the beginning of the transformation process (around 1989-1993) we see a depreciation of the real exchange rate. Since then the real exchange rates appreciate steadily (REER = here the ratio between Euro PPPs and actual Euro exchange rates).

- Figure 2 -

For the *initial undervaluation*, Halpern-Wyplosz (1997, p. 436) offered three explanations:

(1) A pent-up demand for foreign assets faces a negligible supply. Therefore the prices increase. The undervalued exchange rate allows for the net acquisition of foreign assets through current account surpluses.

(2) The freeing of prices in the presence of a monetary overhang is met by a sudden burst of domestic inflation. The associated flight from domestic currency exuberates the demand for foreign assets.

(3) The return to some degree of convertibility raises a difficult policy issue for untested authorities lacking credibility.

For the *subsequent appreciations*, Halpern-Wyplosz (1997, p. 437 ff.) offered six explanations:

(1) Rapid productivity gains are expected when formerly inefficient economies respond to market forces. Firms that used to maximize output and/or employment ("soft budget constraint" – Janos Kornai) now shift toward profit maximization. The resulting deep overhaul of the economy includes an end to overmanning and the closure of activities that are not profitable at world prices. The visible outcome is a dramatic reduction in the size of industry and agriculture and the development of the service industry. The mere emergence of services (banking and finance, management consulting, marketing, etc.) is likely to raise aggregate effectiveness considerably. Once income is rising again, demand for non-tradables increase and results in real appreciation (see De Gregorio et al., 1994a for the analysis of such demand effects on the real exchange rate).

(2) If productivity gains are higher in the traded than in the non-traded good sector, the REER appreciates as predicted by the B-S model[4].

(3) The transition economies inherited a set of natural resource prices considerably below world prices. Similarly, public utility prices also used to be set low and the governments are worried about upsetting unstable public support by raising these prices. This leads to low non-traded good prices. However, this situation is not sustainable, leading to real appreciation.

(4) Public spending changes in its structure but does not decline in the aggregate, and the appropriate welfare system (pension system, social security) has to be built. As the private sector becomes more productive, social returns from public investment (infrastructure and environment) rise and warrant higher public spending. Where tax reform is implemented, personal income taxation and VAT become the dominant source of fiscal income. All these overhaul may lead to a wide array of relative price changes, the effects of which are ambiguous. However, non-monetary financing of public deficits is likely to lead to real appreciation via high real interest rates.

[4] Also the European Commission (2002b, p. 250 ff.) in its report on the nominal convergence of the CEEC stress the importance to disentangle the B-S effects from transition effects, in particular at the early phase of transformation.

(5) Very high potential returns on capital justify accumulation at a rate that exceeds domestic savings. Foreign direct investment (FDI) tends to produce a real exchange rate appreciation best understood as a permanent or equilibrium change[5].

(6) Locally produced goods were initially of poor quality and poorly marketed. As firms learn to operate on world markets, the terms of trade are likely to improve.

3. Facts and Figures about Exchange Rate Behavior in the CEEC

EU enlargement means the integration of two blocs of countries, of which the one - EU-15 - consists of rich countries, and the new 10 members are poor on average. As can be seen from Table 1, the Penn effect is here obvious and can easily be detected as the huge difference between GDP or GDP per capita, measured at current prices and at PPPs. Therefore many authors found that the B-S effect explanation would be appropriate to explain the consequences of the Penn effect, namely a trend appreciation of real exchange rates in the acceding countries.

- Table 1 -

It is a common feature of the CEEC that there is – with the exception of Slovenia, which target at a relative constant real exchange rate – a trend in real exchange rate appreciation. Whichever data source one consults, this general trend is there. According to OECD data (Main Economic Indicators), the four OECD member countries appreciated their exchange rates in real terms since 1995 by 20 percent in Slovakia, by 30 percent in Poland, by 35 percent in Hungary and by 42 percent in the Czech Republic. In the latest Transition report 2002, the EBRD has calculated indicators of competitiveness for 10 CEEC according to a trade-weighted Euro real exchange rate. These data show a similar upward trend in real appreciation, except for Slovenia (see Figure 3).

- Figure 3 -

That the steady real appreciation – whether it is justified due to B-S arguments (productivity improvements in the tradable sector) or not - is not without consequences to the external equilibrium (the current account position) in the CEEC. This is demonstrated by the strong negative relationship of real appreciation during the period 1995-2001 and the average

[5] Begg et al. (2003, p. 79) estimate the influence of FDI on sectoral labor productivity. They find that FDI increases labor productivity in the industry sector six times more than in the service sector. This effect then translates into the B-S effect determining the increase of real exchange rates.

performance of the current account (measured in % of GDP) over the same period (see Figure 4).

- Figure 4 -

Since the beginning of 1999, when the euro area started with the EMU and the Euro, most of the EU candidate countries appreciated in nominal and real terms vis à vis the Euro (see Figures 5 and 6). Only Slovenia depreciated in nominal terms and contained its real exchange rate constant vis à vis the Euro. The mirror image of the steady real appreciation in the transition economies (CEEC, acceding/candidate countries) is the steady real depreciation of the euro against the CEEC currencies in the last decade which improved strongly the competitiveness of the euro area countries in trade with the CEEC (see Figure 7). Cynically speaking and seen from the standpoint of the Euro area countries, the continuing real appreciation – be it due to the B-S effect or otherwise – is not a hindrance for entering the EMU, because it only indicates that the competitiveness of the CEEC will remain in danger in the Single Market for a long time.

- Figure 5 -
- Figure 6 -
- Figure 7 -

Furthermore, one must take into consideration, that nearly each of the CEEC has its own exchange rate regime (see Table 2 for an overview). Three of the candidate countries have a currency board, of which in the case of Lithuania the peg is to the USD, whereas the Estonian krone and the Bulgarian lev are linked to the Euro already. For joining the EMU a currency board with a peg to the Euro is acceptable, not, however one with a peg to the USD. Turkey, an EU candidate country with which accession negotiations did not yet start experienced a dramatic depreciation of its currency vis à vis the Euro, more in nominal than in real terms.

- Table 2 -
- Table 3 -

Begg et al. (2003) see a danger for the financial integration of the ACs into the EMU. ACs will have to satisfy the Copenhagen criteria prior to EU entry, and then the Maastricht convergence criteria prior to full adoption of the euro. These requirements include the dismantling of capital controls, which is already a reality in most ACs today (see Table 3). The combination of full capital mobility and a requirement to participate in ERM-II may entail an interim period in which ACs face enhanced vulnerability to capital flows before the eventual safety of EMU is available . In particular, ACs may face substantial capital inflows

that bring two dangers: the likelihood of crisis if the flow is reversed. To demonstrate this danger, Begg et al. (2003) compare several international financial crises in the 1990s with similar ingredients - fixed exchange rates and free capital mobility - as will be the case in the ACs prior to the entry into EMU) , and the possibility of domestic overheating and protracted disinflation if the flow is not reversed.

4. The Relevance of the Balassa-Samuelson Effect in the CEEC

The Balassa-Samuelson (B-S) effect contains at least three propositions[6]. The B-S model, which explains real exchange rate movements in terms of sectoral productivities, rests on two components: First, it implies that the relative price of non-traded goods in each country should reflect the relative productivity of labor in the traded and non-traded goods sector. Second, it assumes purchasing power parity holds for traded goods.

Proposition I: Relative prices are explained by productivity differentials

In a two-sector economy (traded and non-traded goods sectors with only labor as input), when average and marginal products of labor are proportional, the relative price of non-traded goods is proportional to the ratio of the average products of labor in the two sectors. Or in growth rates: the growth rates of relative prices of non-traded goods are explained by growth rates of relative labor productivity of traded goods[7]. Canczoneri-Cumby-Diba (1999) have empirically verified proposition I for a panel of 13 OECD countries with data from the early sixties to 1993.

Proposition II: PPP should hold for traded goods prices?

The second part of the B-S model assumes that traded goods prices are characterized by purchasing power parity. Again Canzoneri-Cumby-Diba (1999) tested this proposition, did, however, not find always a confirmation.

Proposition III: GDP per capita explains relative prices

The relative price level of home to foreign (expressed in a common currency) – the real exchange rate – is determined by the relative GDP per capita of both countries.

Although in single country time series analysis this proposition is rejected (see Faria-Ledesma, 2001), in a cross-country setting, this relationship is very robust. Balassa (1964, p. 590) finds for 12 industrial countries for the year 1960 that the relationship between the GDP per capita (YR_i) and the relative prices ($PR_i = (P_i / P^* E)$; P_i = price of country i; P^* =

[6] The description of the model follows Canzoneri-Cumby-Diba (1999) and *Faria-Ledesma* (2001).

[7] In a model with a Cobb Douglas production function for both sectors with capital an labor inputs, Froot-Rogoff (1995) and Obstfeld-Rogoff (1996) reach a similar result, but with relative total factor productivities (TFP) instead of relative labor productivities alone.

price of foreign country; E = nominal exchange rate) (in logs) results in an elasticity of 0.33: Bergstrand (1991, p. 326) with data from Kravis et al. (1982, Table t-12) finds for 21 countries in 1975 an elasticity of 0.50.

With PPP data from Eurostat[8] for the year 2000, we find a similar relationship for 30 countries (15 EU countries, 3 EFTA countries and 12 EU candidate countries, of which 10 are CEECs plus Cyprus and Turkey), where YR_i is relative GDP per capita in PPP[9]:

$$\ln(PR_i) = -3.49 + 0.75 \ln YR_i \qquad (1)$$
$$(12.73) \quad (11.75) \qquad R^2 = 0.83$$

If one only takes the 18 industrial countries (15 EU plus 3 EFTA countries), the b-coefficient becomes 0.49. If one only considers the 12 EU candidate countries, the b-coefficient becomes 0.50 (see Figures 8a and 8b):

- Figure 8a -
- Figure 8b -

These cross-section results imply that a GDP p.c. catch-up of the EU candidate countries by 10 percentage points (relative to EU average) would lead to a real appreciation of their currencies vis-à-vis the Euro of around 5 percent (taking the estimated coefficient for the candidate countries only) or of 7.5 percent (taking all 30 countries)[10].

By now, most of the empirical B-S effects studies are estimating this effect in the interpretation of proposition I. After the extension by Bergstrand (1991) for demand-side effects the general equation tested looks now like the following:

$$\log(P_{NT,i,t}) = b_{0,i} + b_1\Pi_{i,t} + b_2 g_{i,t} + b_3 \log y_{i,t} + b_4 \Delta p_{i,t} + b_5 Misc_{i,t} \qquad (2)$$

This empirical approach goes back to De Gregorio et al. (1994). The subscripts i and t indicate country and time; P_{NT} is the relative price of non-traded goods to traded goods; Π corresponds to the difference of total factor productivity across sectors corrected by the labor shares ($\Pi = (q_N / q_T)\log A_T - \log A_N$); A_T is total factor productivity in the trade goods sector; A_N is total factor productivity in the non-trade goods sector; g is government expenditure

[8] Source: Kaufkraftparitäten und abgeleitete Wirtschaftsindikatoren für EU, EFTA und Beitrittskandidaten (Vorläufige Ergebnisse für (Vorläufige Ergebnisse für 2000), Statistik kurz gefasst, Wirtschaft und Finanzen, Thema 2 - 32/2002 (Eurostat).

[9] The figures in parenthesis are t-values.

[10] The European Commission (2002b), p. 246 reaches similar conclusions. For the relationship between PPS (P_i/P) - not real exchange rates - in 2000 and GDP per capita in PPS (relative to EU-15=100) it finds in a regression for 29 countries (all EU member states except Luxembourg, all candidate countries except Malta as well as Iceland, Norway and Switzerland) an elasticity of 0.86.

over GDP (both in real terms); y is per capita income, and Δp is the first difference of the rate of inflation. *Misc* can be miscellaneous other explanatory variables (like different exchange rate regimes; see Halpern-Wyplosz (2001); or monetary policy, openness, terms of trade and energy dependence; see De Broeck-Slok (2001); or real rate of interest; see Deutsche Bundesbank (2002)). The coefficient b_1 measures the impact of productivity growth as suggested by proposition I of the B-S model (*supply-side*) with an expected positive sign (0.23 in the estimations by De Gregorio et al. (1994) for 14 OECD countries for the period 1970-1985). The coefficients b_2 and b_3 are measuring the influence of the two *demand-side* variables g (positive sign with point estimates between 1.5 and 2.0) and y [11] (positive sign with a coefficient in order of 0.24 and 0.29). They are proxies for exogenous demand shifts. In an ad hoc manner, by relaxing the assumption of instantaneous price adjustment in the non-tradable sector, De Gregorio et al. (1994) included the first difference of inflation to capture the possibility of transitory dynamics. Halpern-Wyplosz (2001) included the inflation effect in the estimations of the B-S effect for transition economies with mixed results. Further more, De Gregorio et al. (1994) found the plausible result that in the short-run demand factors dominate, in the long-run, however, the supply-side factors take the lead.

Before we go on to present an overview of the results of B-S effects estimations one must say a word on the difficulties surrounding the measurement of the B-S effect:

1) How to *differentiate* between *"trade goods sector" and "non-traded goods sector"?* This is always an arbitrary decision and depends on the availability of the sectoral data. Balassa and Samuelson were not very helpful in giving advice where to draw the dividing line between the two sectors. Some authors take this statistical business serious (see e.g. Canzoneri-Cumby-Diba (1999); they used the OECD sectoral data base[12]), others (most studies for the transition economies) just divide into industry and services.
2) How to measure the *relative prices* or *prices for both sectors*? Either one follows the prices collected from sectoral data (value added prices) or one simply takes service to

[11] GDP per capita was introduced by Bergstrand (1991) as a demand side explanation on the lines of the Linder-type hypothesis (see Linder, 1961). For Linder, GDP per capita is the most important single factor influencing the demand structur. Therefore one can expect that per capita GDP should be positively correlated with the real exchange rate and national price level. Bergstrand (1991) also included a Heckscher-Ohlin type relative endowment variable, namely the capital/labor ratio. However, this is highly correlated with GDP per capita.

[12] Canzoneri et al. (1999) defined "traded goods" as consisting of the "manufacturing" and "agricultural, hunting, forestry and fishing" sectors. The "non-trade goods" consist of the "wholesale and retail trade, restaurants and hotels", "transport, storage and communications", "finance, insurance, real estate and business services", "community social and personal services", "non-market services" sectors.

non-food CPI prices, a method applied by most studies for transition economies. Many authors even approximate directly the measurement of relative productivities with relative prices of CPI relative to WHP.

3) *Labor or total factor productivity* for both sectors? It depends whether proposition I of the B-S model is derived from a production function with only labor input or with one with two inputs (labor and capital). In any case it is important to distinguish between labor and total factor productivity (TFP) as was demonstrated by De Gregorio-Giovannini-Krueger (1994). The interpretation of the evolution of the real exchange rates using labor productivity rather than TFP may even lead to wrong conclusions. However - due to lack of data for capital - most B-S effects studies for transition economies are using labor productivity. Most studies even estimate separately the influence of labor productivity in the trade-goods sector (meaning industry) and those of the non-traded goods sector (meaning services) separately.
4) *Which econometric procedure?* Single country estimates of the B-S effects with time series are mostly disastrous negative. Panel estimations - mostly done in the case of the CEEC - tend to be verifying the B-S effect, but they mix up countries with different exchange rate regimes. An exception is Halpern-Wyplosz (2001), because they use proxies for different exchange rate regimes.
5) *Isolated B*-S effect or embedded in a more general theory of real exchange rates? Most B-S effects studies for transition economies refer to the isolated B-S effect in the interpretation of proposition I. However, the structural explanation by Balassa and Samuelson is only one of many other factors for the explanantion of the development of real exchange rates. We deal with this topic later.
6) The real *general equilibrium B*-S effect for a multi-country world can only be simulated with a multi-country CGE model. This is done later.

There are a lot of *time series studies* for individual CEEC. Most of them try to empirically test the relationship between productivity and inflation (or the real exchange rate). The long-run link is checked with co-integration tests. A general problem in transition economies is that only short times series are available. The model specification underlying the tests varies and so do the results country by country. In Table 4 the results are compiled so that they express the influence of the B-S effect on the annual real exchange rate (appreciation) vis-à-vis Germany. In addition to catching up (or B-S effects) there are country-specific features explaining the real exchange rate behavior. This is most obvious for Slovenia and the Slovak

Republic, where most empirical studies yielded estimates which tend to be lower than for other countries. In the case of Slovenia this can also be explained by the explicit policy of the National Bank to keep the real exchange rate vis-à-vis the euro relatively constant over time. Or this country already approached per-capita income levels close to the "poorer" EU member states and accordingly, the effect of differential productivity on inflation is expected to be smaller (see European Commission, 2002b, p. 247). In the Slovak Republic the service sector was relatively small when transition began and it was sheltered from liberalization for some time. Consequently, the productivity growth in the non-traded goods sector has been relatively high in more recent years, a factor which reduced the size of the B-S effect. The highest B-S effects on real appreciation were found in Hungary and Poland, at little bit less for the Czech Republic. Also for Estonia, Latvia and Bulgaria (mostly by central bank economists) were produced (see the respective literature in European Commission, 2002b, p. 248). A study by the Bulgarian National Bank came to the conclusion that B-S effects were one of the main reasons for the double-digit inflation rate in the year 2000. The Bank of Estonia estimated that a 1 per cent rise in the income level causes a 0.7 per cent increase in the price level of Estonia and – due to the growth difference of 3-4 per cent vis-à-vis the euro area – produces an inflation differential of about 2 per cent. A similar study by the Central Bank of Latvia concluded that both relative productivity and relative prices in Latvia have behaved in the way predicted by the B-S model.

- Table 4 -

In order to increase reliability of the estimates of the B-S effects in countries for which only short time series exist, several authors relied on pooled observations in *panel studies*. The most careful studies are those by Halpern-Wyplosz (2001; see also Begg et al. 2003), by De Broeck-Slok (2001) and those by Fischer (2002; see also Deutsche Bundesbank, 2002). In the basic version, estimating equation (2) only with the supply-side effect (B-S effect) and one demand-side effect (GDP per capita), Halpern-Wyplosz (2001) regress the relative price of non-traded goods (services to manufacturing) in a panel study for 9 transition economies over the period 1991-1999 on the productivity differential between traded (industry) and non-traded good sectors (services). There is a positive relationship confirming the B-S effect. The productivity term is divided into productivity growth in industry – an increase of which leads to a real appreciation (in the short-run by 0.24, in the long-run by 0.43), and productivity in the service sector – a decrease of which leads to a relative price increase of 0.18 and of 0.32 respectively (similar results can be found in Begg et al., 2003, p. 78). If they include other variables into the standard equation (2) in order to control for inflation acceleration and for

different exchange rate regimes, the B-S effect nearly vanishes. First, the only exchange rate regime that makes a difference is the no-commitment one (managed float with no pre-announced exchange rate). Second the coefficient for industry productivity decreases while it changes the sign of the coefficient for productivity in the service sector, being only marginally significant. So the B-S has gone if one controls for exchange rate regimes. Only if one excludes from the approach of equation (2) the demand-side variables and those of inflation adjustment, the control for exchange rate regimes keep the B-S effect in place. The Deutsche Bundesbank (2001) translated the B-S effect on relative prices into real appreciation vis-à-vis EU-15 (see Table 5). Accordingly, 2.0-2.2 percentage points of the annual real appreciation is due to the B-S effect.

De Broeck-Slok (2001) in a similar approach as those of Halpern-Wyplosz (2001) estimate the standard equation (2) using as *Misc* variables like the Money over GDP, Openness, Terms of Trade as well as a dummy for Fuel and Non-Fuel, most of which are insignificant. Their panel comprises three groups of countries (Eastern Europe[13], other transition countries[14], OECD countries[15]) over the period 1993-1998. Instead of relative prices, they use the trade-weighted real effective exchange rate calculated by the IMF as dependent variable. They distinguish between the tradable sector (industry plus construction) and the non-tradable sector (services) and the agricultural sector, which is a mixture of tradable and non-tradable activities. TFP is proxied by average labor productivity in the three sectors. In addition to the traditional B-S variables, the authors include a whole bunch of variables in their regressions. These additional variables intend to capture movements off an equilibrium path that is mainly determined by productivity developments. The B-S effect is a relatively robust explanation for the development of real effective exchange rates in the CEEC. The B-S effect is due to an annual real appreciation vis-à-vis the EU-15 (see Table 5). For the other transition economies the results are less favorable towards the B-S effect. Interestingly, in the case of the OECD countries, no B-S effect can be found. Only some other variables like openness and government balance explain significantly the change in real effective exchange rates.

Again in contrast to Halpern-Wyplosz (2001) the study by the Deutsche Bundesbank (2002; based on Fischer, 2002) use not relative prices of non-tradable to tradable goods prices as dependent variable, but directly the CPI-based real effective exchange rates of 8 accession countries against a trade weighted average of 21 (non-transition) OECD countries (i.e. the

[13] Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, and Slovenia.

[14] Albania, Armenia, Azerbaijan, Belarus, Croatia, Georgia, Kazakhstan, Kyrgyz Republic, Macedonia, Moldava, Mongolia, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

[15] Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Prortugal, Spain, Sweden, the United Kingdom, and the United States.

inflation differential between accession and OECD countries measured in a common currency). The theoretical TFP is proxied by labor productivity. Industry stands for the tradable (export) sector and services for the non-tradable sector. In addition the agricultural sector is used here directly as a quasi "intermediate" sector – both tradable and non-tradable, but where prices are largely regulated by the government. In some specifications, also the terms of trade are included. For 8 accession countries (Estonia, Latvia, Lithuania, Poland, Slovakia, Slovenia, Czech Republic and Hungary) the estimates of the standard B-S equation (2) are made with a panel a) with annual data over the period 1994-1999, and b) with quarterly data 1994 Q1 to 2000 Q4. The private consumption to GDP ratio is added to the demand-side explanations and as *Misc* variable the real rate of interest of the average of the USA und Germany is used. In the annual model the B-S effect is quite strong, the estimated coefficients for productivity in industry are 0.6 and 0.8 (depending on the model specification), those for productivity in agriculture are 0.5. Although Fischer (2002) developed a B-S model with three basic goods (non-tradables, exports and imports) in the estimated version only the productivity of two sectors (industry and agriculture) is applied. The coefficient for the service sector has either the wrong sign or is insignificant, which is in contrast to proposition I of the B-S model! In the model with quarterly data, only total labor productivity (this is no longer a B-S effect!) is used as explanation of the real exchange rate behavior. The estimated coefficient is positive and high (1.6). So the Deutsche Bundesbank concludes that these estimations can be understood as if the B-S effect would explain 1.9-2.6 percentage points of real appreciation vis-à-vis the EU-15 (see Table 5).

- Table 5 -

Concluding this overview of the most serious panel estimations one must cast serious doubts on the B-S effect as a robust, proper and single explanatory factor of the behavior of real exchange rates of the EU acceding countries.

5. The Balassa-Samuelson Effect in a Multi-Country World

Besides the many reservations against the estimations of the B-S effect in the CEEC, there is another weakness. The B-S effect is only estimated for a single country. This is true for time-series studies (see Table 4) or for panel approaches (see Table 5). In either case the tests look at the B-S effect in a single country or in a group of countries. The B-S model is usually derived within a one-country general equilibrium model context with two sectors and one or two factors of production. The B-S effect has not yet been studied in a multi-country full-fledged general equilibrium context, in order to look at the consequences of the "productivity-

differential" effect in one country on trade and terms of trade in other countries (possible spillover effects).

This is done here with simulations with the GTAP5 world CGE model. For this purpose the GTAP5 has been tailored to a two-sector[16], 5 factors of production[17] and 17 regions model. Data base is the year 1997.

Two scenarios are carried out:

(1) *B-S effect:* A 10% shock to production augmenting technical progress (TFP) in the tradable goods sector.

(2) *General TFP-shock:* A 10% shock to production augmenting technical progress (TFP) in both sectors of the economy (total economy).

The shocks are implemented in the EU candidate countries Hungary, Poland and the rest of the CEEC.

The results are summarized in the Tables 6a and 6b.

ad (1) B-S effect: The sectoral TFP shock leads to the B-S effect insofar, as an increase of TFP in the tradable goods sector in the CEEC increases their relative prices (P_N / P_T) and increases also the general price level in their economies (GDP price level). The effect on the Terms of Trade (TOT, which in a CGE model is the real exchange rate) is weaker. In Poland TOT increase by 8.9 percent, in the Rest-CEEC by 5.6 percent and in Hungary only by 2.9 percent. In most other countries the general price increase in the CEEC results in slight price decreases (with the exception of Austria and Belgium-Luxembourg-Netherlands). The impact on exports is also different in each CEEC country, with the sharpest decline in Poland. The increase of the TOT deteriorates the competitiveness of the CEEC. Interestingly, in a general equilibrium framework also the imports of the CEEC decline nearly at the same rates as their exports. As a result, in Hungary the trade balance deteriorates somewhat, whereas it improves in Poland and the Rest-CEEC. In most other countries exports and imports increase slightly, with the strongest increases in Austria, Germany, Italy, in the former Soviet Union as well as in the USA. As a result, the trade balance of all non-CEEC deterioratse slightly. Real GDP in the CEEC (catching-up effect) increases more than proportional relative to the sectoral technology shock, the strongest increase is in the Rest-CEEC country group. Welfare increases in the CEEC, and decrease slightly in the other countries.

- Table 6a -

[16] The GTAP5 model comes with 57 sectors. We have divided these sectors into non-tradables (mostly services) and tradables (mostly manufacturing sectors, some business services and agriculture).

[17] The five factors of production are: land, unskilled labor, skilled labor, capital, natural resources.

ad (2) General TFP shock: A technology shock (10% increase of TFP) in the whole economy in the CEEC has stronger price and output effects as far as TOT and the GDP price level is concerned, but lead to lower relative price changes (P_N / P_T). The decline in exports and imports of the CEEC is stronger (roughly double the size of only a sectoral TFP shock), due to the higher TOT deterioration. Trade balances in the CEEC but also in all other world regions deteriorate. Welfare increases stronger than in the first scenario.

- Table 6b -

This kind of analysis should be intensified in order to study the danger of the B-S effect on competitiveness and the possible spillover effects to other countries. A TFP shock – either only in one sector (in the tradable sector à la Balassa-Samuelson) or in the total economy of one country - increases productive capacity in the country shocked and leads to the necessary catching-up. However, this has consequences for the allocation of world trade by trading partners. Due to the increase of home's productive capacity, it reduces the trade volume of the shocked countries, the loss of which is (partly) allocated to other world trading partners. The B-S effect (more so an overall TFP shock) might act as a form of regional "new protectionism", leading to more autarky and fewer openness! So, the strong general equilibrium implications of the B-S effect are nearly contrary to the usual one-country macro interpretation of no influence on world trade.

6. The Balassa-Samuelson Effect in a General Theory of Equilibrium Exchange Rates

The B-S hypothesis is only one of a whole range of explanations for the development of real exchange rates. Recently there have been several attempts to generalize the model of real exchange rate in order to encompass the balance of payments and the B-S approaches to real exchange rate determination. In particular the focus lies on the determination of equilibrium exchange rates (see MacDonald-Stein, 1999).

Stein-Lim (2002) distinguish two approaches to estimate the equilibrium real exchange rate. The empirically oriented approach that is not model-specific and directed at estimating the *Behavioral Equilibrium Real Exchange Rate* (BEER) usually implies a smaller degree of under or overvaluation. A more structural approach is the *Natural Real Exchange Rate* (NATREX) framework or the area-wide model. The explanatory power of both approaches lie more in the medium or long-run.

According to Stein-Lim (2002), the *BEER approach* developed by Clark-MacDonald (1999) can be summarized as follows. The equilibrium real exchange rate equilibrates saving less

investment to the current account, where investment and the current account is determined by the real exchange rate and a vector of (exogenous) explanatory variables, determined eclectically from economic theory (e.g., B-S variables). Then the savings-investment equation is solved for the equilibrium real exchange rate. This is the longer-run cointegration equation which is estimated to generate the BEER. In the medium run, the uncovered real interest rate parity (UIRP) equation is added to the explanation. The real exchange rate converges to its longer run equilibrium in proportion to the real long-term foreign less domestic interest rate differential. The real exchange rate then combines the systematic component determining the log of the equilibrium real exchange rate (e.g. B-S effect elements), with the real interest rate differential. In the special issue of the Australian Economic Papers (Vol. 41, Issue 4, December 2002) on "Exchange Rates in Europe and Australasia", the BEER approach is applied for a variety of bilateral exchange rates (e.g., synthetic Euro of EU-12; New Zealand dollar etc.).

The specific characteristics of the *NATREX model* vary according to the economy. It has a rational expectations foundation for the private sector, based upon stochastic optimal control models. For the economy as a whole, which includes the public sector where decisions are political, decisions may be far from optimal (Stein, 2002b, p. 360): In contrast to the BEER approach, the NATREX model comprises a more comprehensive macro-model specification, including a vector of *endogenous* variables X_t and a vector Z_t of *exogenous* fundamental variables (Stein-Lim, 2002):

$$S[X_t; Z_t] - I[R_t^e, X_t; Z_t] = CA[R_t^e, X_t; Z_t] \tag{3}$$

$$dF_t / dt = -CA[R_t^e, X_t; Z_t] \tag{4}$$

$$dY_t / dt = b_t I[R_t^e, X_t; Z_t] \tag{5}$$

$$R_t^e = R[Z_t] \tag{6}$$

Equations (3), (4), and (5) are the core of the model. Macroeconomic balance equation (3) - equilibrating saving (*S*) less investment (*I*) to the current account (*CA*) - is evaluated at a rate of capacity utilization equal to its stationary mean – *internal balance* – and where real long term rates of interest are equal at home and abroad – *portfolio balance*. The medium run equilibrium real exchange rate equates the current account CA_t (which is the sum of the trade balance B_t plus the non-speculative capital inflows rF_t), equal to investment less social saving $[I_t - S_t]$, to zero. The vector of *endogenous* variables X_t consists of the ratio of net liabilities to GDP denoted by F_t, and the growth rate of GDP. Vector Z_t contains typically supply-side variables – like the productivity differentials à la B-S model, as well as demand-

side factors like public plus private consumption/GDP ratios and terms of trade. In a later paper, Stein (2002b, p. 362) distinguishes the vector of explanatory variables ("fundamentals") into Z_1 to Z_4, depending on the kind of exogenous influence (demand shift, productivity, terms of trade, exogenous shift in investment and GDP growth).

The model also includes two dynamic equations. Equation (4) states that the rate of change of net foreign liabilities is the negative of the current account. Equation (5) states that the growth rate of real GDP is directly related to the rate of investment/GDP. The coefficient b_t is the productivity of investment, which is an exogenous variable included in vector Z_t. Equation (6) relates the equilibrium real exchange rate to the actual exchange rate explained by exogenous variables contained in the vector Z_t.

The NATREX approach has been applied by many authors to study the real equilibrium exchange rates for various bilateral or multilateral combinations. Stein (2002a) uses this approach to evaluate the possible repercussions of the equilibrium value of the Euro after enlargement. For an overview of research on the equilibrium real exchange rate of the Euro, see Stein (2002b).

Two recent studies used the NATREX approach (Alberola et al., 1999; Hansen-Roeger, 2000). Alberola et al. (1999) apply this methodology to evaluate the correct entry rate of the currencies of 8 EU currencies at the start of Stage III of the EMU in 1999. They applied a methodology for calculating bilateral equilibrium exchange rates for a panel of currencies for eleven countries plus the euro composite over the period 1980 Q1 to 1998 Q4. The results uncover that, by the start of Stage III of the EMU, the euro was significantly undervalued against the dollar and the pound, but overvalued against the yen. Four major EMU currencies locked their parities with the euro at a rate close to equilibrium (France, Germany, Spain and Italy). The authors found, that for the prospective EMU members, the results indicate that the pound should depreciate considerably before entering EMU, while for Sweden, Denmark, and Greece (they are already EMU members since 2001) deviations from equilibrium are currently small.

Hansen-Roeger (2000), using a similar theoretical approach as Alberol et al. (1999) estimate equilibrium real exchange rates for 14 EU countries, for the USA, Canada und Japan over the period 1980-1999. Again the Hansen-Roeger (2000) model incorporates the B-S effect with two sectors (tradables and non-tradables) and the balance of payments approach in a small macro-model context. The basic approach is similar to those explained in the equations of the NATREX model above (equations (3) to (6)). The model can be solved for two equilibria: (a)

external equilibrium (a set of all $r - f$ -combinations such that the net foreign asset position (*f*) is not changing and (b) an *internal equilibrium* (a set of all $r - f$ -combinations, such that the real exchange rate $r = n + (p - p^*)$ does not change; n = nominal exchange rate).

The empirical implementation tries to identify the theoretical long run equilibrium, i.e. the intersection between the internal and the external equilibrium locus and an equilibrium trajectory of the exchange rate or an adjustment path that leads to long run equilibrium. This is done by Hansen-Roeger (2000, p. 17 ff.) in a similar way as by Alberola et al. (1999) in a specific sense, namely by identifying the path of the exchange rate, generated by eliminating all temporary shocks on the exchange rate based on a decomposition suggested by Gonzalo-Granger (1995). The distinction between temporary and permanent shocks is important in this context. If all exogenous shocks were only of a temporary nature, the equilibrium exchange rate would always return to its initial equilibrium level. In this case, deviations of the actual from the (long run) equilibrium exchange rate could always be calculated by looking at the deviation of the current exchange rate from its historical mean value. In the presence of non stationary shocks (or more precisely, forcing variables which are themselves non stationary), the equilibrium exchange rate can only be represented conditional on the level of the non stationary driving variables of the model.

Lastly, a regression of the form is estimated[18]:

$$r_t = a_f f_t + a_x q_{I,t} + z_t, \tag{7}$$

where a_f and a_x are parameters, f is the stock of net foreign assets, q_I is the international sectoral price ratio, defined as the difference between the price of non-tradables and tradables in domestic relative to those of foreign, and z is a stationary residual. q_I only depends on "fundamental" economic conditions like relative preferences and relative technologies (differences in relative productivity – B-S effect). Permanent improvements in productivity in the tradable sector (relative to non-tradables) should lead to a real appreciation of the real exchange rate ("supply effects"). The net foreign assets position on the other hand is an indicator of future demand conditions in an economy ("demand effects"). A low/high value of f puts downward/upward pressure on domestic demand which leads to a depreciation/appreciation of the domestic currency. Alberola et al. (1999, p. 15) and Hansen-Roeger (2000, p. 21) use as similar data set[19]. Whereas Hansen-Roeger (2000) discuss country

[18] Practically the same equation was estimated by Alberola et al. (1999), p. 10.

[19] The r*eal effective exchange rate* (r_t) is measured by Alberola et al (1999) with the CPI-based index of the real effective exchange rates constructed by the IMF for all the considered currencies except the euro. The synthetic euro was calculated from the exchange rates of the 11 euro area countries, weighted by

by country the mismatch between the *multilateral* equilibrium real effective exchange rates for all 17 OECD countries plus the Euro area during the period 1980 to 1999, Alberola et al. (1999) look also at *bilateral exchange* rates over the period 1980 Q1 to 1998 Q4 for three groups of countries: the euro plus some other major currencies (USA, Japan and Canada); EU countries outside EMU, the "out" countries (Denmark, Sweden, United Kingdom and Greece at that time!); and the four largest EMU economies, the "in" countries (Germany, France, Italy, and Spain). In addition they calculated also the equilibrium rates of EMU currencies against the Euro.

In the context of the NATREX model one can ask the question at which exchange rate the acceding countries should enter the EMU. There are few attempts to estimate the equilibrium exchange rates for the CEEC. One was Halpern-Wyplosz (1997). Another, more recent attempt is those by Smidkova-Barrell-Holland-Jakab (2002). They calculate fundamental equilibrium exchange rates (FEERs) for five EU accession countries. Smidkova et al. (2002) start by modeling a small Mundell-Fleming type macro model consisting of an export and import equation, a balance of current account constraint, the net foreign debt and an equation for domestic prices. The FEER is obtained when solving the equations for the real exchange rate. Hereby, as a rule of thumb the authors assume that for transitional economies in the catch-up process a deficit in the balance of current account of 4% of GDP (instead of a balanced current account as required in the NATREX model!) is a first approximation for a sustainable development in the external balance. Interestingly, FDI enters the export and import demand equations in addition to relative prices (real exchange rate) and the income term. They argue that the higher the stock of the FDI, the smaller the technology gap. Hence exports are more competitive, and productivity of labor is higher the more FDI inflows occur.

With this analytical framework the authors calculate FEERs for five EU accession countries (Czech Republic, Estonia, Hungary, Poland and Slovenia) (Smidkova et al., 2002, p. 9).
First, in a period of ten years (1995-2005) they calculate a trend real appreciation of the FEER for all five CEECs of around 50% (i.e. around 5% per annum). Second, the deviation of the

manufacturing exports. In contrast, Hansen-Roeger (2000, p. 21) prefer the GDP deflator based index to calculate the real effective exchange rate. The *stock of foreign assets* (f_t) was computed by starting with an initial stock (supplied by the OECD) and then adding up the current account balances for each country. The *index of relative sectoral prices* ($q_{I,t}$) was not directly available. As a proxy for the relative change of productivity of the non-tradable to the tradable sector the ratio of CPI to WPI (consumer to wholesale prices) is used.

actual real exchange rate and the FEER measures the misalignment. For the individual countries the results vary: The Slovenian Tolar seems to be undervalued relative to its FEER. In contrast the Polish Zloty is overvalued, also the Estonian krona. The other currencies seem to be in line with its "equilibrium" FEER value. The authors stress that their work is very preliminary. In particular the result depends on the assumption of a "sustainable" current account deficit of 4 percent of GDP.

7. What Happens with the Value of the Euro after EU Enlargement?

Although it is not possible to predict what will be the quantitative value of the Euro after enlargement, it is – according to Stein (2002a) - possible to predict within a range of values the consequences of different scenarios involved with the enlargement. He uses the NATREX model as a framework of analysis that is sufficiently flexible to explain the transmission mechanism. Primarily, the effect of enlargement upon the Euro will depend upon how it affects the fundamentals.

Here we briefly discuss the arguments by Stein (2002a) in the context of three scenarios with his NATREX model:

Scenario I: The desired capital inflow (I-S) into the entire EMU rises (FDI inflows):

There is a rise in social absorption, equal to government plus private consumption plus social investment, in the CEEC. Via FDI inflows, investment is in shopping centers, residential construction, hotels, public utilities, highways and telecommunications. There are rises in the fundamental determinants Z_1 and Z_2 which affect saving and investment, but the other parameters – relative productivity Z_3 (a B-S effect) and the growth rate of real GDP are unchanged. In contrast to this theoretical reasoning, simulations with the NiGEM world macro model (see Barrell et al., 2001) come to different conclusions. When in the next ten years the FDI stocks (the aggregate macro model cannot identify which sectoral purpose they might have) in the 4 acceding countries Czech Republic, Hungary, Poland and Slovenia are doubled this leads to a considerable increase in real GDP in the CEEC of 10 to 20 per cent in 10 years and via spill-overs also to the EU neighboring countries like Austria and Germany of 0.10 to 0.3 per cent. FDI inflows affect the REER in East (appreciation by around 2 per cent) and West (appreciation by around 0.2 per cent)

Scenario II: Investment is diverted from the EU to the CEEC:

Through this reallocation the I-S for the entire EMU is unaffected. The resulting output is exported from the enlarged EMU to the rest of the world. There is a rise in the trade balance, without any permanent change in the other fundamental *Z*-variables. Real GDP growth in the

whole EMU is unaffected. The investment diversion may also come about via the integration of the new 10 member states into the system of EU regional policy. This system will be financed by reducing transfers to the incumbent EU member states (the cohesion countries) and transferring it to the new poor member states (see Breuss-Egger-Pfaffermayr, 2001, 2003).

Scenario III: Restructuring of the new economies leads to an increase in real GDP growth:

There is a rise in the external factors determining real GDP growth. The stylized facts are: (a) growth in the rapidly growing economies of the CEEC can be attributed to the growth in FTP; and (b) the productivity growth does not accord with the B-S hypothesis, but is broad based almost equally in both tradable and non-tradable sectors; (c) the growth is attributable to the restructuring of the economies by privatized firms, generally controlled by foreign investors. The growth impulse might stem from the degree of liberalization, measured by the EBRD liberalization index. Simulations with the NiGEM world macro model (see Barrell et al., 2001) underline these reasonings. In this scenario the EBRD liberalization index of the 4 EU acceding countries (Czech Republic, Hungary, Poland and Slovenia) is increased faster as in the baseline scenario. That means that the process of a better allocation is speeded-up and the market forces come into play more rapidly than expected until now. The NiGEM simulations show that real GDP increases considerable in the 4 acceding countries (up to cumulated 10 percent over 10 years) and again that this results in spillover effects to the old EU member states. Again higher GDP growth is connected with real appreciations – stronger in the CEEC than in the old EU member states.

8. The "Official" Road Map to the EMU

The ten acceding countries will enter the EU in two steps (two-step integration):

(1) on May 1, 2004 they will join the EU on the basis of the *Single Market*;

(2) Only later – after having run through the following steps – they may join the EMU and will get the Euro.

The official doctrine – represented by the European Central Bank (ECB, 2000, p. 121) and the ECOFIN Council of November 7, 2000 (see European Commission, 2001) – proposes a step-by-step integration of the new member states into EMU. The ECOFIN Council in its statement on the implications of the accession process upon exchange rate arrangements in the candidate countries identified three distinct stages (two of which belong to the after-accession period) for the full monetary integration of candidate countries:

(1) The *pre-accession stage*: Free choice of an exchange rate regime; policy should be oriented towards achieving real and nominal convergence; fulfillment of the (economic) Copenhagen criterion of "the existence of a functioning market economy able to cope with competitive pressures and market forces within the Union"; this stage has been already passed with the 5th progress report by the European Commission as of October 10, 2002, in which the Commission attested 10 candidate countries that they are functioning market economies; the European Council of the EU on its historic Copenhagen summit on December 12-13, 2002 declared that 10 candidate countries will become members on May 1, 2004 if the following process of signing the accession treaty in Athens on April, 16 2003 and the following ratification procedure is finished properly.

(2) The *accession stage:* New member states shall treat their exchange rate policy as "a matter of common interest" (EC treaty Art. 124); no competitive devaluations; the candidate countries enter the EU as member states with a derogation concerning the EMU; co-ordination of economic policy and expectation that they work towards fulfilling the Maastricht convergence criteria.

(3) *After accession*, although not immediately, accession countries are expected to join the ERM II. The ERM II has stable but adjustable central rates to the euro for the participating currency with fluctuation bands of +/- 15% around the central rate; countries with a Currency Board pegged to the euro may join the ERM II; after application the candidate countries are evaluated according to the Maastricht convergence criteria; the new member states will adopt the euro in a manner that ensures equal treatment with the initial participants in the euro area. The new member states must have remained in the ERM-II for at least two years with its exchanger rate within the prescribed fluctuation band. Hence, the earliest possible date for entering the EMU will be the years 2007/08. Begg et al. (2003) fear that in the interim period the ACs are highly vulnerable to capital inflows and in the extreme case to financial crises. This is due to the combination of full capital mobility and the requirement to participate in ERM-II. However, the ERM-II must not lead to a fixed exchange rate arrangement. It can be handled individually tailored to each country's needs.

- Table 7 -

At present (see Table 7), all acceding countries have problems at least with one of the five Maastricht convergence criteria as a precondition for joining the EMU. Cyprus would have no problems. The same is true for Latvia, however, this country must give up the Currency Board arrangement, pegging its exchange rate to SDR.

Whereas the inflation criterion as well as the budget criteria are rigid, ERM-II allows more flexibility. Here each member can arrange individually a band with the ECB, at the maximum up to +/-15% fluctuations vis-à-vis the Euro. And the acceding countries have some time to adjust their exchange rates towards "equilibrium real exchange rates" suggested by NATREX or other models. De Broeck-Slok (2001) estimate – due to the B-S effect – for the candidate countries which rates of appreciation one can expect, if they are bound to converge their productivity levels towards those in Portugal. Only Slovenia is already there, so there is no need for further real appreciation. Slovenia is the only CEEC which exchange rate regime targets towards constancy in its real exchange rate! Based on De Broeck-Slok (2001) estimates, Barrell-Holland-Smidkova (2002, p. 10-11) conclude that the Czech Republic and Hungary should appreciate by a further 3 ½ percent if aggregate productivity reaches 60 percent of EU average. The Polish real exchange rate should appreciate by about 18 percent and the Estonian real exchange rate should appreciate by about 28 percent. If convergence in productivity takes place at a steady pace over about 10 years, Estonia should experience an appreciation of about 2 ½ percent per annum and Poland an appreciation of about 1 ½ percent per annum (see also Barrell-Holland-Smidkova, 2002).

Smidkova et al. (2002) showed in their estimations that the fundamental real exchange rates appreciated by about 4-6 per cent per annum on average in the first half of the nineties. Since then the fundamental appreciation continued at a slower pace of around 1-2 per cent per annum until 2001. They estimate that the fundamental appreciation will fall over time as productivity levels converge to EU levels. By 2005, the equilibrium real appreciation is expected to fall to about 1 per cent per annum. By the end of 2001, the currencies of all five EU acceding countries (Poland, Hungary, Czech Republic, Slovenia and Estonia) – with the exception of Slovenia, which appeared to be close to its fundamental levels – appeared to be somewhat overvalued.

Barrell-Holland-Smidkova (2002) - with the help of NiGEM model simulations - studied the outcome of some shocks on the five EU acceding countries, built into the NiGEM world model:

(1) First they simulated an *European technology shock*, leading to an increase in the equilibrium level of output by 1 per cent in the Euro area. This leads also via spill-overs to a smaller than 1 percent increase in real GDP in the CEEC, and hence also to a slight real appreciation of their currencies. They did this simulations under the assumption of different exchange rate behaviors in the CEEC (flexible and fixed nominal exchange rates).

(2) Then a *European fiscal tightening* was simulated by reducing the rate of growth in the Euro are for a sustained period of time (1 percent reduction of budget deficits). Initially, in the CEEC output is higher under fixed regimes, but after four years output is lower under the fixed regime in most countries. In the long-run, the choice of the regimes does not affect the level of output. Overall, the output and price impact on the five CEEC is small.
(3) *Timing of EMU membership:* Here, five possible accession dates are simulated: 2005, 2006, 2007, 2008 and 2009. A precondition for entering the EMU is the convergence of short-term interest rates to Euro area level. As all the CEEC have higher nominal interest rates, this implies different patterns of exchange rate changes. The NiGEM model assumes that the removal of the interest rate differential involves a fall in rates, which induces a nominal depreciation, and a removal of the risk premium, which induces an appreciation. The latter effect is stronger in the model. Therefore the simulations lead to a sharper appreciation of the real exchange rate relative to the baseline scenario the earlier the countries join the EMU. In the three countries Czech Republic, Hungary and Poland, the real appreciation amounts to 2 ½ percent when joining the EMU in 2005 and only around ¾ of a percent when entering EMU in 2008. Similar is the pattern of price deflation – it is stronger when joining earlier than when joining later. The implied real appreciation dampens real GDP in Czech Republic when joining the EMU in 2005 by nearly 1 percentages points, in Hungary only by ¼ percentage points and in Poland there is an increase of real GDP of 1 ¾ percentage points (explanation by Barrell et al. 2002, p. 34: Poland has a larger domestic market than the very open small countries Czech Republic and Hungary).

9. Conclusions

Overall one must conclude that real exchange rate appreciations that reflect productivity gains in the tradable sector (due to the B-S effect) are an equilibrium phenomenon and do not erode competitiveness. The important policy conclusion then is that in transition economies, these appreciations progress in their becoming full-fledged market economies, and they do not require a policy response. Furthermore, the official doctrine of the EU in taking in the new member states into the EMU does not explicitly consider the B-S effect but look primarily on the fulfillment of the Maastricht convergence criteria which are primarily price, interest rate and budgetary criteria and look on the behavior of the nominal (and only see a hindrance in depreciations), not on the real exchange rate. Halpern-Wyplosz (1997, p. 458) conclude that PPP is not an appropriate benchmark in transforming economies. Real appreciation is the equilibrium outcome of a successful transformation. In fact, transformation will be completed

when the real appreciation stops. One must take into consideration that the economic distance for the new entrants to catch up is much larger than for any previous entrants to the EU (see Halpern-Wyplosz, 2001, p. 15). The scope for catch up of the largest transition country, Poland, is about twice that facing Greece or Portugal when they joined. By 2004, when they enter EU's single market, they will have moved further ahead, of course, even so when they may enter the EMU in 2007/08. Previous accessions allowed for a larger menu of options. ERM membership was not required, EMU was not in existence. Even if the transition economies elect to move slowly, the fact that they must first join the ERM-II, and then EMU, is an important constraint which affects both the behavior of forward-looking financial markets and the authorities. Further more, at the time of previous accessions capital controls were not actively disallowed. Greece, Portugal and Spain all made extensive use of this possibility. A sizeable real appreciation will characterize the transition countries for a long time to come, and most likely for long after they have joined EMU. This means either a trend appreciation of their nominal exchange rates with inflation at the EMU average, or an inflation rate in excess of the EMU average if the exchange rate vis-à-vis the euro is kept constant, and even more inflation, if the nominal exchange rate is allowed to depreciate. Halpern-Wyplosz (2001, p. 15), based on their B-S effects calculation "guesstimate" that the B-S effects was responsible for an average annual rate of real appreciation of around 3 percent. During the two-year ERM membership period, which is required prior to EMU entry, there will be a trade-off between exchange rate stability and the inflation target. Keeping the nominal exchange rate stable, as required for accession to EMU, could lead to an inflation rate 3 percentage points above that in the euro area. Preventing such an inflation rate, which is also required for entry into the EMU (Maastricht convergence criteria), will require the nominal exchange rate to appreciate each year by 3 percentage points. Over two years, this would represent about half of the ERM-II bandwidth. The tendency for real appreciation could be reinforced by capital inflows. In fact, the inflows will affect the real exchange rate both via the nominal rate and via the B-S effect as FDI has been found to significantly raise productivity growth more in industry, and less in the services sector. Such an outcome could absorb the remaining half of the bandwidth for ERM-II. Halpern-Wyplosz (2001, p. 15), and similarly Begg et al. (2003) conclude pessimistically: "The risk of currency crises in the acceding countries is therefore far from negligible".

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Tables

Table 1: The Dimension of EU Enlargement, 2001

	Area 1000 km2	Popu-lation Mill.	GDP curr.pr. Bio.Euro	GDP PPP Bio.Euro	GDP p.c. curr.pr. Euro	GDP p.c. PPP Euro	GDP p.c. curr.pr. EU=100	GDP p.c. PPP EU=100
Cyprus	9.0	0.8	10.2	12.5	12750	18460	54	80
Czech Republic	79.0	10.2	63.3	136.2	6206	13280	26	57
Estonia	45.0	1.4	6.2	13.4	4429	9820	19	42
Hungary	93.0	10.2	58.0	121.0	5686	11880	24	51
Latvia	65.0	2.4	8.5	18.2	3542	7700	15	33
Lithuania	65.0	3.5	13.4	30.5	3829	8730	16	38
Malta	0.3	0.4	4.0	4.6	10000	12700	43	55
Poland	313.0	38.6	196.7	355.9	5096	9210	22	40
Slovakia	49.0	5.4	22.3	58.0	4130	10780	18	47
Slovenia	20.0	2.0	20.9	31.8	10450	15970	45	69
Acceding countries (AC-10)	738.3	74.9	403.5	782.1	5387	10460	23	45
Bulgaria	111.0	7.9	15.2	51.8	1924	6510	8	28
Romania	238.0	22.4	44.4	131.3	1982	5860	8	25
Turkey	775.0	68.6	164.6	357.3	2399	5210	10	22
Candidate countries (CC-13	1862.3	173.8	627.7	1322.5	3612	7600	15	33
EU-15	3236.3	375.9	8815	8814.8	23450	23160	100	100
EU-25	3974.6	450.8	9218.3	9596.9	20449	21289	87	92
EU-28	5098.6	549.7	9442.5	10137.3	17178	18442	73	80
				The "Newcomers" in % of EU-15				
AC-10	*22.8*	*19.9*	*4.6*	*8.9*	*23.0*	*45.2*	23	*45*
CC-13	*57.5*	*46.2*	*7.1*	*15.0*	*15.4*	*32.8*	15	*33*

Source: European Commission, "Progress towards meeting economic criteria for accession: The assessment from the 2002 regular report", European Economy, Enlargement Papers, No. 10, October 2002a, Brussels.

Table 2: Exchange Rate Behavior and Current Exchange Rate Regimes in the EU acceding/candidate countries, 1999-2002

Country	Curr-ency code	Nominal Euro exchange rates	Real Euro exchange rates	Exchange rate regimes (Monetary policy framework)
		appreciation (+)/depreciation (-) vis à vis the Euro		
		1/1999-12/2002	1/1999-8/2002	
Acceding countries (AC-10)		*in %*	*in %*	
Cypriotic pound	**CYP**	1.6	-	Floating with bands (+/-15%)
Czech koruna	CZK	16.6	19.5	Managed float (Euro) (Inflation targeting)
Estonian krone	EEK	0.0	6.0	*Currency board* (Euro)
Hungarian forint	HUF	3.0	24.5	Crawling peg (Euro) extended band (+/-15%) (Implicit inflation targeting)
Latvian lats	LVL	11.2	9.7	Fixed peg (SDR); intervention at +/- 1% (Quasi-Currency board; additional monetary aggregates targeting)
Lithuanian litai	LTL	34.5	26.2	*Currency board* (USD)
Maltese lira	MTL	6.8	-	Pegged to basket
Polish zloty	PLN	1.5	12.7	Free float (Inflation targeting)
Slovak koruna	SKK	2.3	16.9	Managed float (Monetary aggregates targeting)
Slovenian tolar	SIT	-17.3	0.5	Managed float (Monetary aggregates targeting)
Candidate countries (CC-13)				
Bulgarian lev	BGN	0.5	15.9	*Currency board* (Euro)
Romania leu	ROL	-59.5	14.6	Managed float (Monetary aggregates targeting)
Turkish lira	TRL	-76.8	-7.4	Free float

Sources: European Commission (2002b), p. 243 and own calculations with ECB data.

Table 3: Capital account regulations in transition countries

Type of transaction	**BG**	**CZ**	**EE**	**HU**	**LV**	**LT**	**PL**	**RO**	**SK**	**SLO**
Direct investments	Free	S	S	S	Free[3]	S1	S1	S	S2	S, Q
Investment in real estate	L	L	L	L	L	S/P	L	L	L2	L
Stock market operations	Free[4]	S	L	L	Free[1]	Free[1]	L	Fee[1,2]	Free	L
Security & money-market operations	Free	Free	Free	P	Free[1]	Free[1]	P	P	Free	Free
Operations in current & deposit accounts with FI	Free1	Free	Free	Free	Free	Free[1]	Q,P	P	Free[1]	Free[1]
Financial loans	R	Free	Free	Free	Free	Free	Free[5]	P	Free	Free
Transfers in performance of insurance contracts	R	Free	Free	L	Free	L	L	Free	Free	Free
Personal capital movements	R	Free	Free[1]	Free	Free	Free	P,Q	P	Free	Free

Notes: Free: No limitations; L: Limited; P: Permission required; Q: Quantitative restrictions apply; R: Registration required; S: Free except fro sectoral limitations.
Bulgaria: 1 April 2002; Czech Republic; 1 January 2001; Estonia: October 2001; Hungary: 16 June 1001; Latvia: November 2001; Lithuania: November 2001; Poland: 1 March 2000; Romania: August 2002; Slovak Republic: June 2002; Slovenai: June 2002.
[1] Some restrictions/requirements on outward operations. [2] Outward investments are free to OECD or EEA members. [3] Certain requirements on citizenship and language proficiency. [4] Acquisition of foreing items: R. [5] Short-term investments: P.
Source: Begg et al. (2003), p. 16 based on informations by the European Commission.

Table 4: Results of Selected Time Series Studies of the BS effect

		Real appreciation vis-à-vis Germany due to Balassa-Samuelson effects (%-pt., unless otherwise noted)					
		Czech Republic	Hungary	Poland	Slovak Republic	Slovenia	Panel
Study	**Period**						
Sinn-Reutter (2001)	1994-1999 (a)	1.8	5.7	3.0	-	2.3	-
Golinelli-Orsi (2001)	1993-2000 (b)	4.3	2.1	5.1	-	-	-
Backé et al. (2002)	1992-2000 (c)	0.8	5.6	9.4	-	3.5	-
	1995-2000 (c)	0.4	3.8	9.8	-	3.9	-
Égert (2002a) (d)	1991-1995	1.0	2.0	1.4	-1.4	-0.8	0.6
	1996-2001	0.9	4.6	2.8	0.6	1.4	1.8
	1991-2001	0.1	2.3	1.5	-1.7	-0.7	0.5
Égert (2002b)	1991-2000 (e)	0.6	2.5	3.1	-0.3	1.2	-
	1990's-2000 (f)	-	3.7	3.1	-	1.1	-
Kovács (2002)	1990s (g)	1.6	1.9	-	1.0-2.0	0.7-1.4	-
	1990s (h)	0.1	1.0-2.0	1.2	1.5	-	1.0-2.0
Selected studies (i)	various periods	-	0.8-2.5	1.2-1.5	-	0.7	-

(a) Base periods are 1994-1997 (Poland, Hungary), 1995-1998 (Czech Republic), 1996-1999 (Slovenia).
(b) Contribution to CPI inflation rate in percentage points.
(c) Inflation differential implied by sectoral productivity developments and sectoral labor shares.
(d) HP filter used to smooth raw data. Table displays average estimates using coefficients from time series analyses and coefficients obtained from panel co-integration.
(e) For Slovakia and Slovenia estimation periods start in 1993:I (monthly data).
(f) Periods start at 1995:5 (Hungary), 1993:1 (Poland), and 1995:4 (Slovenia) respectively.
(g) "From simple accounting"; Hungary for 1994-2001.
(h) "From econometric evidence".
(i) Simon-Kovács (1998) for Hungary vis-à-vis developed countries; Durjasz (2001) for Poland; Zumer (2002) for Slovenia in 1993-2001; estimates for other periods differ: 1993-1996: 0.02%, 1997-2001: 1.4%

Source: European Commission (2002b), p. 247

Table 5: Results of Selected Country Panel Studies of the BS effect

	Real appreciation vis-à-vis EU-15 due to Balassa-Samuelson effects (%-pt.)		
Study	**Country**	**Period**	
Pelkmans, Gros, Núnez-Ferrer (2000)	CEEC-10 (a)	1997-1999	3.8 (b)
IMF (2000, p. 169)	CEEC-10	1993-1999	0.4%-pt. per 1% growth differential
De Broeck-Slok (2001) (f)	CEEC-10	1991-1998	1.4-2.0
Halpern-Wyplosz (2001) (f)	8 countries (c)	1991-1999	2.0-2.2
Coricelli-Jazbec (2001) (f)	19 transition countries (d)	1990-1998	0.7-1.2
Fischer (2002) (f)	CEEC-10	1994-1999	1.9-2.6
Égert (2002a) (f)	CEEC-5 (e)	1991-2001	0.5-1.8
Arratibel, Rodríguez-Palenzuela, Thimann (2002)	CEEC-10 (a)	1995-2001	"relatively insignificant"
Begg et al. (2002)	9 countries (g)	1991-1998	0.4-0.7 to 0.8-1.4 (h)

(a) CEEC-10: all ten CEEC candidate countries.
(b) Vis-à-vis the euro area (EU-11).
(c) CEEC-10 excluding Bulgaria and Slovakia.
(d) CEEC-19 (CEEC-10 plus Armenia, Belarus, Croatia, Kazahkhstan, Kyrgyzstan, Russio, Ukraine and Uzbekistan).
(e) Czech Republic, Hungary, Poland, Slovak Republic, Slovenia.
(f) Figures calculated by the Deutsche Bundesbank (2001, p. 25).
(g) Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovenia.
(h) The lower figures refer to short-term %-pt.-changes of relative prices (service-to-non-foods price ratio), the higher figures are long-run changes.

Source: European Commission (2002b), p. 248.

Table 6a: B-S effect versus total TFP shock in Hungary, Poland and Rest-CEEC

	PN/PT		**TOT**		**Exports-total**	
	B-S[1)]	Total[2)]	B-S[1)]	Total[2)]	B-S[1)]	Total[2)]
	%-changes					
AUT	0.03	-0.26	-0.02	-0.18	0.40	1.51
BEL[*)]	0.05	-0.02	0.00	0.03	-0.06	0.37
GPS[*)]	-0.01	-0.09	-0.07	-0.13	0.21	0.79
DEU	-0.06	-0.23	-0.16	-0.35	0.45	1.35
FRA	-0.02	-0.11	-0.09	-0.18	0.28	0.93
ITA	-0.05	-0.17	-0.13	-0.27	0.42	1.30
GBR	0.00	-0.07	-0.05	-0.09	0.18	0.67
DNK	-0.03	-0.14	-0.08	-0.15	0.18	0.73
FIN	-0.03	-0.11	-0.07	-0.08	0.23	0.85
SWE	-0.02	-0.10	-0.11	-0.15	0.08	0.51
EFTA[*)]	-0.01	-0.07	-0.07	-0.10	0.10	0.50
HUN	**20.01**	**14.96**	**2.88**	**5.85**	**-7.37**	**-20.63**
POL	**23.91**	**18.20**	**8.87**	**14.37**	**-29.86**	**-53.95**
CEE[*)]	**20.06**	**16.46**	**5.62**	**11.74**	**-18.01**	**-44.63**
XSU[*)]	-0.04	-0.19	-0.11	-0.24	0.67	1.87
USA	-0.02	-0.06	-0.16	-0.31	0.52	1.31
ROW	-0.04	-0.13	-0.14	-0.26	0.25	0.77

Table 6b: B-S effect versus total TFP shock in Hungary, Poland and Rest-CEEC

	GDP, real		**GDP, price level**		**Welfare-total**	
	B-S[1)]	Total[2)]	B-S[1)]	Total[2)]	B-S[1)]	Total[2)]
	%-changes				Mill.USD	
AUT	-0.02	-0.08	0.08	0.19	-74	-313
BEL[*)]	-0.01	-0.02	-0.08	0.00	-110	-31
GPS[*)]	0.00	-0.01	-0.20	-0.25	-266	-458
DEU	-0.03	-0.08	-0.17	-0.12	-1643	-3595
FRA	-0.02	-0.06	-0.21	-0.25	-741	-1470
ITA	-0.02	-0.05	-0.21	-0.22	-664	-1305
GBR	0.00	0.00	-0.20	-0.23	-237	-350
DNK	-0.03	-0.06	-0.17	-0.15	-107	-187
FIN	-0.02	-0.04	-0.17	-0.08	-64	-84
SWE	-0.02	-0.05	-0.18	-0.14	-162	-239
EFTA[*)]	-0.01	-0.03	-0.18	-0.14	-235	-286
HUN	**12.90**	**28.86**	**13.73**	**13.59**	**6141**	**13128**
POL	**14.32**	**30.13**	**21.64**	**24.12**	**22983**	**43379**
CEE[*)]	**15.78**	**27.80**	**13.86**	**19.72**	**25462**	**44588**
XSU[*)]	-0.01	-0.01	0.01	0.32	-238	-433
USA	0.00	0.00	-0.38	-0.63	-2277	-3588
ROW	-0.01	-0.02	-0.39	-0.62	-6691	-9561

[1)] B-S: 10% increase of FTP in tradable sector.
[2)] Total: 10% TFP increase in total economy
[*)] BEL = Belgium, Luxembourg, the Netherlands; GPS = Greece, Ireland, Portugal, Spain; EFTA = Switzerland plus Rest-EFTA; CEE = Rest-CEEC; XSU = Former Soviet Union (CIS).
Source: Own simulations with the GTAP5 world CGE model.

Table 7: Maastricht Convergence Criteria: Acceding and Candidate Countries, 2001 (Precondition to enter EMU)

	Inflation	**Government budgetary position**		**Foreign debt whole economy**	**Exchange rates**	**Exchange rates**	**Long-term interest rates**
	CPI (HICP)[§)] %-change 2001[+)]	Deficit in % of GDP 2001[+)]	Debt (gross) in % of GDP 2000[&)]	Debt in % of GDP 2001[&)]	%-change vis à vis Euro[1)] 2001	Exchange rate regime 2001	Lending rate in % 2001[#)]
Reference value EU-15	*2.7 (3.3)*	*-3.0*	*60.0*	-	*no deva-luation*		*6.9*
Cyprus	**2.0**	**-3.0**	**54.6**	74.9	+1.6	Floating with bands (+/-15%)	**4.9**
Czech republic	4.5	-5.2	**23.6**	26.5	+14.2	Managed float (Euro)	**5.0**
Estonia	5.6	**+0.5**	**5.0**	26.8	+/-0.0	CB (Euro)[4)]	**4.5**
Hungary	9.1	-4.1	**53.1**	44.6	+2.9	Crawling peg (Euro)[2)]	10.9
Latvia	**2.5**	**-1.6**	**16.0**	45.7	+10.0	Fixed peg (SDR)[3)]	**5.2**
Lithuania	**1.3**	**-1.9**	**23.5**	25.5	+25.6	CB (USD[4)5)]	**3.4**
Malta	**2.5**	-7.0	66.0	179.2	+6.4	Pegged to a basket[6)]	**4.7**
Poland	5.3	-3.9	**39.3**	23.3	+1.5	Free float	17.1
Slovakia	7.3	-5.4	**44.1**	33.4	+2.3	Managed float	7.4
Slovenia	8.6	**-2.5**	**27.5**	27.0	-21.0	Managed float	**6.8**
Acceding countries (AC-10)	5.7	-4.0	35.3	50.7	-	-	3.7
Bulgaria	7.4	**+0.4**	70.0	77.4	+0.5	CB (Euro)[4)]	**3.7**
Romania	34.5	-3.3	**23.0**	21.3	-147.2	Managed float	41.0
Turkey	57.6	-28.4	102.4	47.7	-331.8	Free float	92.0
Candidate countries (CC-13)	24.2	-12.5	42.2	50.3	-	-	15.9
Euro area	2.4 (2.5)	-1.5	69.3	-	-	-	5.0
EU-15	2.0 (2.3)	-0.8	63.0	-	-	-	5.0

[1)] Most recent appreciation (+) or depreciation (-) against the Euro since January 1, 1999. The candidate countries are not yet members of the Exchange Rate Mechanism (ERM-II).
[2)] Hungary extended the band of fluctuations against the Euro from +/- 2.25% to +/- 15% on May 4, 2001
[3)] SDR = IMF's Special Drawing Rights, a basket of the USD, Euro, GBP and JPY.
[4)] CB = Currency Board. [5)] Lithuania changed its anchor for the Litas from the US-Dollar to the Euro as of February 2, 2002.
[6)] Basket = 70% Euro, 20% GBP and 10% USD (since August 23, 2002).
Data sources:
[+)] Economic Forecasts for the candidate countries: Autumn 2002, European Economy, Enlargement Papers, No. 12, November 2002, Brussels.
[&)] European Commission, "Progress towards meeting economic criteria for accession: The assessment from the 2002 regular report", European Economy, Enlargement Papers, No. 10, October 2002a, Brussels.
[#)] Day-to-day money rate. [§)] CPI (consumer price index); in parenthesis: HICP (harmonized index of consumer prices).

Figures

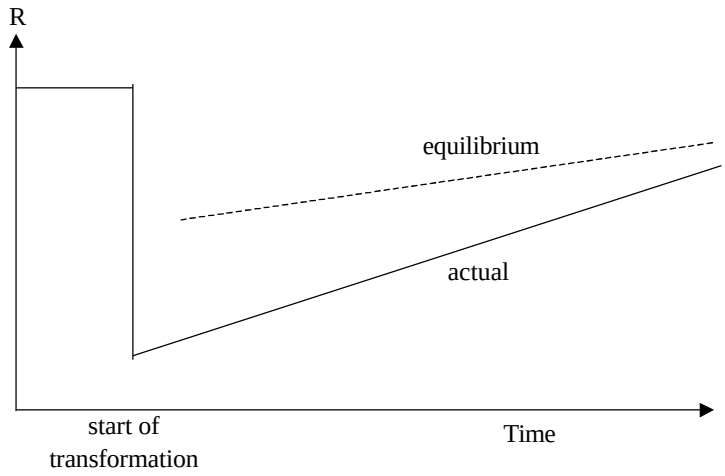

Figure 1: The behavior of real exchange rates in transformation economies (stylized facts)
R = real exchange rate
Source: Halpern-Wyplosz (1997, p. 437).

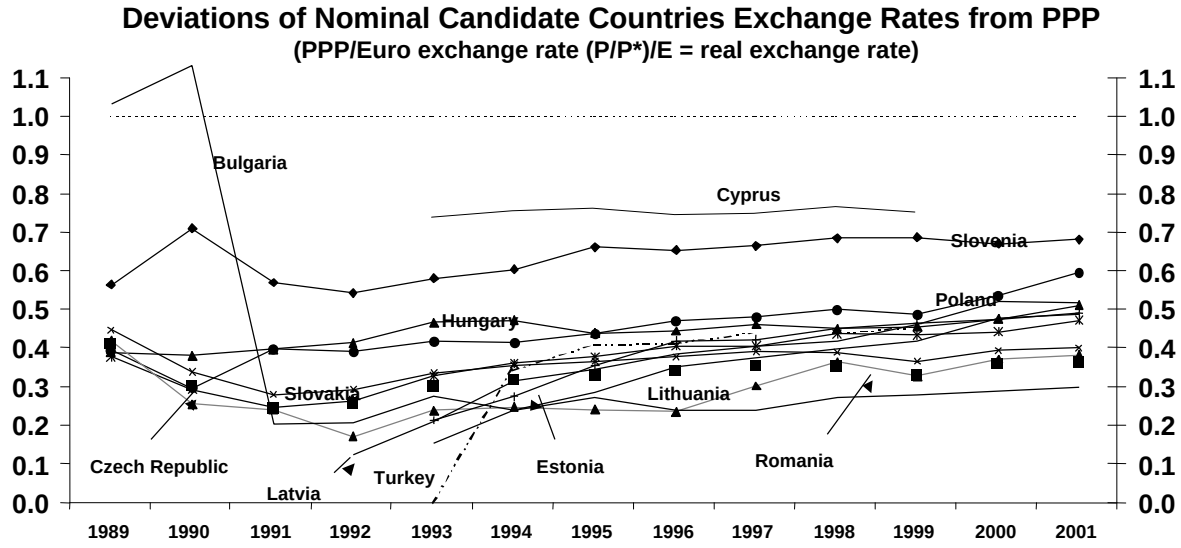

Figure 2: Deviations of Nominal Candidate Countries Exchange rates from PPP
Data source: WIIW, Vienna

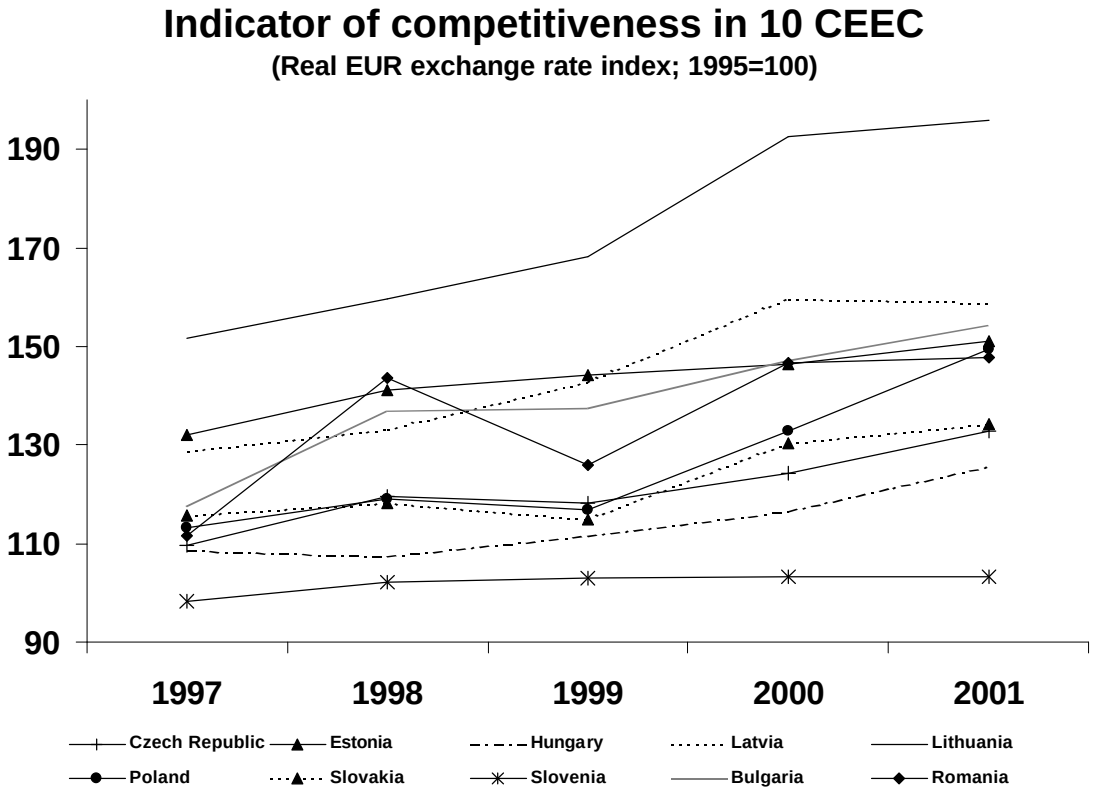

Figure 3: Indicator of competitiveness in 10 CEECs (Real Euro exchange rates).
Source: EBRD, Transition report 2002: Agriculture and rural transition, London 2002, pp. 65-66.

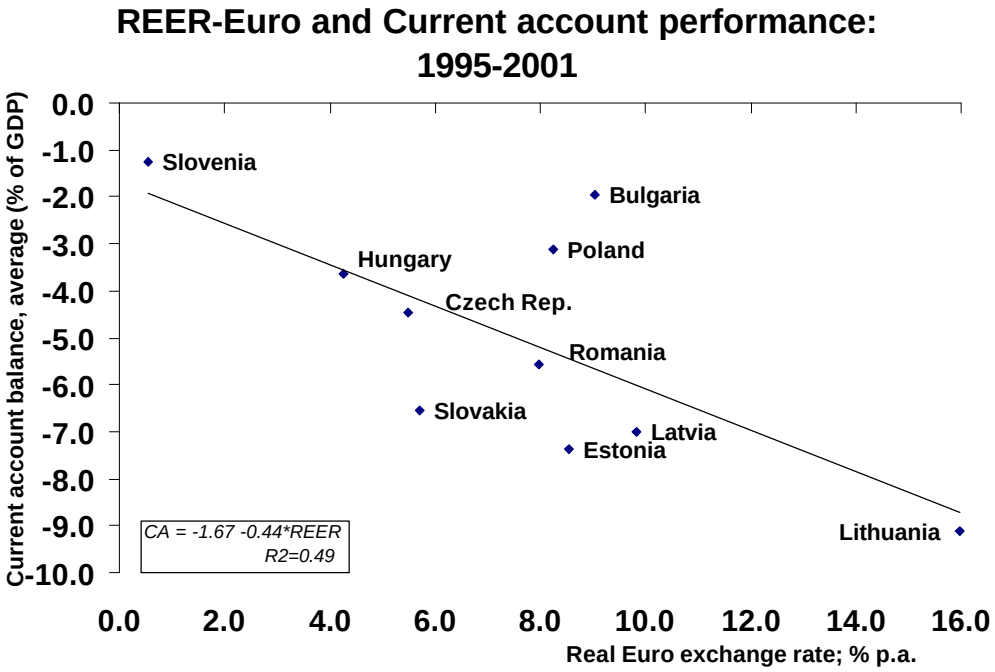

Figure 4: Real exchange rate development and current account position, 1995-2001 in 10 CEEC

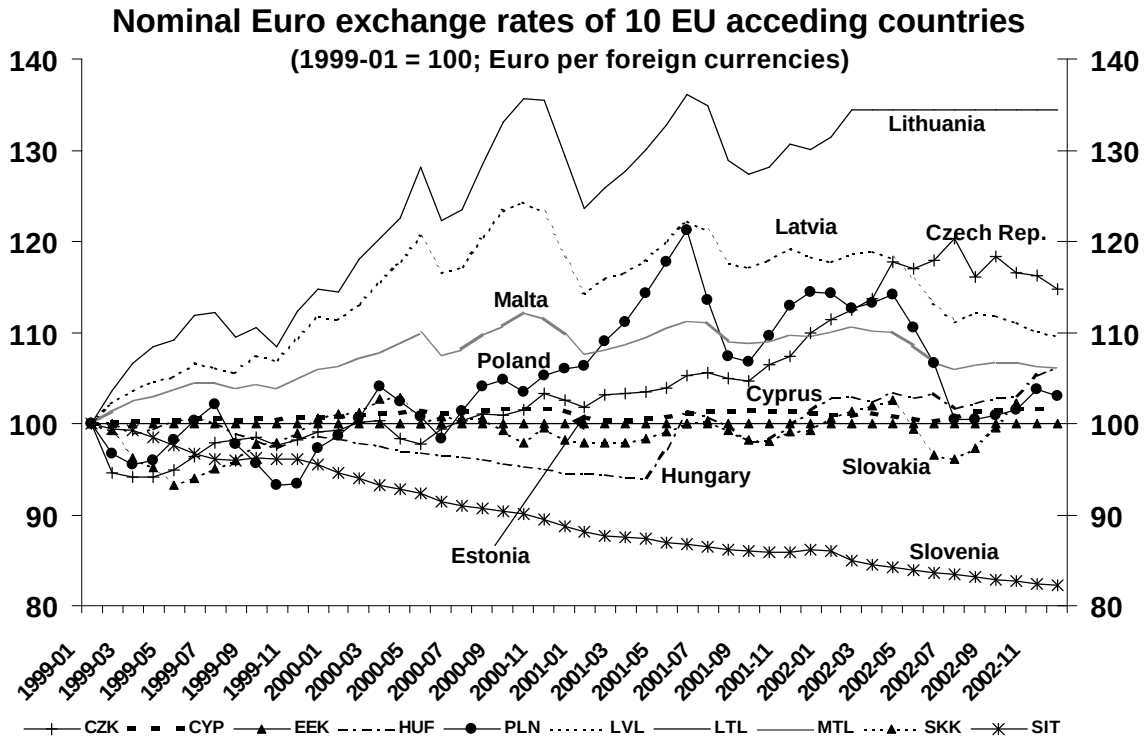

Figure 5: Nominal Euro exchange rates of 10 acceding countries.

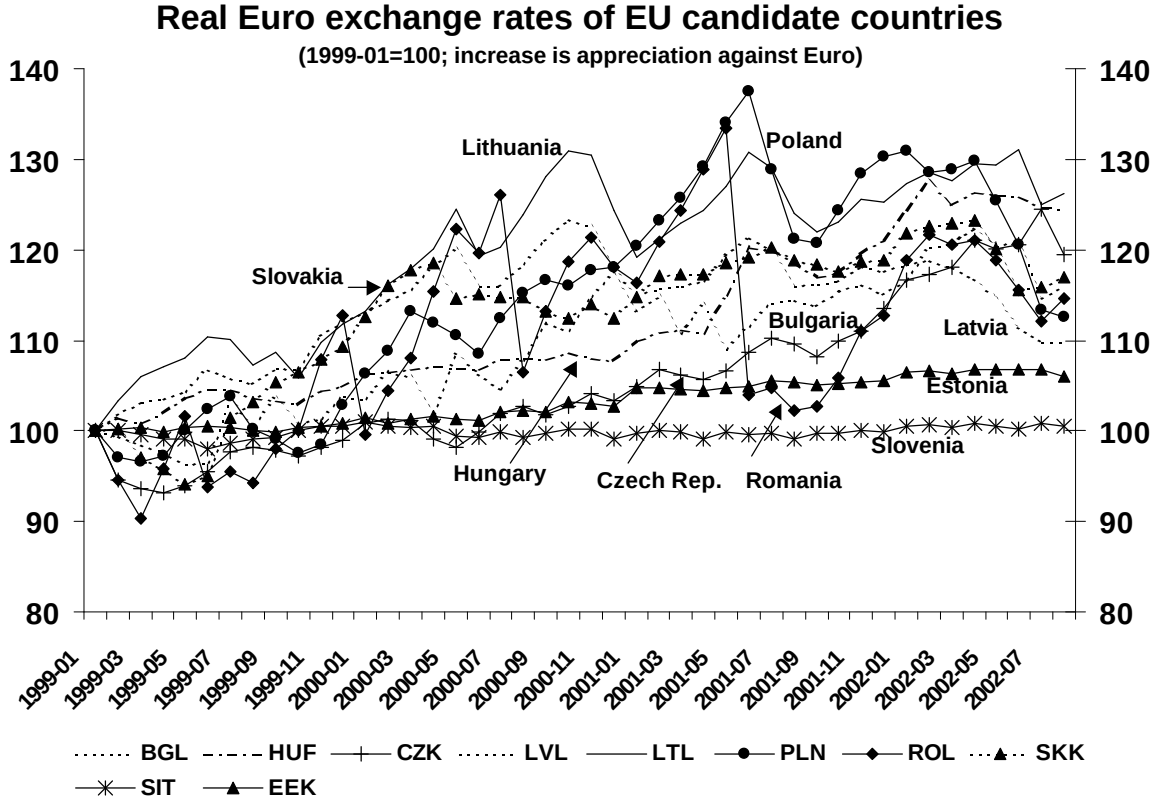

Figure 6: Real Euro exchange rates of EU candidate countries
Real exchange rates = relative CPI in a common currency (Euro); calculated without weighting.

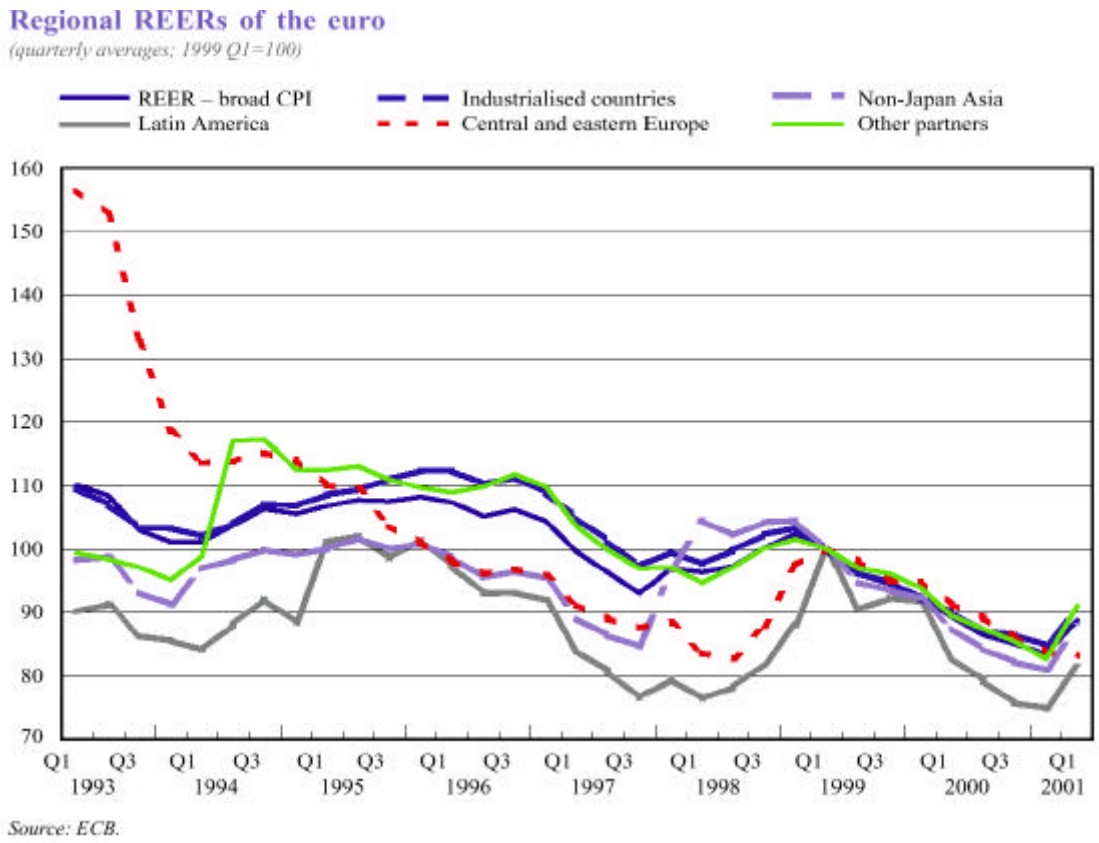

Figure 7: Regional REERs of the Euro
Source: Buldorini et al. (2002).

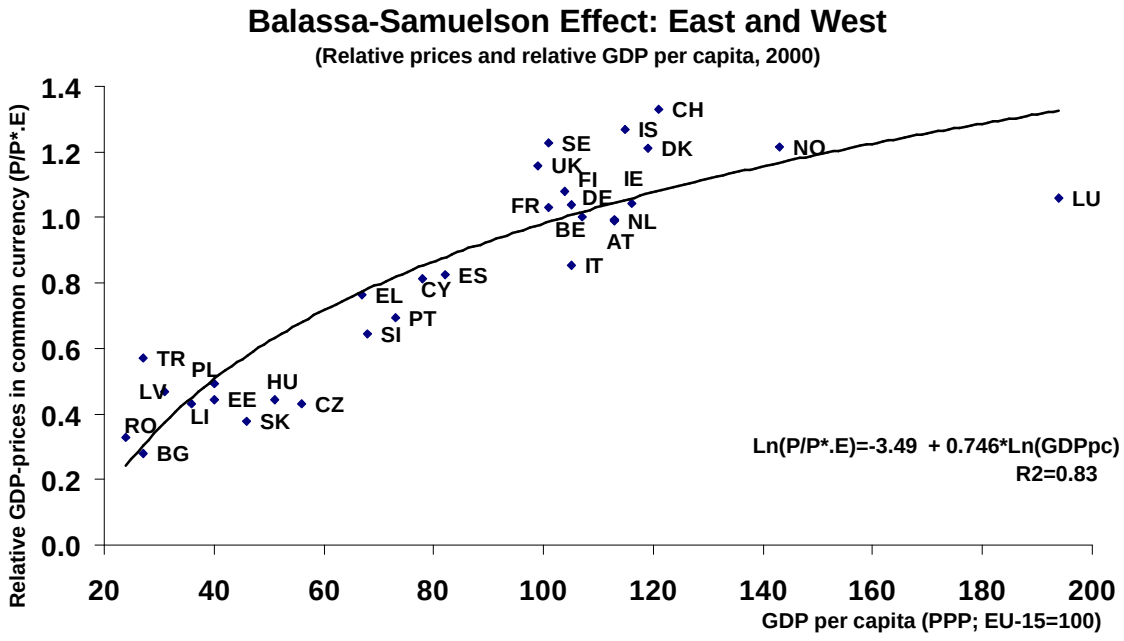

Figure 8a: Balassa-Samuelson Effect: East and West

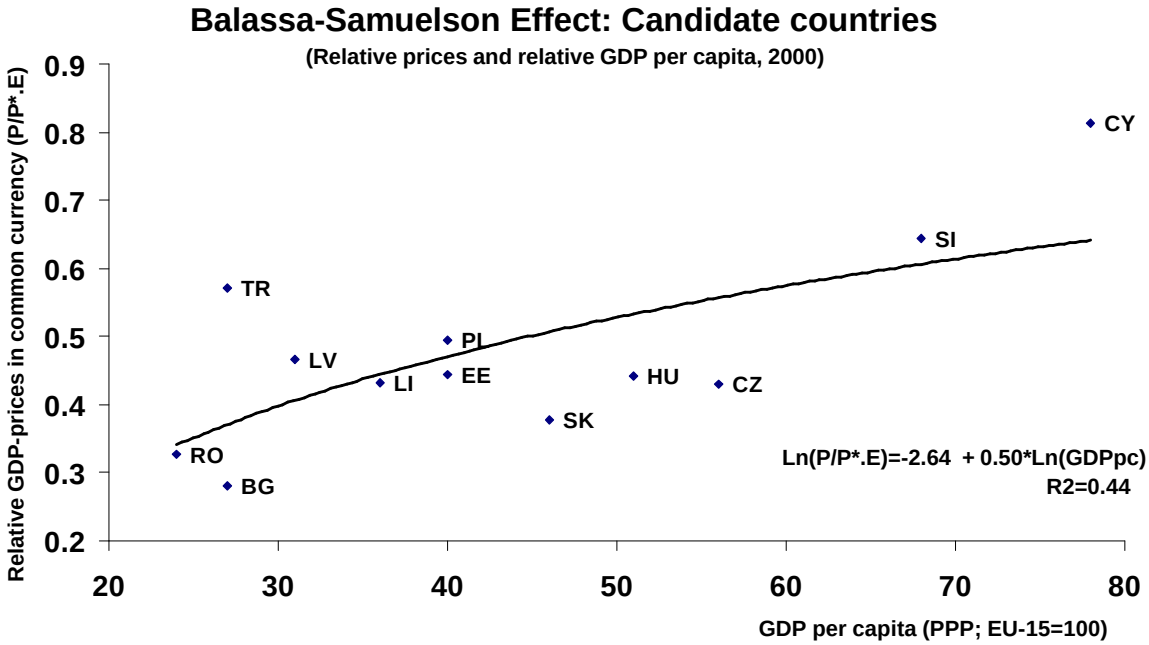

Figure 8b: Balassa-Samuelson Effect: Candidate Countries

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