



# **Monetary Policy and Currency Substitution in the Emerging Markets**

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## **Exchange Rate Arrangements in the Accession to the EMU**

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# Exchange Rate Arrangements in the Accession to the EMU

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## Abstract

Several observers have raised the issue of whether the process of real convergence of candidate countries to income levels of EU members is compatible with EU membership and eventually adoption of the euro, as Maastricht criteria impose strict constraints on nominal variables. After accession, countries have to decide the optimal path to the adoption of the euro. Some have argued that the euro should be adopted only when a sufficient degree of real convergence has been achieved. The idea is that real exchange rates will be affected by real appreciation trend, which would imply higher inflation if countries enter the euro zone. The paper shows that Balassa-Samuelson effects are relevant but such long-term considerations cannot justify maintaining flexibility of exchange rates for a long time. Another set of arguments in favor of delaying adoption of the euro is based on shorter-term considerations, namely the possibility of using nominal exchange rates to achieve a real exchange rate target and maintain competitiveness. This view seems to suggest the need for an accommodative exchange rate policy in the presence of inertia in prices and inflation in non-tradable goods. Fixing the exchange rate could imply temporary losses of output in the non-tradable sector. The paper argues that while a fast disinflation achieved through the end of accommodative exchange rate policy would likely imply a temporary fall in output in the non-tradable sector, at the same time it would likely bring a welfare improvement by reducing the welfare losses associated to rigidities and monopoly power in non-tradable sectors. In summing up, the paper finds that the arguments in favor of flexibility of exchange rate and delay in the adoption of the euro are very weak.

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Keywords: Balassa-Samuelson effect, EMU, accession.

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## 1. Introduction

Starting from a very low level of GDP per capita, countries that are in the process of negotiating entry into the European Union (hereinafter candidate countries) have displayed faster rates of output growth than European Union members. Entrance into the EU should boost growth prospects and with it the process of real convergence. Economic integration and foreign direct investment should lead to a rapid growth of productivity in tradable sectors, creating a gap with productivity growth in the non-tradable sector. Such a process implies that the so-called Balassa-Samuelson effect will operate. This will result in a trend appreciation of the real exchange rate. Several observers have raised the issue of whether the process of real convergence is compatible with EU membership and eventually adoption of the euro, as Maastricht criteria impose strict constraints on nominal variables. In particular, inflation should converge to the best performers in the EU. In summary, for candidate countries, the process of real convergence should proceed simultaneously with that of nominal convergence. In this paper, we investigate this issue, looking at the dynamics of real exchange rates in candidate countries and the implications for inflation dynamics. We argue that the observed real appreciation of the last few years can be ascribed in most cases to the workings of the Balassa-Samuelson effect. Such a long-term, anticipated effect cannot justify maintaining flexibility of the exchange rate.

We also found that the real appreciation trend results from higher domestic inflation rather than a nominal appreciation of the exchange rate. Interestingly, for most candidate countries, this takes place in a context of principle flexible exchange rates. However, a similar pattern is identified for countries with a currency board. Thus, inflationary pressures seem to arise irrespective of the exchange rate regime and could be partially attributed to rigidities in the non-tradable sectors in transition economies. These rigidities, however, cannot be considered a justification for flexible exchange rates. Indeed, wage and price setters internalize the exchange rate accommodation rule and a higher inflation rate would arise. A non-accommodating stance of the exchange rate policy – for instance, an early adoption of the euro – would avoid this outcome although the resulting benefits may not be the same for every country (Nutti, 2000). Output in the non-tradable sector would decline temporarily, but the adverse effects of monopoly power on welfare would be contained as the rate of inflation declines. Interestingly, these types of arguments were central in the debate that preceded the creation of the European Monetary Union. In countries such as Italy, the end of the cycle of devaluations was considered a key instrument for a steady reduction of inflation and an end to wage and price pressure in the non-tradable goods sector. These effects on price setting in the non-tradable sector are likely to more than compensate the Balassa-Samuelson effects. Nevertheless, if the Balassa-Samuelson effects were predominant, a change in the Maastricht criteria would be advisable (Buiter and Grafe, 2002).

The paper proceeds as follows. Section 2 presents a short overview on different interpretations of the real exchange rate appreciation in transition economies. Section 3 describes evidence on the Balassa-Samuelson effect in transition economies. It is argued that structural reforms implemented in transition economies have indeed determined the level of real exchange rate during the transition process. These results are used to draw conclusions on the implications for Maastricht criteria and the choice of an exchange rate regime. Section 4 presents conclusions.

## **2. Interpreting the Real Exchange Rate Appreciation in Transition Economies**

Empirical evidence on different models of real exchange rates can be organized in the following two groups of arguments. First, in contrast with earlier empirical work (Meese and Rogoff, 1983), evidence suggests that the real exchange rate does not follow a random walk, and that shocks to the real exchange rate damp out over time, albeit very slowly. In this light, the real exchange rate fluctuates and may exhibit large and sustained deviations from its estimated mean as long as the deviations revert to the mean. The estimated mean is regarded as a purchasing power value, although the estimates may be far from the mean of unity required under purchasing power parity (PPP). Second, evidence shows that real exchange rates tend to be lower in rich countries than in poor countries, and that relatively fast growing countries experience real exchange rate appreciation. Historically, technological progress has been faster in the tradable goods production. Moreover, the tradable goods productivity bias seems to be more pronounced in high-income countries. An increase in productivity of the tradables production bids up wages in the entire economy. Producers of non-tradables are only able to meet the higher wages if there is an increase in the relative price of non-tradable goods. This implies a higher general price level since the price of tradable goods is determined in world markets. This phenomenon is best known as the Balassa-Samuelson effect.

All transition economies have undergone major reforms, all of which have had appreciable consequences for their real exchange rate values. Changes in production and productivity, trade liberalization and removal of state subsidies, restrictive monetary policy accompanied by tax reform, underlying process of financial innovations and bank restructuring, are among the factors that played an important role in determining the key relative price in transition economies. Moreover, these economies had to choose an exchange rate regime that was appropriate for facilitating the reorientation of their trade toward the world market and that was primarily used as a nominal anchor in an attempt to stabilize the economy. Government budget deficits spilled over into current account deficits, which were primarily financed by foreign capital inflows. To these inflows, which exceeded the surge in imports, central banks responded with sterilized intervention.

One would have expected that real exchange rate development in transition economies varied to a great extent across countries. However, in the early days of transition, real exchange rate paths were similar in all transition economies. In general, transition started with the abrupt depreciation of local currencies that accompanied the end of a command economy and the dismantling of previously prevailing multiple exchange rates. Despite differences in monetary and real shocks that these countries have experienced, real exchange rate movements in all transition economies have followed the same time path. Halpern and Wyplosz (1996) offer three explanations for an initial undervaluation of the real exchange rate in transition economies. First, a negligible supply of foreign assets was short of a pent-up demand, which was previously reflected in the black market premium. The undervalued exchange rate in turn allowed for the net acquisition of foreign assets through current account surpluses. Over time, the real exchange rate has been corrected by closing the current account surplus. Second, price liberalization in the presence of monetary overhang was met by a sudden burst in inflation. The process of initial macroeconomic stabilization and price liberalization was associated by the flight from domestic currency. And third, most transition economies were involved with an exchange rate stabilization program, which required fixing the nominal exchange rate. In light of loose credibility and lack of experience, policymakers were more inclined toward setting the nominal exchange rate at higher levels than necessary. The risk of being unable to sustain convertibility was higher than the possible costs of undervaluation at the beginning of transition. Consequently, the real exchange rate had appreciated in order to correct for the implausible initial devaluation of the nominal exchange rate used as a nominal anchor in exchange rate based stabilization programs. However, not all countries have adopted the fixed exchange rate regime. Rather, they fought inflation by focusing on monetary targets. Slovenia and Latvia are among the most distinguished representatives of the money based stabilization programs. It would be expected that the real exchange rate would follow different transition paths in these two countries. However, that was not the case; the real exchange rate movement broadly coincided with the real exchange rate paths in other transition economies, which introduced the fixed exchange rate regime. As Wyplosz (1999) concludes, there is not enough evidence to determine whether any particular exchange rate regime worked better. It is most likely that exchange rate regimes made little difference in the observed path of the real exchange rate and were particularly important in a context of broad stabilization programs with aims to reduce inflation and stabilize price levels rather than directly influence the real exchange rate path (Desai, 1998).

Following the initial undervaluation, the real exchange rate subsequently appreciated. The appreciation of domestic currencies was associated with two phenomena (Roubini and Wachtel, 1998). First, the appreciation was a response to the initial undervaluation of the real exchange rate. And second, the real equilibrium exchange rate itself embarked on a path of trend appreciation mainly explained by the factors that were already mentioned above. In general, a persistent appreciation of the real exchange rate may not be due to misalignments but rather caused by changes in fundamentals. Moreover, it seems that in transition economies, those factors played an even more important role than

is established for other developing countries. Halpern and Wyplosz (1996) and Krajnyak and Zettelmeyer (1997) summarize these factors as determining the real exchange rate path in transition economies, which was observed after the initial depreciation in the following points.

First, formerly inefficient production lines responded to market forces by rapid productivity increases. In turn, income has started to rise again after the initial drop. As suggested by theoretical framework (De Gregorio, Giovannini, and Krueger, 1993; De Gregorio, Giovannini, and Wolf, 1994), increase in income increases demand for non-tradables and results in appreciation of the real exchange rate. Second, if productivity rises faster in the tradable sector than in the non-tradable sector, then the real exchange rate appreciates as predicted by Balassa (1964) and Samuelson (1964). Although one would expect that productivity in the non-tradable sector, which was obviously underrepresented in the previously planned economies, would outperform productivity in the ailing tradable sector, evidence on transition economies refutes this view. The productivity differential between the tradable and non-tradable sectors has been increasing since the early days of transition. One explanation for this development might be found in the overemployed tradable sector before transition, which at the beginning of transition was massively reduced in size and able to adjust to the market. A relatively well-educated labor force caught on to the difference in productivity and let the real exchange rate appreciate. Third, the general price level in transition economies was well below the price levels in countries with comparable PPP-adjusted GDP (Coorey, Mecagni, and Offerdal, 1996; Richards and Tersman, 1996). Most of the natural resource prices as well as public utility prices in transition economies were administered. The situation was not sustainable and consequently, when prices were liberalized, the real exchange rate appreciated. Fourth, the tax reform in transition economies changed most of the relative prices, which contributed the most to the real exchange rate appreciation. The tax reform was needed since the corporate taxation inherited from central planning has become highly inefficient and tax revenues have quickly shrunk. Fifth, increase in productivity induced an increase in high potential returns on capital. The dynamics of the transition process warranted the potential long-run gains, which attracted foreign capital either in the form of direct investment or as a portfolio investment in emerging stock markets in the region. The surge in capital inflows was comparable to other emerging markets in developing economies. Consequently, capital inflows seem to contribute much to the real exchange rate appreciation although evidence on the relationship between capital flows and the real exchange rate for transition economies is weak and mixed since most transition economies that experienced a surge in capital inflows have engaged in sterilized intervention (Siklos, 1996; Calvo, Sahay, and Vegh, 1995). And finally, the improved quality of locally produced tradable goods was reflected in better prices obtained in the world market. The terms of trade improved and contributed to the real exchange rate appreciation as predicted by theoretical framework (Edwards, 1989; De Gregorio and Wolf, 1994).

While evidence on the real exchange rate appreciation is not debated despite different measures for the real exchange rate index, there is still an ongoing debate on what was presented above on the causes and effects of this appreciation (Roubini and Wachtel, 1998). In one view, the real exchange rate has caused a loss of competitiveness that worsens the current account balance. According to this view – which is rather unfortunately called the *misalignment view*<sup>1</sup> – the real appreciation is the consequence of the choice of the exchange rate regime and the ensuing capital inflows. In general, it represents a loss of real competitiveness. The arguments for this view are based on the reasoning that the real appreciation of the currency is very likely to occur when the exchange rate is pegged and used as a nominal anchor in a stabilization program. While fixing the exchange rate can help to disinflate an economy, pegging the exchange rate will not reduce the inflation rate instantaneously. The reasons why inflation will not come down at the same time can generally be associated with sticky prices and wages in the economy, which disrupt the Law of One Price and consequently the PPP. If domestic inflation does not converge immediately to the world level when the exchange rate parity is fixed, a real appreciation will occur over time. This appreciation of the real exchange rate would imply a loss of competitiveness of the domestic economy. Exports become more expensive relative to imported goods, which consequently worsens the trade balance and the current account over time. Even small differentials between domestic and foreign inflation can compound rapidly into a substantial appreciation. While a real appreciation is more likely to occur when the currency is pegged to a fixed exchange rate, misalignments of the real exchange rate may also occur under a regime of managed floating exchange rate rules if the central bank does not follow a crawling peg policy of targeting the real exchange rate. The real appreciation under a managed float may occur as a result of large capital inflows (Roubini and Wachtel, 1998). If this view were correct, then the large and growing current account imbalances in some transition economies would be caused in part by the real appreciation of the currency. As shown later, this view is widely rejected by empirical studies on the real exchange rate appreciation (Krajnyak and Zettelmeyer, 1997), which show that most of the external competitiveness of transition economies is still in line with economic fundamentals underlying the current account imbalances.

On the other hand, the *fundamentals view*<sup>2</sup> explains the real exchange rate appreciation not as a signal of exchange rate misalignment and competitiveness loss, but as an appreciation of the long-run equilibrium or fundamental real exchange rate. According to this view, the worsening of the

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<sup>1</sup> In a strict sense of the word, the *misalignment view* represents situations in which the actual real exchange rate differs significantly from its long-run equilibrium value. What the long-run equilibrium value is, however, remains unclear; or better, different approaches to the long-run equilibrium value of the real exchange rate have emerged over the last two or three decades. The evolution of these issues is provided in Williamson (1994) and Hinkle and Montiel (1999).

<sup>2</sup> The fundamental variables are considered to be associated with real variables in the economy, and not to ‘fundamental’ variables as the money stock, the interest rates, and the business cycle (De Grauwe, 1994). Williamson (1994) considers the terms of trade, tariffs, trade restrictions, and exogenous capital flows as fundamental variables determining the real exchange rate.

current account has not been caused by the real appreciation. It is instead the optimal response to the underlying structural and fundamental changes in the economy. A fundamental real exchange rate appreciation can occur for one of two reasons. First, it represents a correction of earlier depreciation and a return of the real exchange rate to equilibrium levels. And second, the real exchange rate mirrors the shifts in the macroeconomic fundamentals that cause an appreciation. Roubini and Wachtel (1998) provide arguments as to why the long-run equilibrium real exchange rate may have appreciated and why the *fundamentals approach* to the real exchange rate modeling may explain the trend appreciation in transition economies. First, significant increases in productivity growth observed in the region may imply that unit labor costs have not significantly increased in spite of the real appreciation of the currency. While dollar wages have increased in transition economies, the appreciation of the real exchange rate based on relative wages may not imply an appreciation of the real exchange rate measured in terms of unit labor costs. Second, the Balassa-Samuelson approach implies that productivity growth in the production of tradables in the excess of that of non-tradable goods leads to a real appreciation of the consumer price index (CPI)-based real exchange rate. The real appreciation is then caused not by a loss of competitiveness, but rather because of the increase in the relative price of non-traded to traded goods caused by the differential productivity growth in the two sectors. And third, structural reforms in transition economies have led to capital inflows that have financed both investment demand for non-tradable factors of production (such as land, real estate, and the service sector labor force) and non-tradable goods and services. Consequently, an increase in the relative price of non-tradable goods to tradables shows up as an appreciation of the CPI-based real exchange rate.

This view is broadly consistent with empirical studies governing the appreciation of the real exchange rate in transition economies (Halpern and Wyplosz, 1996, 2001; Krajnyak and Zettelmeyer, 1998; Richards and Tersman, 1996; Coricelli and Jazbec, 2001; De Broek and Sløk, 2001). The *fundamentals view* corresponds to a broad consensus on the transition process, which states that structural reforms implemented in transition economies have indeed determined the pace of the most important macroeconomic variables among which the real exchange rate plays one of the most important roles. However, in the absence of good measures of the equilibrium exchange rate, it is hard to assess how much of the observed real appreciation is due to misalignments and how much is due to an equilibrium appreciation. Since the real exchange rate appreciated in all transition economies despite different exchange rate regimes, it is argued that the *fundamentals view* is the most consistent approach to the determination of the real exchange rate in transition economies.



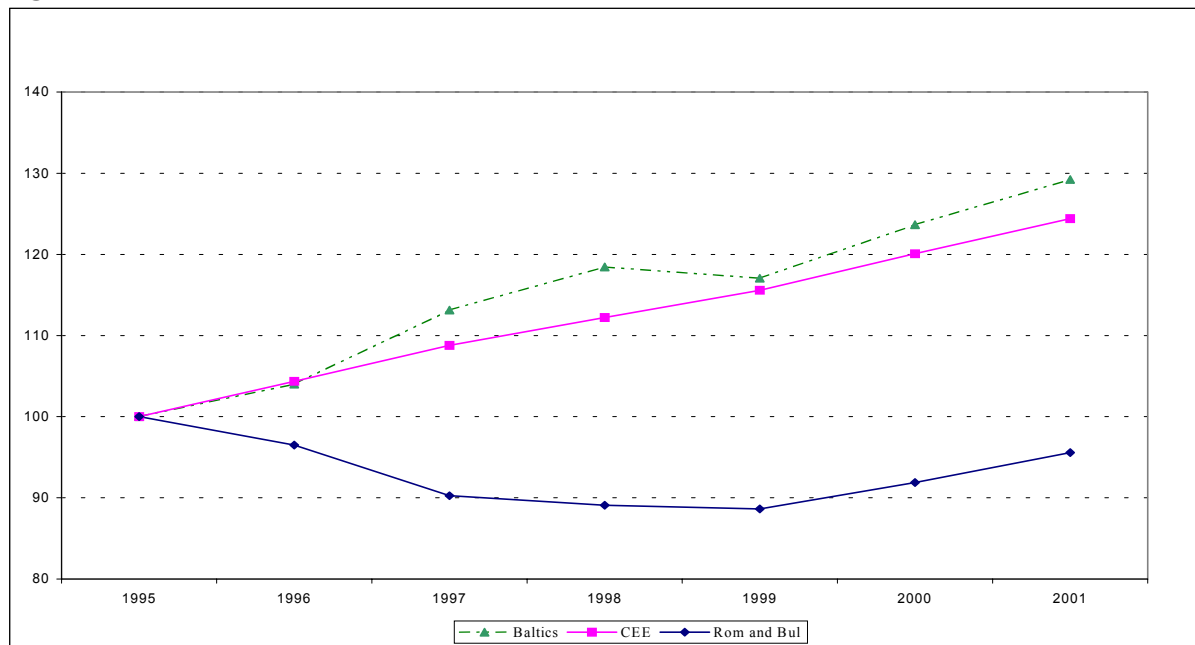
### 3. Balassa-Samuelson Effect in Transition Economies

Studies on the behavior of real exchange rates in transition economies emphasize the productivity approach to explain the trend appreciation of the real exchange rate (Halpern and Wyplosz, 1996, 2001). There is vast potential for gains in productivity in transition economies both through more efficient use of existing resources and technologies and through upgrading technology. However, this approach should also take into account the initial conditions in transition economies at the beginning of reforms (Coricelli and Jazbec, 2001). Decades of central planning have resulted in distorted structures of these economies. Industries were favored by the emphasis of central planners on material production, while services were largely neglected. The structure of the economy was reflected in distorted price levels, as empirical studies on price development in transition economies indicate. Transition and the introduction of market-determined prices along the other market-enhanced reforms have brought about massive changes in output, employment, and last but not least, relative prices. To analyze structural changes in transition economies, it is therefore useful to use the approaches that take into account the real changes in the fundamentals rather than models with established patterns of developments in market economies.

To explain the price differential used to measure the real exchange rate, let us assume that there is an economy-wide wage that is equal to the marginal product of labor in each sector. To the extent that there are differences in productivity between countries, wages will differ as well. In less-developed countries, productivity is generally lower than in more developed countries. While this applies to both sectors of the economy, there is evidence that the productivity gap is larger for tradables than it is for non-tradables. Also, the scope for productivity gain is more limited in non-tradables than in tradables. Because of this, the price of non-tradables will typically be lower in less-developed countries than in industrial countries. Since the overall price level is a weighted average of the price levels of tradable and non-tradable goods, the general price level will be lower in less-developed countries, with the difference being a function of the proportion of goods that are non-tradable, and the price differential for non-tradables (Richards and Tersman, 1996). As an increase in tradable productivity is the main determinant of economic growth – assuming that non-tradable productivity is more or less the same across countries – higher relative growth is reflected in a more appreciated real exchange rate. Figures 1 and 2 generally confirm this line of argument. Transition economies are classified into three groups: Czech Republic, Hungary, Poland, Slovak Republic, and Slovenia represent Central and Eastern European countries (CEE); Estonia, Latvia, and Lithuania represent Baltic countries; while Bulgaria and Romania are shown separately as they have experienced political difficulties during the transition process and lag behind in the implementation of structural reforms. Figure 1 depicts the growth performance in the three groups of transition economies in the

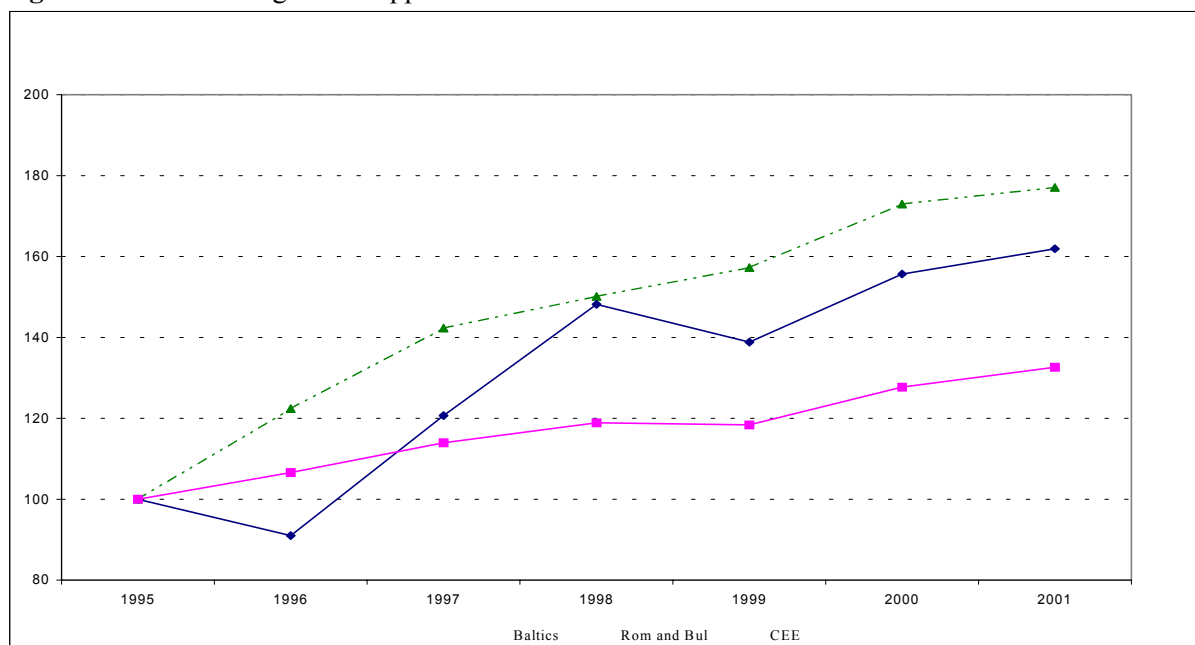
period from 1995 to 2001. The real exchange rate appreciation for the same groups of countries is presented in Figure 2.

**Figure 1:** Growth in Selected Transition Economies



**Source:** EBRD Transition Report 2001.

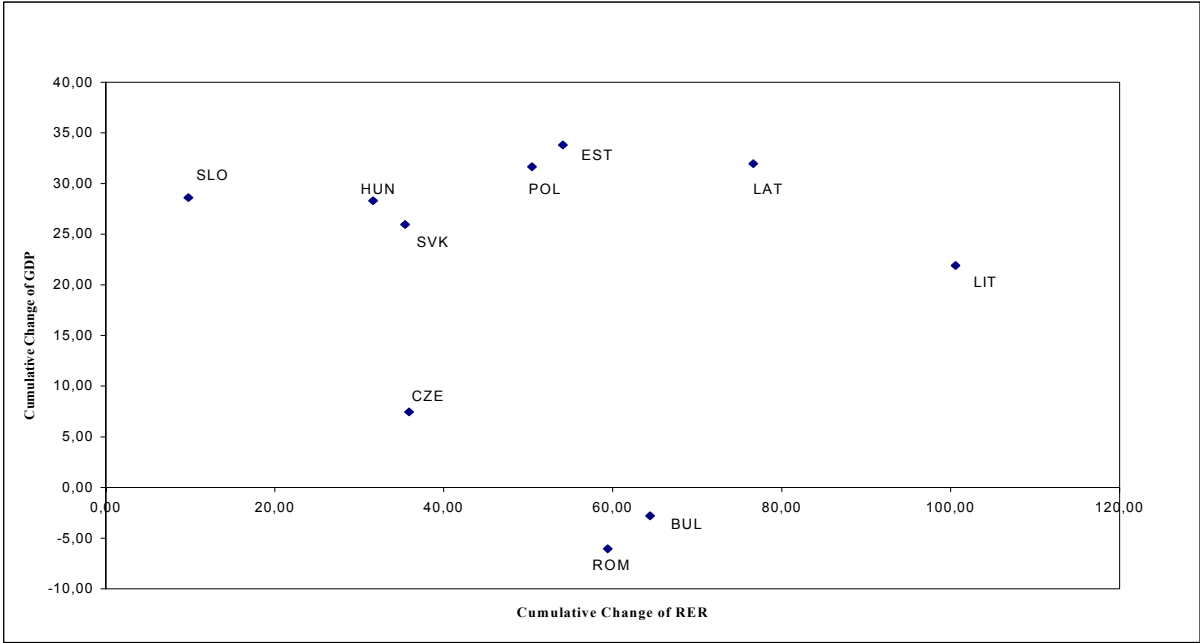
**Figure 2:** Real Exchange Rate Appreciation



**Source:** EBRD Transition Report 2001.

Generally, countries that have grown faster during the transition process have experienced stronger real exchange rate appreciation. Also, poor performers – in our case, Bulgaria and Romania – have experienced strong appreciation owing to larger distortions and poor initial conditions at the beginning of the transition process. Figure 3 presents the cumulative change in GDP from 1995 to 2001 plotted against the cumulative change in the real exchange rate index.

**Figure 3:** Cumulative Change in GDP and RER



**Source:** EBRD Transition Report 2001.

Except for the Czech Republic, which experienced financial turbulence in 1998, and Bulgaria and Romania, which lag in the implementation of structural reforms, there exists positive correlation between growth of GDP and real appreciation. The correlation varies across countries; however, visual inspection confirms the existence of the Balassa-Samuelson effect in latter stages of the transition process as presented for the period from 1995 to 2001. In what follows, the extent of the Balassa-Samuelson effect is estimated in a framework which enables one to disentangle the effect of structural reforms at earlier stages of the transition process and the pure Balassa-Samuelson effect in recent years on the level of the real exchange rate in transition economies. The results broadly coincide with other studies on transition economies (Halpern and Wyplosz, 1996, 2001; Krajnyak and Zettelmeyer, 1998; De Broek and Sløk, 2001; and various IMF transition country studies) with respect to the existence of the Balassa-Samuelson effect in transition economies. However, the extent of its effect is rather lower than in comparable studies, as the effect of structural reforms on the level of the real

exchange rate is separated from the pure productivity differential effect. To explain the separation of structural reforms from the working of the Balassa-Samuelson effect, a simple model is introduced in the next section.

### **3.1. Framework to Account for Balassa-Samuelson Effect in Transition Economies<sup>3</sup>**

The characteristics of transition economies are captured by the initial relative price discrepancy between the relative price of tradable goods in terms of non-tradables in transition economies relative to the relative price of tradables in market economies. The price discrepancy is believed to be caused by preferences of the central plan for the tradable goods production over the production of non-tradables. The rationale for the relative preference for the tradable production could be found in a self-sustained structure of the pre-transition economy and physical characteristics of the tradable sector output of the economy. If services are considered to be the main representative of the non-tradable good, then it clearly follows that the central plan was much easier forecasted and determined in terms of ‘measurable’ quantities of tradable production. The notion of tradables should not be taken literally. It is enough to think about tradable production in terms of physically measurable output, whose price is determined in the world market.

It can be shown that in a transition economy, the labor market adjustment owing to structural changes in the economy may affect the real exchange rate determination. In so doing, the causality is reversed: the flow of labor from one sector to another is one of the indicators of structural reforms, and as such, the determinant of the real exchange rate in transition economies.

Let us assume that central planners have marked preferences for the tradable goods sector production. They set the production of tradables to be larger relative to the production of non-tradables regardless of the market demand conditions:

$$(1) \quad Y_T = \eta Y_N, \quad \eta > 1.$$

It follows that the tradable sector consequently employs relatively more labor than the non-tradable production. The bias in production of tradables was widely observed in formerly centralized

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<sup>3</sup> See Coricelli and Jazbec (2001) for a full derivation of the model of real exchange rate determination in transition economies.

economies. These economies were inclined to favor heavy industry and industrial production at the expense of private housing, consumer goods and services (see, among others, Melitz and Waysand, 1996). As long as  $\eta > 1$ , which is true by assumption, the non-tradable sector employs fewer workers relative to the tradable goods sector. If state-owned firms in both sectors of the planned economy still follow some kind of profit maximization objective, then they would employ labor up to a point where the marginal product of labor equals the real wage paid in that sector. Any other employment decision would not substantially alter the conclusions, which follow. It follows that the higher the preferences of central planners for tradable goods production are, the lower the nominal wage attained in that sector:

$$(2) \quad \frac{\partial W_T}{\partial \eta} < 0.$$

Therefore, there exists a level of tradable production for which the wages in both sectors are the same. The relative price of a tradable good in terms of non-tradables is determined on the basis of labor employment decisions in both sectors of the economy:

$$(3) \quad \frac{P_T \alpha a \eta^{(\alpha-1)/\alpha} L_N^{\alpha-1}}{P_N \alpha a L_N^{\alpha-1}} = \frac{W_T}{W_N} = 1.$$

For that reason, the relative price of tradables in terms of non-tradables in the pre-transition period is greater than 1. If the measure of the real exchange rate is taken to be the relative price of tradables in terms of non-tradables, then one could say that the value of the domestic currency is overvalued:

$$(4) \quad \frac{P_T}{P_N} = \eta^{(1-\alpha)/\alpha} > 1.$$

The price of tradable goods is determined in the world market and considered to be given to the pre-transition economy. The average price in the economy is, therefore, a function of central planners' preference to the tradable goods production. The preferences of central planners,  $\eta$ , represent the non-market structure of the economy where the plan dominates over market forces. Since

technology is given by the same production functions in both sectors of the economy, the real equilibrium wage can easily be defined solely as a function of the central plan and thus abstracted from market forces:

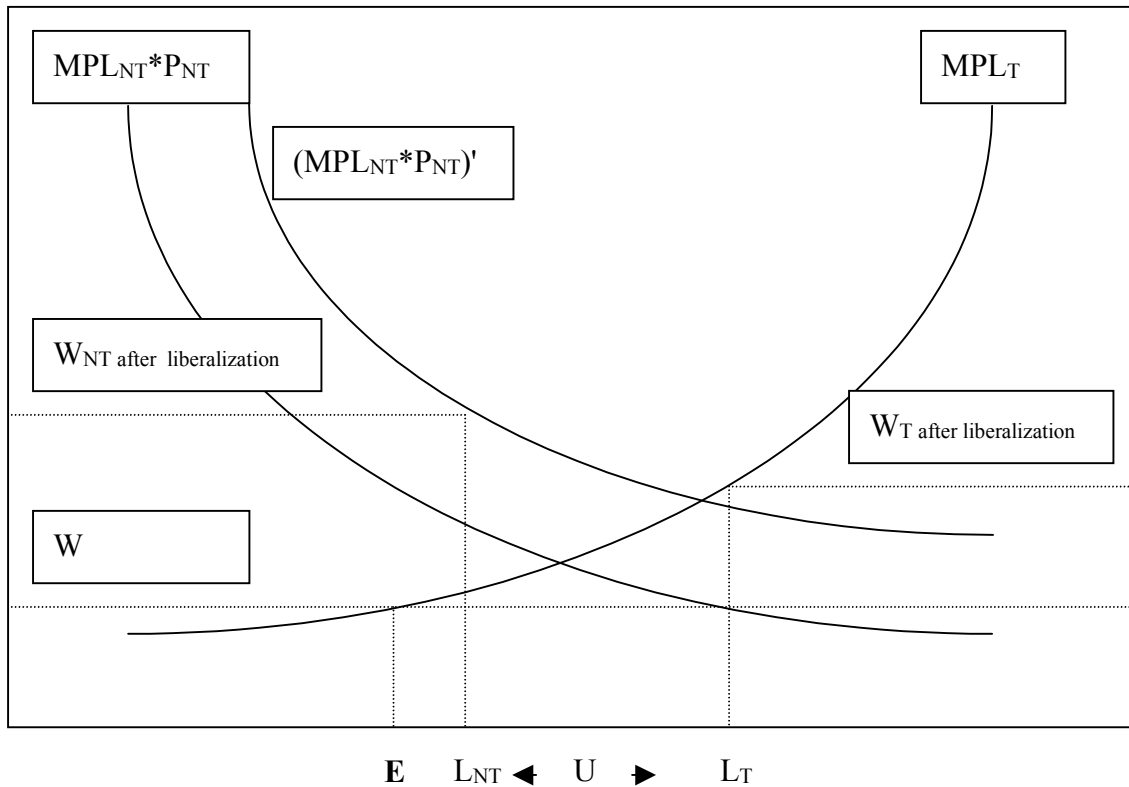
$$(5) \quad \omega^E = \omega(\eta).$$

Consequently, the preferences of central planners stand as a proxy for the initial conditions in transition economies. The higher the required volume of the tradable goods production is, the greater the initial price discrepancy between the relative price tradables in terms of non-tradables. For that reason, transition economies inherited pressure for real exchange rate appreciation.

Figure 4 depicts the initial conditions in transition economies in a simple two-sector factor-specific model (capital is specific to the sector, while labor is mobile). On the vertical axis, wages are measured in terms of tradable goods and the value of marginal product of labor in the two sectors: non-tradables on the left and tradables on the right. The two lines depict the value of the marginal product of labor in the two sectors in relation to levels of employment. Following equation (5), the real pre-transition wage measured in terms of tradable goods is below the market equilibrium, forcing the economy to employ more labor in tradables than in non-tradables production.

Price liberalization and the beginning of the transition process pushes labor demand in non-tradable production to  $(MPL_{NT}P_{NT})'$ . The value of the marginal product of labor in the non-tradable sector jumps to the new steady state. Monopoly power in the non-tradable sectors implies that higher wages can be accommodated through higher prices. Consequently, the real exchange rate appreciates and labor shifts from the tradable to the non-tradable sector. If we assume the Law of One Price for tradable goods, devaluation of the nominal exchange rate may counteract the increase of real wages, if measured in terms of tradable goods, thereby allowing a higher level of employment in the non-tradable sector. Nonetheless, wages in the non-tradable sector could still be higher than in the tradable sector after the initial price liberalization. Wages in the tradable sector cannot adjust instantaneously, as their value crucially depends on productivity in that sector and on international competition. As long as there are forces of monopolistic competition at work in the non-tradable sector or increased trade union pressure in that sector, wages in the non-tradable sector will be higher than in the tradable sector, implying unemployment in the economy.

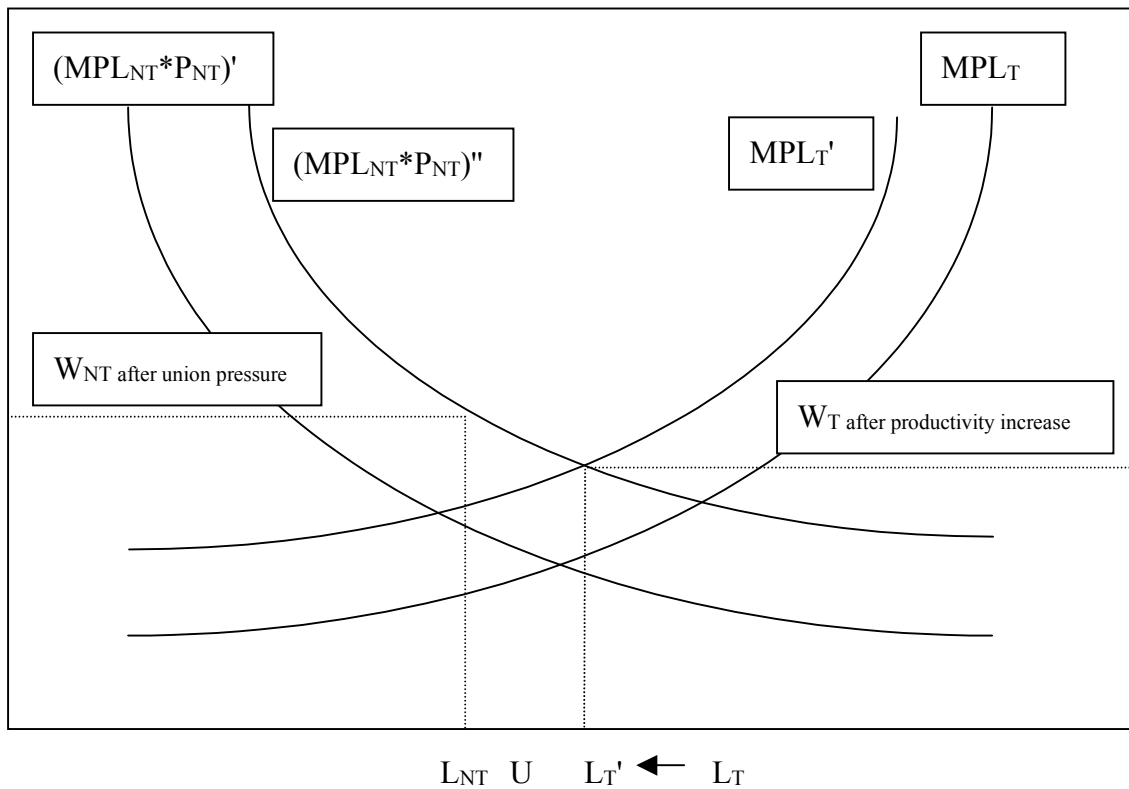
**Figure 4: Labor Market after Price Liberalization**



As long as we observe a large reallocation of resources across sectors, Figure 4 may well serve for an explanation of the transition process in the first few years following the initial price liberalization and cuts in subsidies to the state-owned sector. Models of transition (Aghion and Blanchard, 1993; Chadha and Coricelli, 1997; among others) pay special attention to labor market dynamics once the transition process has begun. The observed productivity increase in tradable sectors at the beginning of transition is, therefore, due mainly to labor shedding in that sector. Once the initial labor reallocation is settled, productivity increase in the tradable sector may occur mainly because of technology advances in that sector. It is only then that the pure Balassa-Samuelson effect takes place. Figure 5 shows the working of the Balassa-Samuelson effect once market forces correct for an initially distorted labor market. Labor productivity in tradables increases from  $MPL_T$  to  $MPL_T'$  causing wages and employment in the tradable sector to increase correspondingly. Monopolistic competition in the non-tradable sector or powerful trade unions bid up wages in that sector trying to keep the difference between wages in both sectors that has been established after price liberalization intact. Wages in the non-tradable sector can increase only through price increases in that sector causing real exchange rate appreciation and confirming the working of the Balassa-Samuelson effect. Correspondingly, the value of the marginal product of labor in the non-tradable sector shifts from  $(MPL_{NT}P_{NT})'$  to  $(MPL_{NT}P_{NT})''$ . Employment in the non-tradable sector can either slightly increase or stay the same. A

shift in employment in the non-tradable sector, therefore, crucially depends on the competition in that sector or on trade union power.

**Figure 5:** Labor Market after Productivity Increase



The simple model suggests that the real exchange rate appreciated during the first few years of the transition process mainly because of structural reforms taking place. Price liberalization was accompanied by a large reallocation of resources and real exchange rate appreciation. Monopolistic competition in non-tradable sectors, which was almost implied by the non-existence of that sector before transition and possibly the increasing power of trade unions, helps to explain relatively higher wages in the non-tradable sector in transition economies.

In summing up, one would expect an increase in non-tradable wages measured relative to tradable wages at the beginning of transition. After initial price liberalization and labor reallocation, relative wages should fall. The fall in relative wages should correspond to an increase in labor productivity differential between the tradable and non-tradable sector as wages in the tradable sector start to grow because of higher productivity. However, the correction of relative wages, which were established during the first years of transition, depends on the degree of competition and trade union



power in the non-tradable sector. As long as firms in the non-tradable sector can take advantage of monopolistic power and trade unions can successfully negotiate wage increases, relative wages in the non-tradable sector measured in terms of wages in the tradable sector may stay constant or even increase. Data for CEE countries, Bulgaria, Romania, and the Baltics seem to confirm this line of reasoning. Figure 6 in the Appendix depicts wages in the non-tradable sector relative to wages in manufacturing for ten transition economies. Data are from the ILO database. Wages in the non-tradable sector are presented by unweighted average over sectors. The non-tradable sector consists of sectors from E to O in NACE classification of economic activity. In addition to the entire non-tradable sector (E-O), relative wages in market and public sector services measured in terms of manufacturing wages are shown separately. Market services are represented by sectors E to K, while public sector services are represented by sectors L to O. Wages in the manufacturing sector are represented by sector D<sup>4</sup>.

In all transition economies, relative wages in the non-tradable sector increased in the first few years of the transition process corresponding to a different start of transition. After that, the relative wage in the non-tradable sector declined perhaps as a result of further labor reallocation or/and productivity increase in the tradable sector. Although the magnitude of the relative wage swing is different across countries, they all mimic the hump shape of the relative wage path in the first few years of the transition process. Furthermore, all countries thereafter resume a slight increase in the relative wage in the non-tradable sector. However, the magnitude of the relative wage increase in the later years of transition was much higher in Latvia, Romania, and Bulgaria than in other countries. Also, in Slovenia, the relative wage in the non-tradable sector is much higher than that in other countries. Slovenia also distinguishes itself from other countries in the behavior of the relative wage in the public sector – the relative wage in the public sector is much higher than in any other country<sup>5</sup>.

Although similar patterns of the relative wage of non-tradables in terms of tradables are observed in transition economies, it is instructive to look at labor market developments during the transition process in order to disentangle the working of the Balassa-Samuelson effect. Figure 7 in the Appendix displays labor reallocation together with productivity differential between industry and services in selected transition economies. The criterion for the period of observation was the year after which the relative price of tradables in terms of non-tradables began to decline monotonically, and the longitude of time series, which ends in 1998<sup>6</sup>. Data correspond to empirical results presented in the next section. A detailed description of the data is presented in Coricelli and Jazbec (2001).

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<sup>4</sup> It should be mentioned that not all transition economies began the transition process at the same time. According to Fisher, Sahay, and Vegh (1996), the transition process begins with the year of the most serious stabilization attempt. In this respect, the transition process, which in most cases started with price liberalization, began in 1990 for Poland and Hungary; in 1991 for Bulgaria, Czech Republic, and Slovak Republic; in 1992 for the Baltics and Slovenia; and in 1993 for Romania.

<sup>5</sup> For an insightful analysis of the case of Slovenia, see Bole (2002).

<sup>6</sup> Exceptions are Romania – where the relative price of tradables has indeed increased – and Estonia – where the

Labor reallocation in Figure 7 is represented by the ratio between labor employed in industry and services, which encompass both market and public services, respectively. Both measures – labor ratio and productivity differential – are indexed to the base year that corresponds to the beginning of the transition process. Although statistical properties of the corresponding time series are not thoroughly examined due to the short time interval, the polynomial trend of order 3 is added to Figure 7 to ease the explanation. In all cases, labor reallocation took place at the beginning of the transition process. Except in Romania, the labor reallocation process stabilized into the fifth or sixth year of transition. In this respect, conclusions from Figure 4 seem to explain the extent of structural reforms presented by the labor reallocation process. One would expect that productivity differential between labor productivity in industry and services would begin to increase. However, in the case of Estonia and Slovak Republic, the productivity differential even declined in the first few years, while in Lithuania, Latvia, and Romania, it increased only by a modest amount. Moreover, one can see from Figure 7 that only more advanced transition economies experienced the productivity differential increase once the labor reallocation ended. Surprisingly, Bulgaria experienced the most dramatic increase in productivity differential prior to 1998. For that reason, we can distinguish cases where the Balassa-Samuelson effect has indeed taken place after the initial period of labor reallocation (Poland, Czech Republic, Hungary, and Slovenia) and cases where the increase in productivity differential was mainly due to labor reallocation. The dynamics of the ratio of labor employed in industry and services together with productivity differential broadly corresponds to the dynamics of the relative wage in the non-tradable sector measured in terms of tradables presented in Figure 6.

### 3.2. Empirical Results

The real wage is an increasing function of the targeted real wage determined by pre-transition levels and positive shocks to the demand for labor determined by productivity parameters in both sectors of the economy and government consumption. The more distorted the pre-transition equilibrium wage is (the higher the equilibrium wage is determined by the central plan's objective to produce more of the industrial good relative to services), the higher the pressure of the union to negotiate for higher wages once transition begins. It is established that the nominal wage is an increasing function of the real wage determined by the pre-transition structural parameter,  $\eta$ , which takes into account a distorted measure of the transition economy, productivity parameters, and government consumption. The nominal wage is, therefore, determined as follows:

$$(6) \quad W = W(\omega(\eta), a_T, a_N, G),$$

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relative price of tradables started to decline already in 1990.

where  $W$  is the nominal wage;  $\omega(\eta)$  represents the average real wage depending on the structural parameter,  $\eta$ ;  $a_T$  and  $a_N$  represent the technology parameters specific to the production of tradable and non-tradable goods, respectively; and  $G$  stands for real government consumption of non-tradable goods.

All variables enter the nominal wage equation with positive signs as expected. The only indeterminacy may arise from the sign of  $a_N$ , which can take either a positive or a negative value. However, it is assumed that an increase in non-tradable sector productivity in transition economies increases demand for labor to satisfy private sector demand in the tradable and non-tradable sectors by less than the increase in tradable sector productivity. The nominal wage equation is one of the most important equations in this framework since the real economy parameters enter the real exchange rate measure via the nominal wage equation. It is assumed that the price of tradables is determined in the world market and is therefore given exogenously to a transition economy. For this reason, the price of tradables could be normalized to 1 in order to provide the following expression for the real exchange rate measure:

$$(7) \quad \frac{1}{P_N} = \frac{\Phi - 1}{\Phi} \left( \frac{a_N}{W(\omega(\eta), a_T, a_N, G)} \right),$$

where  $P_N$  is the price index for non-tradable goods and  $\Phi$  is the share of non-tradable goods consumption in total private consumption.

The real exchange rate measured as the relative price of tradables in terms of non-tradable goods, therefore, negatively depends on the productivity differential, the share of non-tradable consumption in total private consumption, and real government consumption. The parameter that measures the extent of structural misalignment inherited from the central plan,  $\eta$ , enters the real exchange rate equation with a positive sign. The regression equation is presented as follows:

$$(8) \quad \log(P_T/P_N)_{i,t} = \alpha_{oi} - \alpha_1 \log(a_T - a_N)_{i,t} - \alpha_2 \text{share}_{i,t} - \alpha_3 \text{govreal}_{i,t} + \alpha_4 \text{lab}_{i,t} + \varepsilon_{i,t},$$

where  $(P_T/P_N)_{i,t}$  is the relative price of tradables in terms of non-tradable goods;  $(a_T - a_N)_{i,t}$  is the productivity differential between tradable and non-tradable goods production and is measured in terms of labor productivity in both sectors;  $\text{share}_{i,t}$  represents the share of non-tradable consumption in total private consumption;  $\text{govreal}_{i,t}$  is the share of government consumption in GDP measured in constant

prices; and  $lab_{i,t}$  represents the structural misalignment variable. It is proxied for by the ratio between labor employed in the tradable sector versus labor employed in the non-tradable sector. All coefficients have a negative sign except for the structural variable, which enters the equation with a positive sign. This constitutes the positive correlation between the real exchange rate and the labor employed in the tradable sector relative to the non-tradable sector. For this reason, the structural variable proxied for by the labor ratio represents the parameter that measures the rigidity of the labor market to structural changes in the economy. As for the rest of the story, this rigidity is assumed to be exogenously determined in the economy and thus independent of all other right-hand side variables in equation (8). This is a relatively stringent assumption on the structure of a transition economy, and its validity can be seriously questioned.

Data used to construct price indices, productivity measures, demand variables, and structural parameters cover 19 transition economies<sup>7</sup>. Each transition economy is observed from the beginning of its most serious stabilization attempt as defined by Fisher, Sahay, and Vegh (1996). This implies that the relative price of tradables in terms of non-tradables is set to 1 in the year of the most serious stabilization attempt. The implicit GDP deflator for industry in each country represents the price of tradables. Analogously, the implicit GDP deflator for services defines the price of non-tradables. The criterion for the period of observation was the year after which the relative price of tradables in terms of non-tradables started to consistently decline. However, this criterion has not been followed in all cases<sup>8</sup>. Different periods of observation were examined and compared to each other. For all countries, the period of observation ends in 1998. The longest series runs from 1990 to 1998, while the shortest covers the period from 1995 to 1998. The entire sample includes 122 observations.

In the analysis, two sectors were distinguished: tradable and non-tradable. While theoretical literature on real exchange rates relies upon the division of commodities into tradables and non-tradables, it is almost impossible to construct these two groups of commodities in reality. An obvious benchmark for tradability should be the extent to which the particular good is actually traded. For example, the sector is defined as tradable if more than 10 percent of total production is exported. In general, one would label manufactures as tradables and services as non-tradables. However, this is quite impossible at this stage in transition economies. In what follows, the tradable sector is represented by the industry sector, which includes manufacturing; gas, electricity, and water; mining and quarrying; and construction. The reason that all other sub-sectors besides manufacturing were included in the measure for the tradable sector was that for some countries, sectoral data and data on international trade flows were not available. To ensure consistency, all tradable sectors in different countries include gas, electricity, water, mining and quarrying, and the construction sector, although

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<sup>7</sup> Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine, and Uzbekistan.

<sup>8</sup> Exceptions are Belarus, Romania, and Russia where the relative price of tradables has indeed increased. For these cases, the beginning of the observed period starts after the initial depreciation.



prices. This result is in line according to the Balassa-Samuelson effect, which states that prices of tradables are determined in the world market and therefore equalized across countries. Prices of non-tradables are assumed to be determined domestically based on the domestic wage and productivity levels. To the extent that productivity in the two sectors within the country grows at different rates, it is likely that there will be offsetting movements in the relative price of tradables in terms of non-tradables. If the growth of productivity trend in the tradable goods sector exceeds that of the non-tradable goods sector, there will be a tendency for the relative price of tradables to decline over time.

Figure 8 in the Appendix summarizes econometric results derived from estimation of equation (9). Stacked columns represent the level of real exchange rate in each year. The portions of columns correspond to actual contributions that each variable had to the level of the real exchange rate in each year of the transition process. The sum of all portions of a column and country-specific constants add up to the fitted value for the real exchange rate level in the respective year. Nonetheless, it is the dynamics of the contribution of each set of variables that is interesting in explaining the determination of the real exchange rate in transition economies.

As shown in Figure 8, structural reforms contributed the most to the level of the real exchange rate in the first few years of the transition process in almost all economies. A notable exception is Romania with a sporadic effect of structural reforms on the exchange rate. Moreover, visual inspection of Figure 8 confirms that the effect of structural reforms rather stabilized on average in the fifth or sixth year of the corresponding transition time. Unfortunately, due to short time series, it is impossible to econometrically check for structural break in the data. Nonetheless, the productivity differential effect is the key factor once the labor reallocation settled down. In this respect, one can distinguish CEE countries from the Baltics and Romania. As already observed in Figure 7, Bulgaria seems to have experienced a large increase in productivity differential once structural reforms were more or less over. For that reason, Bulgaria is similar to CEE countries, while the Slovak Republic is an exception, as the productivity differential was constantly increasing after the initial labor reallocation. In the Baltics, the productivity differential remained constant, which points to the fact that the main source of the difference between labor productivity in industry and services could be accounted for only by labor reallocation from industry to services, and not by technology advances in the tradable sector. Once we take into account the initial labor reallocation as the main source of an increase in productivity differential in the first years of transition, the estimates of the Balassa-Samuelson effect following equation (9) are rather lower than in comparable studies (see Halpern and Wyplosz, 1996, 2001; De Broek and Sløk, 2001; and Deutsche Bundesbank, 2001). If we take into account only the period after the labor reallocation has been completed, the estimate of the Balassa-Samuelson effect should increase for CEE countries. Coricelli and Jazbec (2002) show that in the case of Slovenia, a 1 percent increase in productivity differential translates into about 1.5-1.7 percent real appreciation, considering only the period after initial labor reallocation. This figure is almost twice as high as the

estimate on productivity differential effect in equation (9). As Slovenia is the most developed transition economy regarding GDP per capita, then the Balassa-Samuelson effect in other transition economies should be even higher. A visual inspection of Figure 7 where labor reallocation and productivity differential are shown could provide a tentative conclusion that in Hungary, Poland, and the Czech Republic, the Balassa-Samuelson effect is even stronger than in Slovenia. One should additionally take into account the approach to measure the Balassa-Samuelson effect proposed by MacDonald and Ricci (2001). They believe that independent of the productivity differential between productivity in manufacturing and services, the size and efficiency of the distribution sector of the economy could substantially contribute to the real exchange rate appreciation. As the size and efficiency of the distribution sector in transition economies grew since the beginning of transition, this channel to the real exchange rate appreciation should be taken into account when explaining the consequences of higher growth in transition economies. For those reasons, one could conclude that the working of the Balassa-Samuelson effect would nevertheless imply higher inflation rates even after accession to the European Union. Thus, transition economies are likely to face problems in meeting the Maastricht criterion on inflation, unless growth is proportionally suppressed to meet the criterion of 1.5 percentage points above the best three EU inflation performers. Again, this implies that after accession, inflation differential will remain a serious problem, irrespective of the exchange rate regime.

### **3.3. Exchange Rate Pass-Through**

With respect to exchange rate regimes, all CEE countries moved from fixed to more flexible exchange rate regimes during transition perhaps also to be able to curb inflation rates toward required levels, although the main reason for the move was believed to be from pressure caused by a surge in foreign capital inflows (Corker et al., 2000). In so doing, CEE countries added a potential new source to higher inflation rates in addition to the working of the Balassa-Samuelson effect. Namely, the move from a fixed to a more flexible exchange rate regime could backfire attempts to lower inflation as the exchange rate pass-through could add to inflationary pressure instead of suppressing it. The evidence on selected transition economies could partially support this kind of argument although the extent of the pass-through cannot be firmly established (Darvas, 2001; Campa and Goldberg, 2002). Taking into account caution in explaining econometric results, Darvas (2001) finds short-run estimates of pass-through of nominal exchange rate to fundamental prices (food, energy, and administered prices were excluded from CPI) in 2000 higher in Hungary and Slovenia than in Poland and the Czech Republic. He tentatively concludes that part of the difference in the pass-through estimates could be attributed to the exchange rate regime, as Hungary and Slovenia had managed an exchange rate regime opposed to Poland and the Czech Republic, which had a floating regime in 2000. Although Darvas (2001) takes

into account the change of the exchange rate regime in Hungary, the Czech Republic, and Poland during the transition process, the main concern explaining results for pass-through in transition economies is still the shortness of time series for the exchange rate and prices if one seriously considers the importance of the initial period of the labor reallocation process as explained above. Interestingly, the timing of the change of exchange rate regimes in Hungary, the Czech Republic, and Poland vaguely corresponds to the periods when the process of structural reforms proxied by labor reallocation settled down.

Although the existence of the Balassa-Samuelson effect and potential exchange rate pass-through could provide an explanation for the real exchange dynamics in CEE countries on average, it is in the Baltics where both effects had a rather modest occurrence. On one hand, all Baltic countries have currency boards, which offsets the exchange rate pass-through, while on the other hand, it seems that the increase in productivity differential was rather small after the initial labor reallocation. For those reasons, real exchange rate appreciation in the Baltics could mostly be attributed to demand factors. The dynamics of relative wages in Latvia shown in Figure 6 could provide justification for this kind of reasoning. Also, wages in the public sector have been increasing more in the Baltics than in other transition economies, with the exception of Slovenia and Romania.

As real appreciation in transition economies resulted in higher inflationary pressure rather than nominal appreciation, part of the inflationary pressure could derive from labor market rigidities as pointed out in the discussion of Figure 4 above. For that reason, it is not surprising that countries with higher relative non-tradable wage growth – either growth of wages in market or public services – on average face higher inflation rates. This brings up the issue of the relationship between exchange rate policy and disinflation in an economy with price-wage and inflation inertia in the non-tradable sectors.

### **3.4. Exchange Rate Policy and Disinflation**

The discussion in previous sections was generally related to real models. However, the analysis of the relationship between exchange rate policy and inflation requires consideration of the monetary sector. Candidate countries face the challenging decision on the speed of convergence to the euro zone rate on inflation. Before entering the ERM2, the Maastricht criterion on inflation will not apply. However, a fundamental policy question is whether candidate countries should aim for rapid convergence and whether this would be in contrast with their growth performance. We already stated that the Balassa-Samuelson effect is going to be relevant and that Maastricht criterion on inflation should be revised to take into account the equilibrium phenomenon of increasing prices of non-tradable goods. However, inflation performance in candidate countries is not only related to the



Balassa-Samuelson effect but also to the policy stance of the different countries. Exchange rate policy is one of the key aspects of this policy stance. A useful reference framework for discussing the costs and benefits of different speeds of disinflation is a two-sector model with monopolistic power in the non-tradable sector. In the context of perfect capital mobility, interest rates in candidate countries would be determined by foreign interest rates and expected depreciation of the exchange rate. In the staggered price model of Calvo (1983) with price level inertia in the non-tradable sector, it is easy to show that by reducing the rate of depreciation of the exchange rate, a country can reduce the overall rate of inflation inducing a temporary fall in output in the non-tradable sector, as in standard new-Keynesian models. A more interesting model is a recent extension of staggered price models by Calvo et al. (2002) that takes into account the average rate of inflation for the price setting of firms in a monopolistically competitive market. The intuition of the model is that firms choose a price rule that includes a revision of price schedule depending on the rate of inflation in the economy. This implies that firms internalize the effects of policies such as that of a persistent rate of depreciation of a central bank that wants to target the real exchange rate. In this version of the model, there is inflation inertia in addition to price-level inertia. The implication is that a disinflation policy implemented through a reduction of the rate of depreciation of the exchange rate induces as in the previous model a temporary decline in output in the non-tradable sector. However, in this model, disinflation brings welfare gains as it reduces the welfare losses associated with monopolistic power in the non-tradable sector. A disinflation policy can thus be seen as a way of reducing the welfare losses of monopolistic price setting. This line of reasoning seems very relevant for an exchange rate policy in candidate countries. Perhaps the best example of the inflationary impact of an exchange rate policy driven by a real exchange rate target is Slovenia. As shown in Figure 9 in the Appendix, the real exchange rate oscillates around a stable (not far from zero) mean. Data on industrial production (3MAIP), real exchange rate (3MARER), nominal exchange rate (3MANER), and consumer price index (3MACPI) present 3-month moving averages. At the same time, the rate of inflation seems to have reached a floor of about 8 percent. Apparently, price and wage setters have internalized the exchange rate rule. As a result, the disinflation process operates very slowly.

#### **4. Conclusions**

In the paper, we analyzed the behavior of the real exchange rate in candidate transition countries. We examined both the relevance of the Balassa-Samuelson effect and of monopolistic price setting in non-tradable sectors. We argued that while significant, the Balassa-Samuelson effect cannot be an argument for flexibility of the exchange rate, as it is a long-term and fully anticipated phenomenon. Exposing countries to the high frequency oscillations of the exchange rate determined in the short term by capital flows seems hard to justify.

Regarding the view that exchange rate flexibility is a substitute for rigidities in the goods and labor market, the paper concludes that accommodating the exchange rate policy can protect output in the non-tradable sector in the short run, but at high welfare costs.

## References

- Aghion, Philippe, and Olivier Jean Blanchard, "On the Speed of Transition in Central Europe", *EBRD Working Paper*, No. 6, July 1993.
- Balassa, Bela, "The Purchasing Power Parity Doctrine: A Reappraisal", *Journal of Political Economy*, Vol. 72, December 1964, pp. 584-596.
- Bole, Velimir, "Disinflation and Labor Market Distortions: Lessons from Slovenia", *mimeo*, 2001.
- Buiter, Willem H., and Clemens Grafe, "Anchor, Float or Abandon Ship: Exchange Rate Regimes for Accession Countries", *CEPR Discussion Paper*, No. 3184, London, January 2002.
- Calvo, Guillermo, "Staggered Prices in a Utility-Maximizing Framework", *Journal of Monetary Economics*, No. 12, 1983, pp. 383-398.
- Calvo, Guillermo, Ratna Sahay, and Carlos A. Vegh, "Capital Flows in Central and Eastern Europe: Evidence and Policy Options", *IMF Working Paper*, No. 57, April 1995.
- Calvo, Guillermo, Oya Celasun, and Michael Kumhof, "Nominal Exchange Rate Anchoring Under Inflation Inertia", *IMF Working Paper*, No. 30, February 2002.
- Campa, Manuel Jose, and Linda S. Goldberg, "Exchange Rate Pass-Through into Import Prices: A Macro or Micro Phenomenon?" *NBER Working Paper Series*, No. 8934, May 2002.
- Chadha, Bankim, and Fabrizio Coricelli, "Fiscal Constraints and the Speed of Transition", *Journal of Development Economics*, Vol. 52, 1997, pp. 221-249.
- Coorey, Sharmini, Mauro Mecagni, and Erik Offerdal, "Disinflation in Transition Economies: The Role of Relative Price Adjustment", *IMF Working Paper*, No. 138, December 1996.
- Coricelli, Fabrizio, and Boštjan Jazbec, "Real Exchange Rate Dynamics in Transition Economies", *CEPR Discussion Paper*, No. 2869, London, July 2001.
- Coricelli, Fabrizio, and Boštjan Jazbec, "Accession to the European Union: Real Exchange Rate Dynamics for Candidate Countries", *Rivista di Politica Economica*, No. I-II, January-February 2002, pp. 109-138.
- Corker, Robert, Craig Beaumont, Rachel van Elkan, and Dora Iakova, "Exchange Rate Regimes in Selected Advanced Transition Economies: Coping with Transition, Capital Inflows, and EU Accession", *IMF Policy Discussion Paper*, No. 3, April 2000.
- Darvas, Zsolt, "Exchange Rate Pass-Through and Real Exchange Rate in EU Candidate Countries", *Deutsche Bundesbank Discussion Paper*, No. 10, May 2001.
- De Broek, Mark, and Torsten Sløk, "Interpreting Real Exchange Rate Movements in Transition Economies", *IMF Working Paper*, No. 56, May 2001.

De Grauwe, Paul, "Exchange Rates in Search of Fundamental Variables", *CEPR Discussion Paper*, No. 1073, December 1994.

De Gregorio, Jose, Alberto Giovannini, and Thomas H. Krueger, "The Behavior of Nontradable Goods Prices in Europe: Evidence and Interpretation", *IMF Working Paper*, No. 45, May 1993.

De Gregorio, Jose, Alberto Giovannini, and Holger C. Wolf, "International Evidence on Tradables and Nontradables Inflation", *IMF Working Paper*, No. 33, March 1994.

Desai, Padma, "Macroeconomic Fragility and Exchange Rate Vulnerability: A Cautionary Record of Transition Economies", *Journal of Comparative Economics*, Vol. 26, 1998, pp. 621-641.

Deutsche Bundesbank, "Monetary Aspects of the Enlargements of the EU", in *Monthly Report*, October 2001, pp. 15-30.

Edwards, Sebastian, "Real Exchange Rates in the Developing Countries: Concepts and Measurement", *NBER Working Paper*, No. 2950, 1989.

Fisher, Stanley, Ratna Sahay, and Carlos A. Vegh, "Stabilization and Growth in Transition Economies: The Early Experience", *Journal of Economic Perspectives*, Vol. 10, No. 2, Spring 1996, pp. 45-66.

Halpern, Laszlo, and Charles Wyplosz, "Equilibrium Exchange Rates in Transition Economies", *IMF Working Paper*, No. 125, 1996.

Halpern, Laszlo, and Charles Wyplosz, "Economic Transformation and Real Exchange Rates in the 2000s: The Balassa-Samuelson Connection", *mimeo*, March 2001.

Hinkle, Lawrence E., and Peter J. Montiel (ed.), *Exchange Rate Misalignment: Concepts and Measurement for Developing Countries* (Oxford University Press), 1999.

Krajnyak, Kornelia, and Jeromin Zettelmeyer, "Competitiveness in Transition Economies: What Scope for Real Appreciation?" *IMF Working Paper*, No. 147, November 1997.

MacDonald, Ronald, and Luca Ricci, "PPP and the Balassa-Samuelson Effect: The Role of the Distribution Sector", *IMF Working Paper*, No. 38, March 2001.

Meese, A. Richard, and Kenneth Rogoff, "Empirical Exchange Rate Models of the Seventies", *Journal of International Economics*, **14**, 1983, pp. 3-24.

Melitz, Jacques, and Claire Waysand, "The Role of Government Aid to Firms during the Transition to a Market Economy: Russia 1992-1994", *The Journal of Policy Reform*, Vol. 1, 1996, pp. 299-334.

Nuti, Mario, "The Costs and Benefits of Euro-Isation in Central-Eastern Europe Before or Instead of EMU Membership", University of Rome and London Business School, *mimeo*, 2000.

Richards, Anthony J., and Gunnar H. R. Tersman, "Growth, Nontradables, and Price Convergence in the Baltics", *Journal of Comparative Economics*, Vol. 23, 1996, pp. 121-145.

Roubini, Nouriel, and Paul Wachtel, "Current Account Sustainability in Transition Economies", *NBER Working Paper*, No. 6468, 1998.

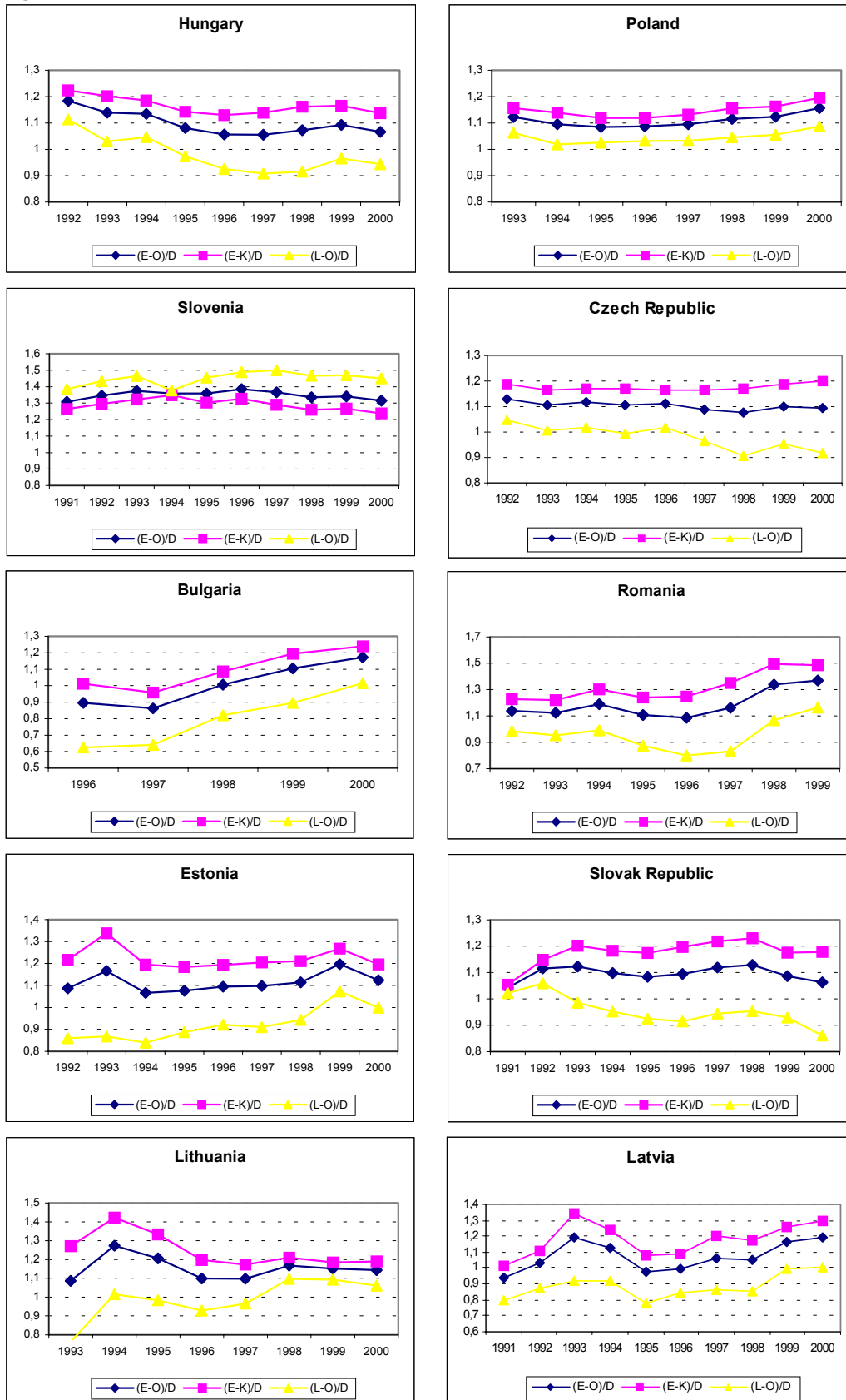
Samuelson, Paul A., "Theoretical Notes on Trade Problems", *Review of Economics and Statistics*, Vol. 46, March 1964, pp. 145-154.

Siklos, L. Pierre, "Capital Flows in a Transitional Economy and the Sterilization Dilemma: The Hungarian Case", *IMF Working Paper*, No. 86, 1996.

Williamson, John, *Estimating Equilibrium Exchange Rates*, Institute for International Economics, Washington, 1994.

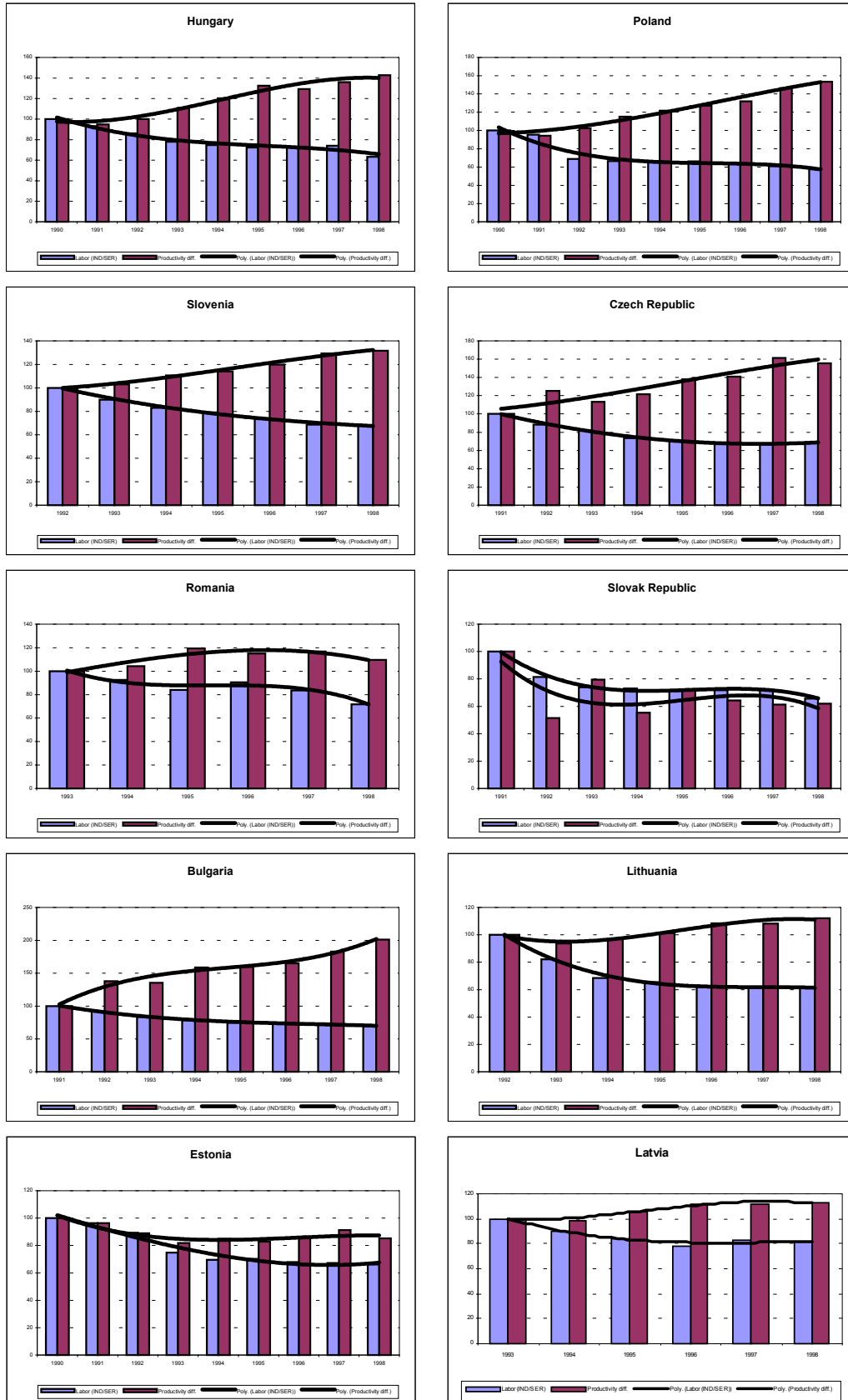
Wyplosz, Charles, "Ten Years of Transformation: Macroeconomic Lessons", *Paper presented at the World Bank Annual Bank Conference on Development*, Washington, April 1999.

Figure 6: Relative Non-Tradable Wage in Terms of Tradables



Source: ILO Database.

**Figure 7: Labor Reallocation and Productivity Differential**



**Figure 8: Accounting for Real Exchange Rate**

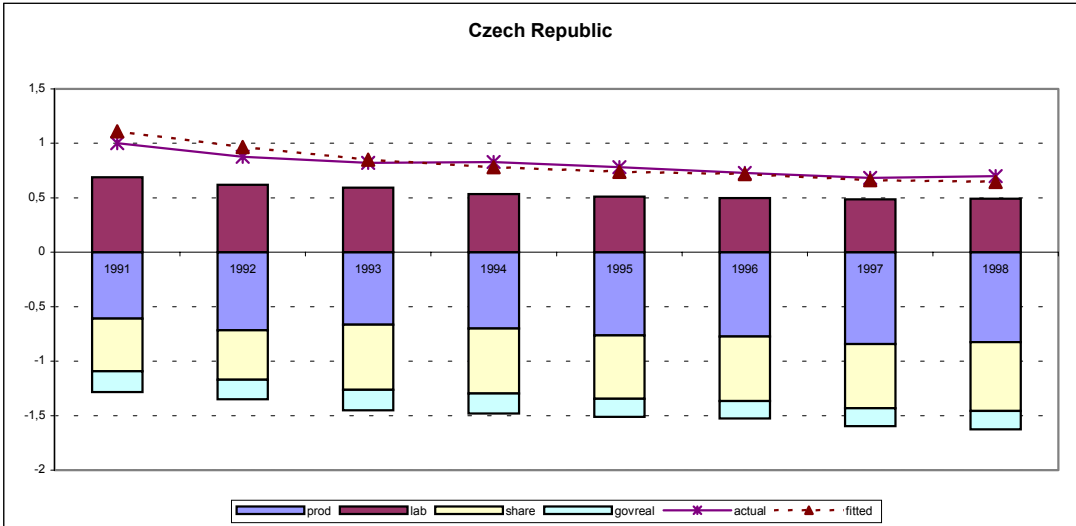
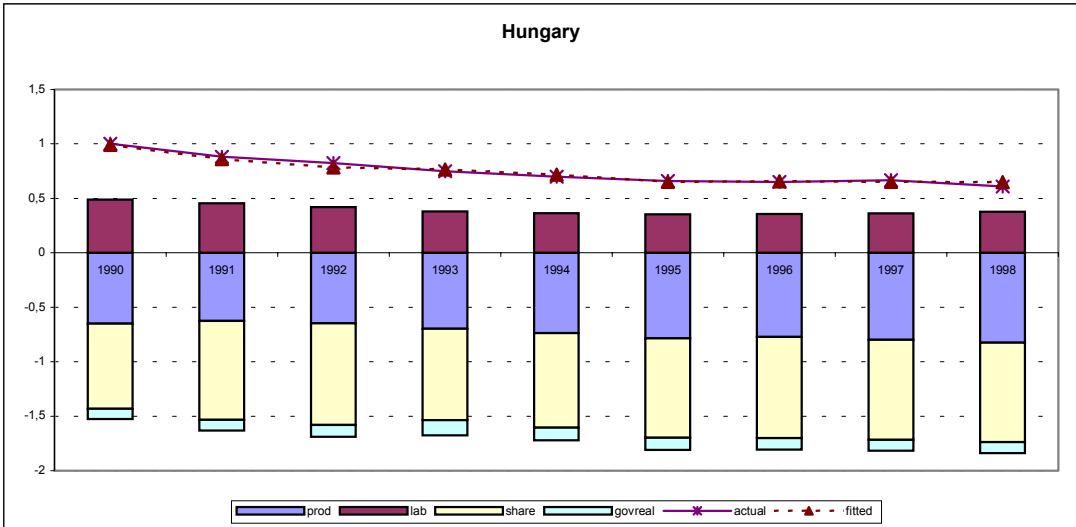
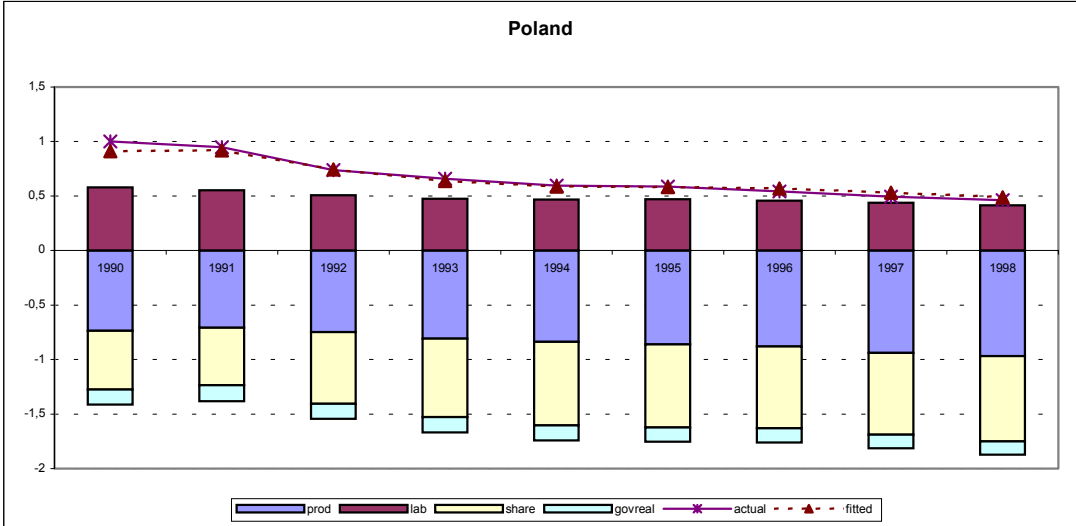




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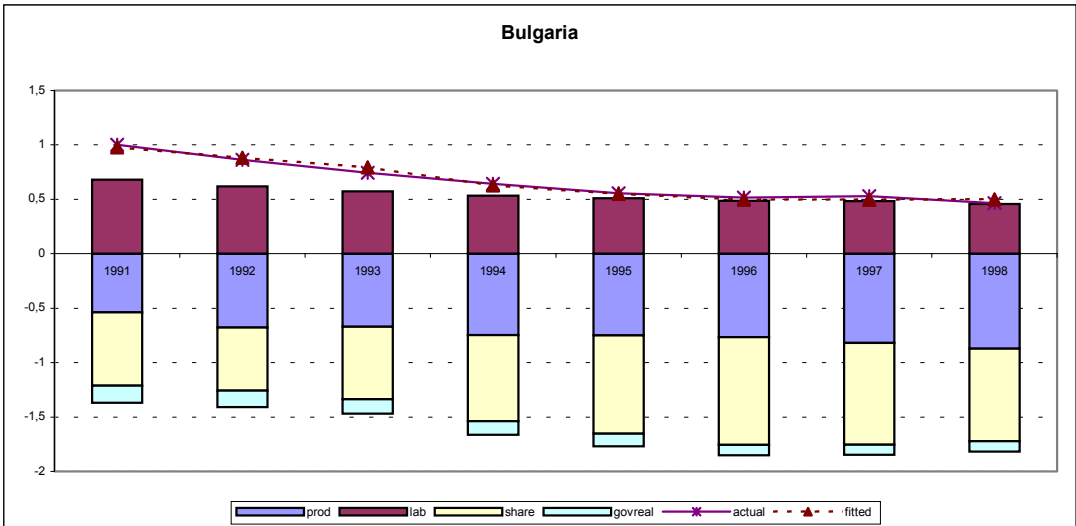
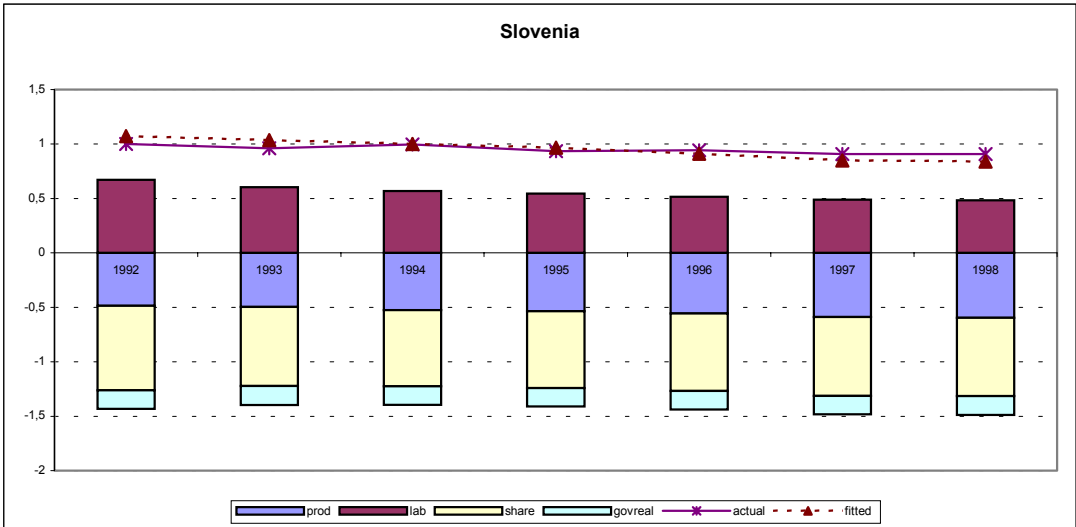
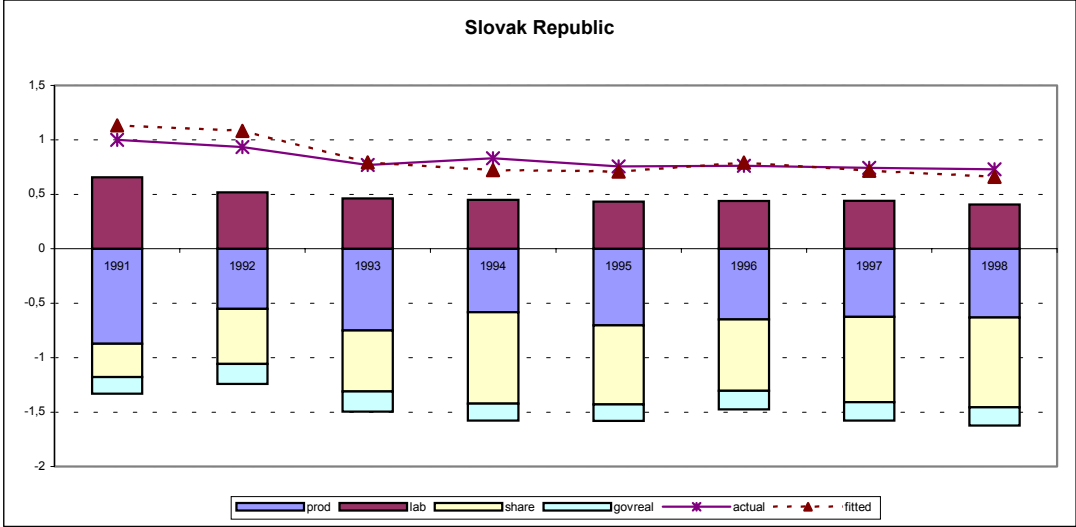


Figure 8:...continued

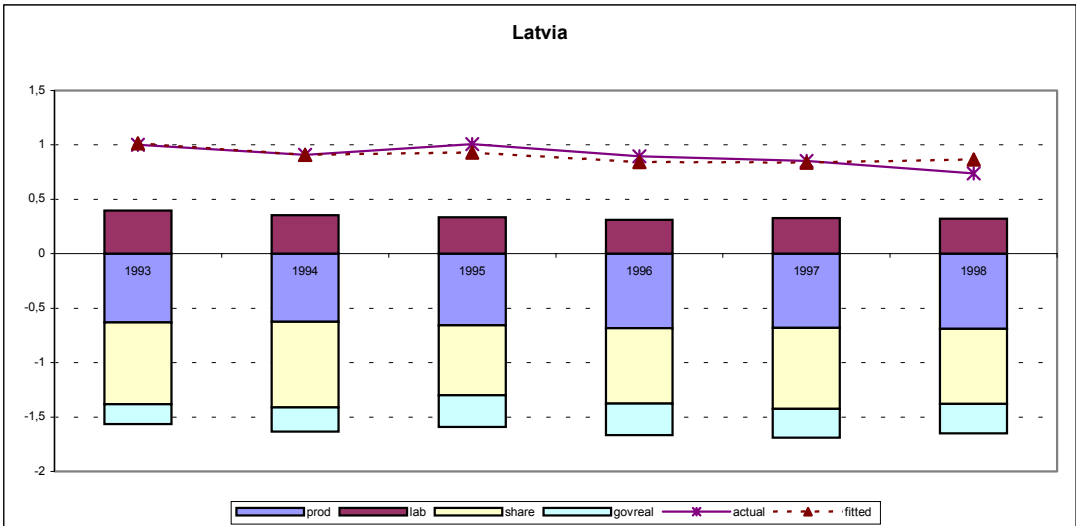
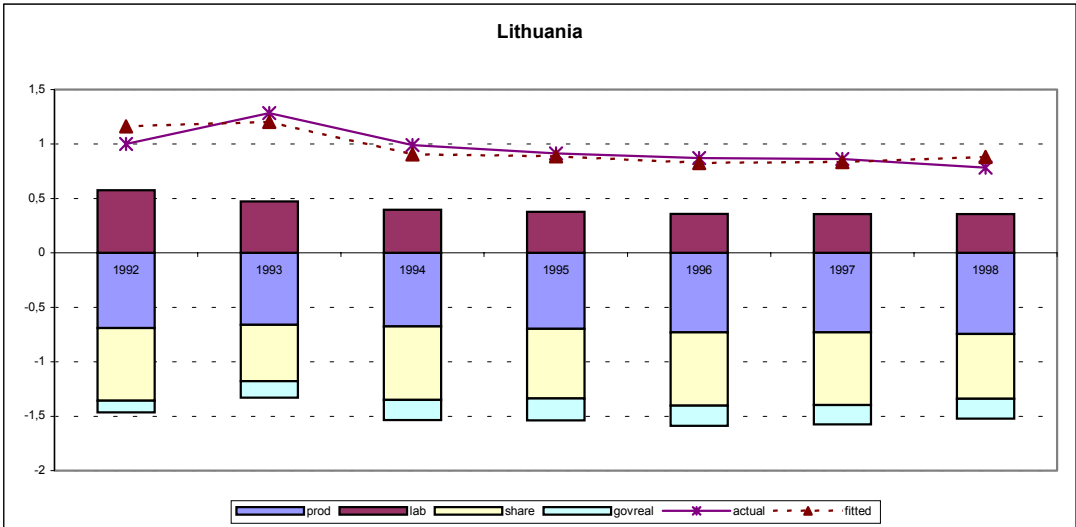
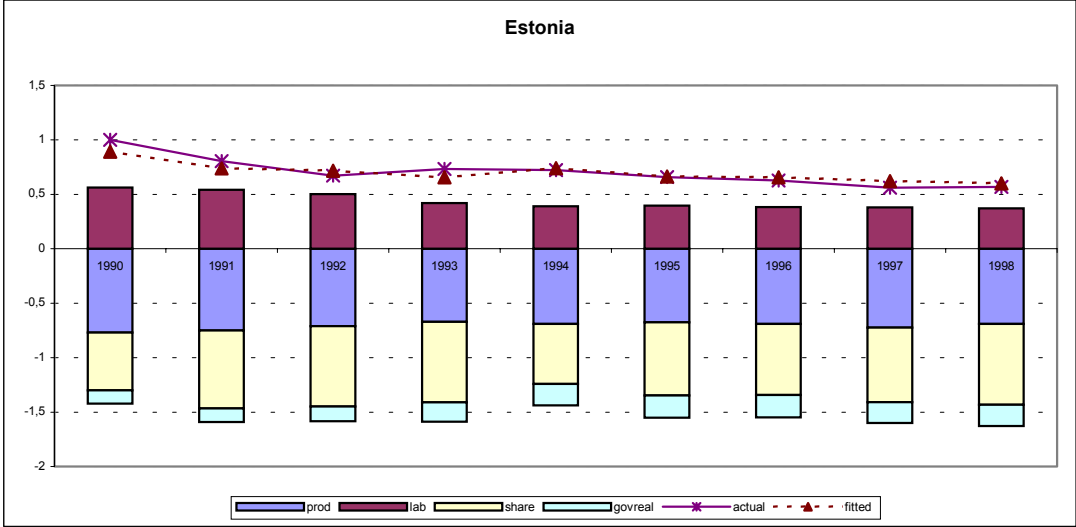
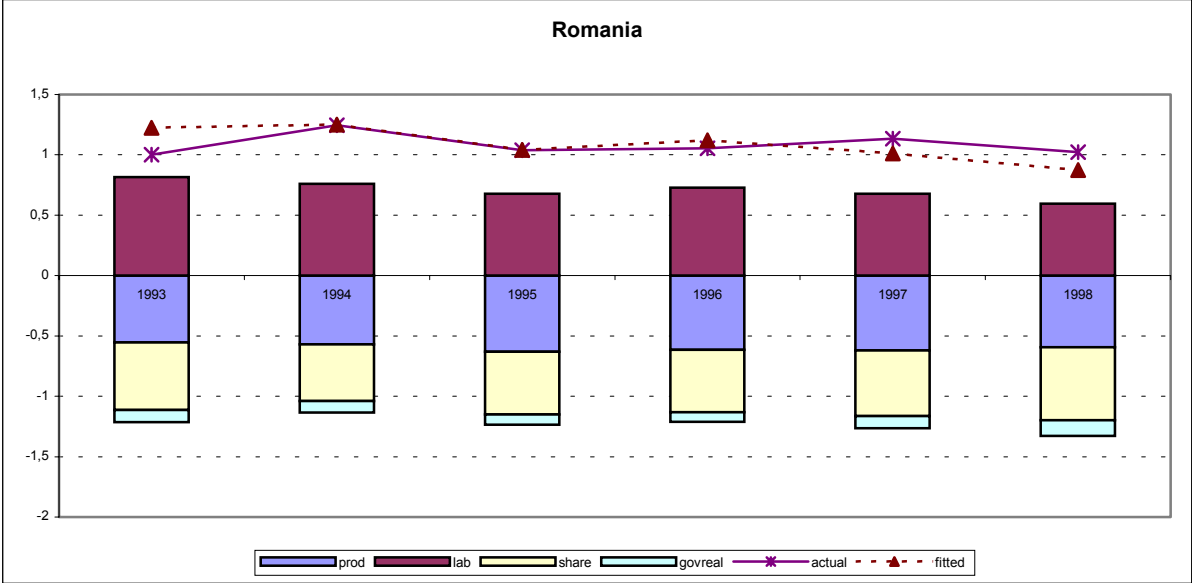
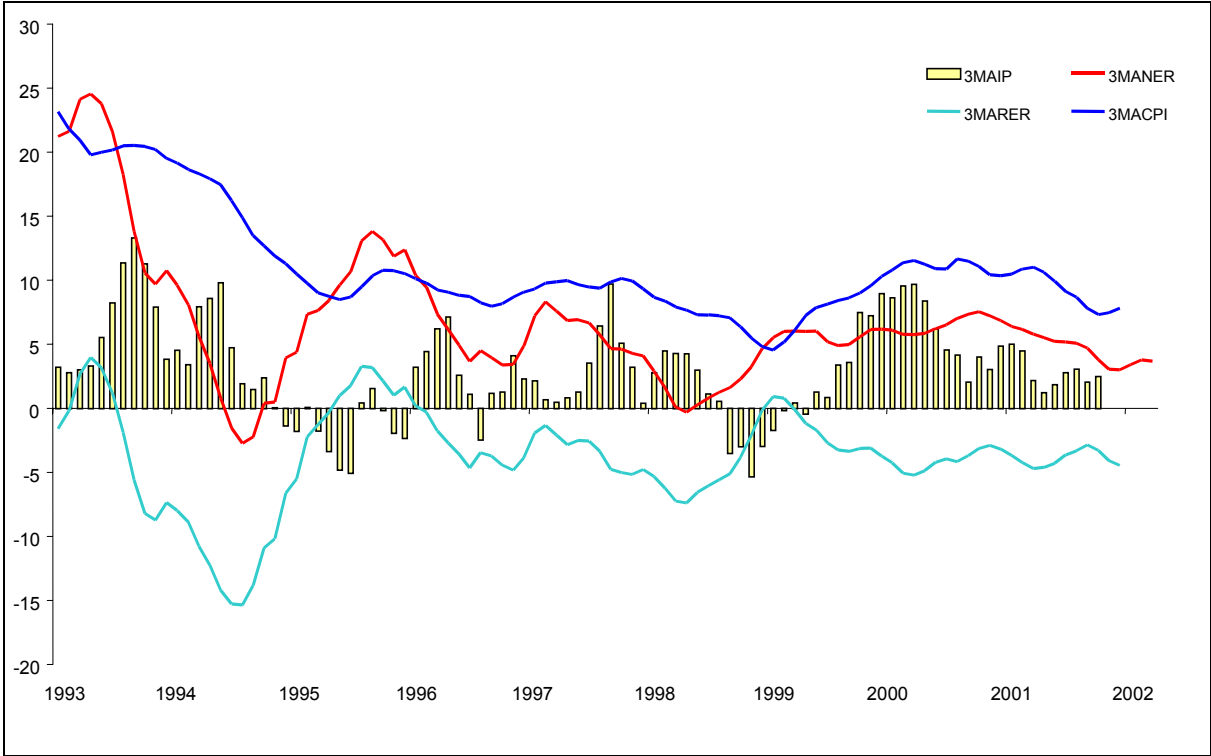


Figure 8:...continued



Source: The World Bank; and authors' calculations.

**Figure 9:** Nominal and Real Exchange Rates in Slovenia



**Source:** Thomson Financial, datastream.