Determinants of Real Exchange Rates in Transition Economies

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1 Introduction

Although real exchange rates in transition economies have similar paths, the question remains whether the initially distorted economic environments in these economies have played any role in determining real exchange rate behavior since the beginning of the transition process. Also, one should ask whether the real exchange rate path in transition economies was indeed determined only by supply-side factors neatly introduced into the exchange rate story by the productivity differential approach. It seems that demand factors played an important role in determining real exchange rates in transition economies. The arguments for this view can be grounded either in increased demand for nontradables, which were previously not available in the markets of transition economies, or in changed government consumption, which as a result of market reform now redirects its final destination to the market for nontradables. This line of approach to real exchange rate determination in transition economies would necessarily follow the conclusions from empirical studies on growth in transition economies (in particular, Berg et al., 1999; Havrylyshyn, Izvorski and van Rooden, 1998). Those studies generally suggest that the initial conditions do matter, although they can be overcome by appropriate policy measures to correct the unfavorable starting points in transition economies. If this were the right approach, then one would be able to distinguish different factors that affect the real exchange rate in transition economies. The evidence from transition economies suggests that the experience of all transition economies with respect to productivity growth, trade liberalization, and capital inflows has not been the same.

Recent studies on real exchange rate behavior in transition economies support the argument to use the productivity approach to explain the trend appreciation of the real exchange rate in transition economies (Halpern and Wyplosz, 1996 and 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, as they significantly determined the macroeconomic policies and structural changes implied by the overall stance of the economies in those times. Decades of central planning have resulted in distorted structures of these economies. Industries had become overwhelming in the composition of output due to 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 with other market-enhanced reforms have brought about massive changes in output, employment and, last but not least, in relative prices. To analyze structural changes in transition economies, it is therefore useful to use the approaches that take

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into account the real changes in the fundamentals rather than models with established patterns of developments in market economies. As such, the productivity approach to real exchange rate determination serves as a natural candidate for analyzing the real exchange rate in transition economies.

The aim of this paper is to empirically test a model of real exchange rate determination in transition economies.[1]) A digression from the standard approach to real exchange rate determination in transition economies is presented in section 2. It is argued that central plans determined relative prices and the labor market in such a way that it was inevitable for the real exchange rate to appreciate once structural reforms in transition economies began. It is shown that the productivity differential between labor productivity in the tradable and nontradable sectors, private demand for nontradable goods, real government consumption, and structural reforms implemented to correct distortions inherited from the pretransition central planning period do negatively affect the real exchange rate and, as such, contribute to real exchange rate appreciation. Section 3 describes data and determinants of the real exchange rate. Sections 4 and 5 present key results. The empirical findings seem to confirm that transition – when looking only at real exchange rate behavior – is over once progress in structural reforms no longer affects the real exchange rate's determination relative to other factors. Section 6 provides some conclusions.

2 Model of Real Exchange Rate Determination in Transition Economies

To explain the price differential, 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 nontradables. Also, the scope for productivity gains is more limited in nontradables than in tradables. Because of this, the price of nontradables 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 nontradable 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 nontradable and the price differential for nontradables (Richards and Tersman, 1996). Coorey, Mecagni and Offerdal (1996) provide evidence of the difference between overall price levels for selected transition economies and the overall Austrian price level in 1993 and conclude that the differences between the price levels range between 65% to 90% in favor of Austrian prices. For some nontradables, this difference is even wider. In Moldova, for example, the price of communications services reached only 4% of the equivalent Austrian price in 1993. Richards and Tersman (1996) provide evidence of lower prices in the Baltic countries

1 *See Jazbec (2000 and 2001) for a full derivation of the model of real exchange rate determination in transition economies.*

when comparing them to countries with similar income levels. When comparing the Baltic countries with their neighbor Sweden, they conclude that, for example, in Latvia in early 1994, the general level of consumer prices was no more than 35% of the Swedish level, or no more than 40% of the U.S. level. They point out, however, that part of this estimated differential may be due to quality differences. Nonetheless, the difference is substantial and requires an explanation that may be grounded in subsidies to the tradable sector, which mainly comprised industry and manufacturing in the previously centralized economies.

The real wage is an increasing function of the targeted real wage determined by pretransition 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 pretransition equilibrium wage is (the higher the equilibrium wage determined by the central plan's objective to produce more of the industrial good relative to services is), the higher the pressure of the union is to negotiate for higher wages once transition starts. It is established that the nominal wage is an increasing function of the real wage determined by the pretransition structural parameter, η, which takes into account a distorted measure of the transition economy, productivity parameters and government consumption. The nominal wage is, therefore, determined as follows:

$$W = W(\omega(\eta), a_T, a_N, G), \tag{1}$$

where W is the nominal wage; $\omega(\eta)$ represents the average real wage depending on the structural parameter, η; a_T and a_N represent the technology parameters specific to the production of tradable and nontradable goods, respectively; and G stands for real government consumption of nontradable 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 negative value. However, it is assumed that an increase in nontradable sector productivity in transition economies increases demand for labor to satisfy private sector demand in the tradable and nontradable 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, therefore, is 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:

$$\frac{1}{P_N} = \frac{\Phi - 1}{\Phi}\left(\frac{a_N}{W(\omega(\eta), a_T, a_N, G)}\right), \tag{2}$$

where P_N is the price index for nontradable goods and Φ is share of nontradable goods consumption in total private consumption.

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

$$log(P_T/P_N)_{i,t} = \alpha_{oi} - \alpha_1 log(a_T - a_N)_{i,t} - \alpha_2 share_{i,t} - \alpha_3 govreal_{i,t} + \alpha_4 lab_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where $(P_T/P_N)_{i,t}$ is the relative price of tradables in terms of nontradable goods; $(a_T - a_N)_{i,t}$ is the productivity differential between tradable and nontradable goods production and is measured in terms of labor productivity in both sectors; $share_{i,t}$ represents the share of nontradable consumption in total private consumption; $govreal_{i,t}$ 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 nontradable sector. The sign of all coefficients is negative except the sign on 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 nontradable 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 (3). This is a relatively stringent assumption on the structure of a transition economy, and its validity can be seriously questioned. However, the right set of structural variables believed to determine the appropriate framework for analysis of transition has yet to be found.

3 Determinants of the Real Exchange Rate

Data used to construct price indices, productivity measures, demand variables and structural parameters cover 19 transition economies.[1]) Each transition economy is observed from the start 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 nontradables 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 nontradables. The criterion for the period of observation was the year after which the relative price of tradables in terms of nontradables started to consistently decline. However, this criterion has not been followed in all cases.[2]) Differ-

1 *Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine and Uzbekistan.*

2 *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.*

ent 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 whole sample includes 122 observations.

For the purpose of analysis, two sectors were distinguished: tradable and nontradable. While theoretical literature on real exchange rates relies upon the division of commodities into tradables and nontradables, 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% of total production is exported. In general, one would label manufactures as tradables and services as nontradables. 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 subsectors 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 one could doubt their tradability. A more substantial problem arises from the inclusion of nonmarket services in the variable representing the nontradable sector. However, the reasons for the inclusion of nonmarket services in the total services sector are the same as for the construction of the tradable sector variable. It is believed that, on average, these complications fade away, although in specific cases they could represent the main reason for the different behavior of relative prices, as argued later.

The independent variable is the relative price of tradables in terms of the price of nontradable goods. The implicit sectoral GDP deflators for industry and services are used to proxy for the price indices in these two sectors. The relative price takes value 1 at the beginning of transition and enters the regressions in logarithms.

Data on the right-hand side of equation (3) fall into the following categories:

– Productivity measure. This variable is solely represented by the productivity differential between labor productivity in the production of tradable goods and labor productivity in the production of nontradables ($(a_T - a_N)_{i,t}$). The productivity differential measures the extent of the Harrod-Balassa-Samuelson effect on the real exchange rate. The rationale for using labor productivity instead of total factor productivity (TFP), which would theoretically follow from the specification of the production function, is merely determined by data availability. To construct the TFP measure, one would need reliable data on capital stock in transition economies, which is quite impossible since there are problems related to the physical extent of capital stock as much as to pricing of capital in these economies. This problem is especially relevant in measuring the capital stock in the service sector. For the time being, it is assumed that labor productivity would consistently represent the effect

of the productivity differential on the real exchange rate measure. The labor productivity variable was constructed from the sectoral GDP figures measured in constant prices divided by the labor employed in that sector. In the case of the nontradable productivity variable, problems arise mainly from the inclusion of government services in the total services sector. On the other hand, tradable sector productivity suffers from the broader definition of the tradable sector. Usually, one would consider the tradable sector to be mainly represented by manufacturing. In the case of transition economy data, this sophistication was relatively impossible. The productivity measures in both sectors, therefore, reflect the complications of data availability rather than conceptual issues. Data on sectoral GDP in constant prices were gathered from national accounts collected by World Bank desk economists. Labor data were obtained from ILO publications and from EBRD desk economists. The productivity differential variable enters equation (3) in logarithms.

– Demand variables. These variables consist of the share of nontradable consumption in total private consumption ($share_{i,t}$) and real government consumption measured in percent of GDP ($govreal_{i,t}$). The share of nontradable consumption in total private consumption is believed to measure the shift of private consumption from tradables to nontradables. It is expected that this variable should have a substantial impact on the relative prices in transition economies, since product variety as well as the liberalization of economies have greatly improved since the beginning of transition. One possible explanation of the increased effect of private demand for nontradables on the real exchange rate could be found in a surge of capital flows into the region. Some of the capital inflows were directed to private consumption. Consequently, the price of nontradable goods increased and caused the appreciation of the relative price of tradables. The change in the share of nontradable consumption in total private consumption should, therefore, negatively affect the relative price of tradables in terms of nontradables. Government consumption is assumed to fall only on nontradable goods. Therefore, the private consumption of nontradables is equal to value added in services minus government consumption. Total private consumption is the sum of nontradable and tradable consumption. The latter is equal to value added in tradable goods plus the deficit in the trade balance. De Gregorio, Giovannini and Krueger (1993) argue that the nominal government expenditure over nominal GDP is by construction correlated with the real exchange rate. For this reason, real government consumption over real GDP is used to construct the real government consumption measure ($govreal_{i,t}$).
– Structural variable. As follows from the model, the preference of central plans in the pretransition period for the industry sector meant a larger number of workers in industry compared to employment in services. Once transition started, the number of workers in industry declined while employment in services increased. To capture this effect, the structural variable ($lab_{i,t}$) was constructed by dividing the number of workers employed in industry by the number of workers employed in services.

The same line of argument as in the case of constructing the tradable and nontradable sectors is relevant for constructing this variable. As transition progresses, the structural variable should decline and positively affect the relative price of tradables in terms of nontradable goods. The reasons for a decline of the labor ratio throughout the transition process should be attributed to the structural changes in the transition economies, and are thus exogenous to other right-hand side variables in the regression equation (3). To impose the latter, the structural variable ($lab_{i,t}$) was instrumentalized by the structural reform index constructed by De Melo, Denizer and Gelb (1996), and total credit to the private sector (EBRD Transition Report, 1999). Also, the structural reform index itself was used in a few regressions to avoid possible misspecification of the instrumental variable. However, the results do not differ significantly. Empirical work on growth in transition economies is mainly driven by the search for an appropriate set of variables to distinguish transition economies from their developed counterparts, and that would more thoroughly explain the output behavior in the region. In the case of exchange rate behavior, this argument is even more pronounced.

The possible effects of explicit different initial conditions in transition economies was captured by country-specific dummies, which transferred the regression analysis to the estimation of unbalanced panel data with fixed effects. A dynamic specification of equation (3) was not possible due to short time series, especially for the group of FSU countries.

Due to potential endogeneity, the structural variable approximated by the ratio between labor employed in the tradable sector and labor employed in the nontradable sector was instrumentalized by the structural reform index and credit to the private sector in transition economies. In a few regressions only the structural reform index was used. The results, however, did not change substantially. The structural reform index was originally constructed by de Melo, Denizer and Gelb (1996) and covered the period from 1990 to 1996. The updates from 1996 are constructed on the basis of the EBRD Transition Reports (1997 and 1998) and presented in Havrylyshyn et al. (2000). The structural reform index is a weighted average of three subindices: the index of internal liberalization, which scores price liberalization and the dismantling of trading monopolies in domestic markets; the index of external liberalization, which measures the removal of trade controls and quotas, moderation of tariff rates, and foreign exchange restrictions; and the index of private sector conditions, which measures the progress in privatization and financial sector reforms (de Melo, Denizer and Gelb, 1996; Berg et al., 1999).

4 Empirical Results

Table 1 reproduces the results of the regression of equation (3) for the full sample of 19 economies, each observed in the time of transition. The total number of observations is 122. The results of the basic equation (A.1) in table 1 support the earlier findings that the productivity differential, the share of nontradable consumption in total private consumption, and real gov-

ernment consumption negatively affect the real exchange rate, thereby contributing to real appreciation. The labor ratio between labor employed in tradables to labor employed in nontradable goods production enters the regression with a positive sign, as predicted by the model. This suggests that any delay in structural reforms – relatively high values of the labor ratio variable at the beginning of transition relative to its end values – in general tends to act as a restraining force on the real exchange rate.[1])

To test for possible differences across regions (CEE, Baltics, and FSU), variables with region-specific slopes are added to the basic regression (A.1). In so doing, it is argued that significant coefficients on multiplicative dummies would reflect different effects of single variables on the determination of the real exchange rate across regions. As expected, the results are not very satisfactory, which can mostly be explained through relatively short time series and, more importantly, by the fact that on average there were no significant differences between regions. This conclusion may come as a surprise; however, on average the dynamics of different independent variables are not substantially different when the process of transition is measured in transition time from the beginning of the most serious stabilization plan implemented in each country.

Regression (A.2) adds eight interaction terms to test for different joint effects of independent variables on real exchange rate determination among three groups of transition countries. As expected, most of the interaction terms are not significant. A joint Wald test on the significance of all Baltics and FSU-specific variables, respectively, cannot reject the null hypothesis of all respective country-dummy coefficients being zero. F-statistics on joint Baltics dummies is equal to 3.991, while F-statistics on joint FSU dummies is slightly higher, 4.396, but still not big enough to reject the null hypothesis.

To test for the significance of individual pairs of interaction terms, regressions from (A.3) to (A.7) are employed. In so doing, the possible isolated effects of independent variables on the real exchange rate across different groups of countries are examined. To test the joint effect of demand variables on real exchange rate determination, regression (A.3) adds four multiplicative dummies, two for each group of countries. Again, the coefficients on real government consumption and private nontradable consumption are not significantly different from zero, although they are correctly signed. It is argued later that demand variables played a more important role in determining the real exchange rate in the Baltics than in other regions. A negative sign of coefficient on demand variables in the Baltics corresponds to this line of argument.

Regressions (A.4) and (A.5) separately test the significance of the effect of private nontradable and government consumption, respectively, on the real exchange rate in the Baltic countries and the FSU. The results are along the line of regression (A.3) and merely replicate the conclusions from regres-

1 *The dispersion of the country-specific constants of the fixed-effects panel estimates – not reported here – is quite large. In effect, it appears that the country-specific constants act like country dummies, increasing the goodness of fit, but it is difficult to give an objective interpretation of the factors explaining the variation in economic performance among countries.*

sion (A.3). Again, the results are expected – although statistically insignificant – especially for the government variable, as the Baltic countries struggled to establish sovereignty from the Soviet Union in the early days of transition and strengthened the role of government in the economy. Inclusion of region-specific productivity measures produces regression (A.6). The results indicate that, on average, the productivity differential played a less important role in determining real exchange rates in the FSU than in the CEE and Baltic countries.

Regression (A.7) tests for possible differences in real exchange rate determination with respect to the effect of structural parameters. All three coefficients on structural reform variables are not significantly different from zero. The results from regression (A.7) are not surprising to the point that, on average, the transition countries began with the transition process along the same lines of implementation of reforms. As empirical models on growth in transition show, all transition economies were sequencing their reforms from macroeconomic stabilization via microeconomic liberalization to institution-building. All variables in the model are normalized to the beginning of the stabilization program in each economy; for that reason the sequencing of reform should be the same in all countries, if one accepts the assumption that

Table 1

Fixed-Effects Panel Estimates

(Relative Price of Tradables in Terms of Nontradables)

Variable	Dependent Variable: $\log(P_T/P_N)_{i,t}$						
	(A.1)	(A.2)	(A.3)	(A.4)	(A.5)	(A.6)	(A.7)
$\text{Log}(a_T - a_N)_{i,t}$	−0.868*	−1.332*	−0.888*	−0.869*	−0.885*	−1.175*	−0.890*
	(0.169)	(0.141)	(0.177)	(0.173)	(0.171)	(0.126)	(0.176)
$\text{Share}_{i,t}$	−1.656*	−1.854*	−1.685*	−1.672*	−1.663*	−1.568*	−1.695*
	(0.219)	(0.233)	(0.187)	(0.195)	(0.218)	(0.212)	(0.236)
$\text{Govreal}_{i,t}$	−0.749*	−1.595*	−0.711*	−0.762*	−0.682	−0.812*	−0.635*
	(0.379)	(0.497)	(0.754)	(0.389)	(0.737)	(0.401)	(0.360)
$\text{Lab}_{i,t}$	0.644*	0.021	0.555*	0.639*	0.568*	0.865*	0.31
	(0.202)	(0.276)	(0.009)	(0.205)	(0.205)	(0.251)	(0.363)
Baltics							
Lab*Bal		1.035*					0.471
		(0.273)					(0.189)
Share*Bal		0.2	−0.18	−0.071			
		(0.517)	(0.539)	(0.572)			
Prod*Bal		−1.476*				−1.002	
		(0.694)				(0.714)	
Gov*Bal		1.313*	−0.504		−0.492		
		(0.672)	(0.838)		(0.793)		
FSU							
Lab*FSU		1.757*					0.301
		(0.734)					(0.575)
Share*FSU		0.594	0.092	0.056			
		(0.549)	(0.434)	(0.415)			
Prod*FSU		1.035*				0.729*	
		(0.273)				(0.211)	
Gov*FSU		1.829*	1.099		1.038		
		(0.882)	(1.033)		(1.023)		
Adj. R^2	0.853	0.886	0.851	0.85	0.883	0.876	0.851
N	122	122	122	122	122	122	122

Source: Author's calculations.

*Note: Numbers in parentheses are for heteroscedasticity-adjusted standard errors. The * indicates that the coefficient is significantly greater or smaller than zero, as appropriate, at a 5% level. Country dummies are not reported.*

all countries followed the same stabilization program. As most transition countries accepted the external technical assistance provided by the World Bank or the International Monetary Fund, the assumption about similarities of the transition process becomes plausible.

The robustness of all other coefficients does not change substantially by substituting the labor ratio variable with the reform index in regressions (A.1) to (A.7). The results presented in table 1 are fully consistent with the view that structural reforms in transition economies contributed to the real appreciation trend observed in the region from the beginning of transition. Since all regressions are run in transition time, the results indicate that we can still expect further appreciation of the real exchange rate in those economies that started with transition later. Most FSU countries were still in the fourth or fifth year of the transition process in 1998 compared to more advanced transition economies. While other factors started to play a more significant role in determining the real exchange rate in those economies at later stages of the transition process, it is expected that the real exchange rate in FSU countries will replicate the behavior of the early starters.

5 Accounting for the Real Exchange Rate

For each time period, summing the product of each right-hand side coefficient and the corresponding data for each variable, and then averaging either over all countries or over the different groups of countries will calculate the contribution of each group variable. The results from the basic regression (A.1) underlie figures 1 to 3 and relate to the evolution of the real exchange rate in transition economies. Stacked columns represent the level of the 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.

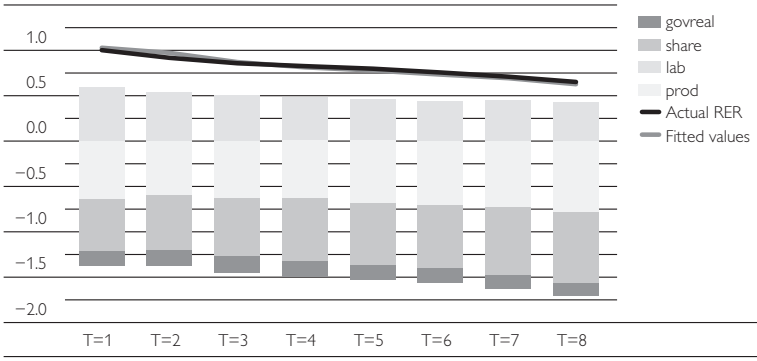
Figure 1 shows that on average, structural reforms contributed the most to the level of the real exchange rate in the first five years of the transition process in CEE countries. In the third year of transition, however, the productivity differential between labor productivity in the tradable and nontradable sectors, and private demand for nontradables, respectively, began to dominate the real exchange rate. Government consumption played a minor role in the combination of factors believed to determine the level of the real exchange rate.

Figure 3 could, however, lead to wrong conclusions as to which factors were the most important contributors to the real exchange rate determination in transition economies, since it only depicts averages for all transition economies. While the fifth year of transition represents the year 1998 for almost all FSU countries, CEE countries on average entered the eighth year of transition in 1998. Since the year 1998 was crucial, especially for FSU countries because of the Russian financial crisis, wrong conclusions could be drawn from an analysis limited only to an average across all transition

economies. Also, only Hungary and Poland entered the ninth year of transition; therefore, the last column represents the average only for Hungary and Poland. To grasp the different dynamics of the transition process, figures 2 and 3 present accounted levels of real exchange rates for the Baltics and the FSU, respectively.

Figure 1

Determination of Real Exchange Rates in CEE Countries without Bulgaria and Romania

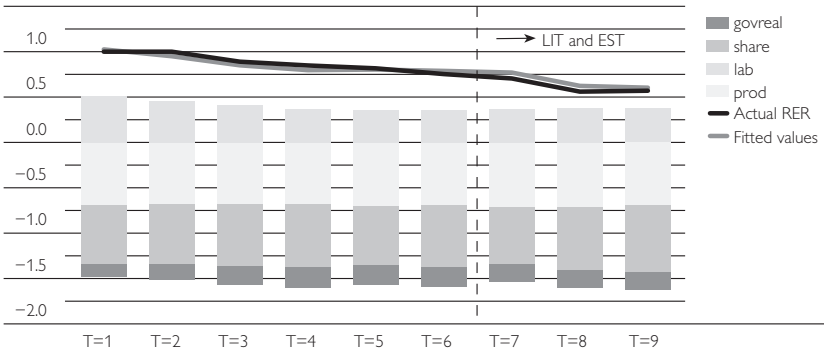


Source: Author's calculations.

In the Baltic countries, the structural parameter development was similar to that of CEE countries. However, the demand factors, both private consumption of nontradable goods and government consumption, respectively, had a more pronounced effect on the real exchange rate than in CEE countries. A dotted line in figure 2 indicates the period in which only the average over Lithuania and Estonia is shown. In these two countries, demand factors significantly contributed to real exchange rate appreciation in the last years of the transition process, while the productivity measure seemed to play a minor role in determining the real exchange rate throughout the whole transition period in the Baltic countries. In this respect, the Baltics were different from CEE countries, where it was shown that supply-side factors played a

Figure 2

Determination of Real Exchange Rates in the Baltic Countries



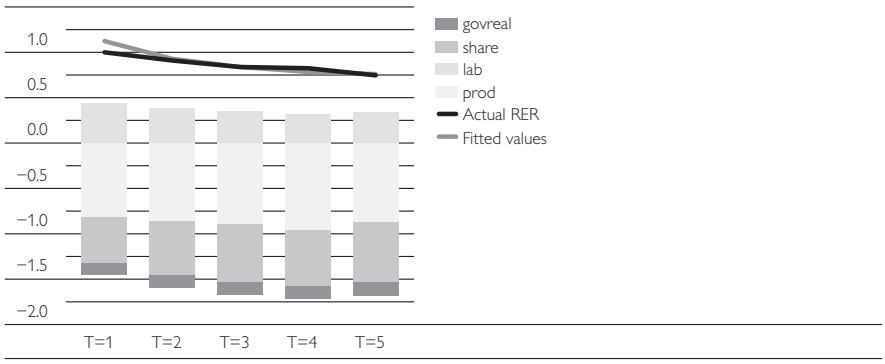
Source: Author's calculations.

more important role in determining the real exchange rate – at least later in transition.

Figure 3 presents the development of real exchange rate determinants in FSU countries. Unlike in the Baltics, structural reforms and productivity differentials were the most significant contributors to real exchange rate appreciation during the five years of transition experienced in FSU countries. However, the fifth year of transition in that region coincided with the Russian crisis; for that reason, one could say that the FSU would have still continued with structural reforms had the Russian crisis not prevented it from doing so. In contrast to other regions, structural reforms and productivity differentials went almost hand in hand right from the beginning of transition in FSU countries, although it seems that the development of the productivity differential was less intense than the dynamics of structural reforms. The breakdown of this relationship occurred in the fifth year of transition when the Russian crisis took place. While the intensity of structural reforms remained almost the same, the productivity differential decreased rather substantially relative to the period prior to 1998. In addition, private demand for nontradables increased. Nonetheless, the correct story for the behavior of real exchange rates in FSU countries cannot be grounded only on such a short period of time; therefore, only speculations on the right factors determining real exchange rates in FSU countries could be cast.

Figure 3

Determination of Real Exchange Rates in FSU Countries



Source: Author's calculations.

On the one hand, part of the reason for the real exchange rate determination in FSU countries can be attributed to more adverse initial conditions relative to other transition economies, as is regularly acclaimed in growth models. As transition took off in that region, structural reforms and productivity improvements in the tradable sector relative to the nontradable sector improved almost simultaneously, accounting for worse macroeconomic and entrepreneurial conditions before transition relative to other parts of the region. However, on the other hand, failure to clearly account for the real exchange rate determination in FSU countries could be attributed to variable construction in estimating equation (3). As established earlier, the labor ratio in FSU countries may suffer from a misspecification if an increase in the share of workers employed in the agriculture sector is not taken into account,

namely if the ratio between workers employed in the tradable to nontradable sector is corrected by an increase in the share of workers employed in the agriculture sector, then structural reforms in FSU countries progressed less than indicated in figure 3. For that reason, one could say that the real exchange rate appreciation in FSU countries during the first five years of transition could be attributed mainly to the Harrod-Balassa-Samuelson effect. Moreover, as structural reform indices show, the reforms are far from over in FSU countries relative to the values of the structural reform indices in CEE countries and the Baltics, respectively. The values of the structural reform index for each country are shown for the period of observation used in the estimation of equation (3).

Under the maintained assumption that the regression equation (A.1) is well-specified, it is expected that progress in structural reforms in FSU countries toward reforms to the extent carried out in the CEE and Baltic countries will cause further real exchange rate appreciation in that region. In that respect, FSU countries are different from the CEE and Baltic countries, where structural reforms were more advanced and other factors began to dominate real exchange rate appreciation.

6 Conclusions

This paper presents an empirically tested model suitable for the analysis of real exchange rate appreciation in transition economies. The structural models of the real exchange rate seem to be the most appropriate approach employed to analyze the commonly observed real appreciation trend in transition economies. For that reason, the model of De Gregorio, Giovannini and Krueger (1993) was extended in order to introduce a variable representing the structural reform progress in transition. Similar to growth models of transition (Berg et al., 1999; Havrylyshyn, Izvorski and van Rooden, 1998), it was shown that adverse initial conditions and structural reforms affected the real exchange rate measured as the relative price of tradables in terms of nontradable goods only in the first five years of the transition process. After that period, other factors began to dominate real exchange rate determination. All countries entered the sample in the year when their most serious stabilization attempt was introduced. In so doing, it was possible to distinguish the extent of the reforms implemented in each group of transition countries and their impact on real exchange rate determination.

Since only advanced transition economies have been engaged in transition for more than five years, speculations are cast for further developments in the real exchange rate in less advanced transition economies. It is argued that they will observe trend appreciation determined by structural reforms at least as long as they catch up with the more advanced economies. While the CEE countries have experienced an increase in the productivity differential between labor productivity in the tradable and nontradable sector at the later stages of transition, the demand factors seemed to play a more pronounced role in determining the real exchange rate in the Baltic countries. Although an explicit analysis of the external competitiveness in the theoretical framework employed in this paper is not possible, one could argue that the increased effect of demand factors on the real exchange rate in the Baltic

countries at later stages of transition caused a loss of external competitiveness reflected in a current account deficit, which is on average higher than in more advanced CEE countries.

One could argue that the analysis of the real exchange rate in transition economies should also account for the surge in capital flows observed from the beginning of transition and different exchange rate regimes maintained by monetary authorities in transition economies. Again, an explicit analysis is not possible. However, exchange rate regimes seemed not to play any direct role in explaining output performance in different transition economies. The fixed exchange rate regime was used mainly to better contain inflationary pressure and, as such, it affected real output growth only indirectly through better inflation performance. However, it seems that the fixed exchange rate regime did indeed affect the real exchange rate negatively in the case of the Baltic countries (they introduced a currency board as the most extreme fixed exchange rate regime). The link between the fixed exchange rate regime and real exchange rate appreciation measured by a fall in the relative price of tradables and nontradables seems to be established through an increase in capital flows if these mainly increase domestic consumption rather than investment. Measured in cumulative per capita terms in the 1991–97 period, foreign capital flows were indeed among the biggest in Estonia and Latvia (EBRD Transition Report, 2000). For that reason, it could be that Bulgaria, Estonia, Latvia and Lithuania were the only countries in 1998 still maintaining a fixed exchange rate regime (Fisher and Sahay, 2000).

The question of the exchange rate regime is becoming important in the light of EU enlargement, as five of the CEE countries are expected to join the EU (Coricelli and Jazbec, 2001). If convergence between incomes per capita will occur, rates of growth in CEE countries will be much faster than in EU countries. With flexible prices, such an adjustment in the real exchange rate would occur through an increase in the price of nontradables. In this respect, choosing the appropriate exchange rate regime before adopting the euro will be crucial for the processes of real and nominal convergence in transition economies.

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