Fundamentals, the exchange rate and the next EU enlargement rounds – Evidence from Bulgaria, Croatia, Romania and Turkey

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Abstract

We analyze the link between macroeconomic fundamentals and exchange rate dynamics in the four potential EU member states Bulgaria, Croatia, Romania and Turkey. Given the different institutional settings of the exchange rate market in the countries of interest, we follow two different modelling strategies. For Romania and Turkey, we evaluate possible exchange rate misalignments based on a monetary model of exchange rate determination. In the case of Bulgaria and Croatia, with currency board and narrow-band peg arrangements against the euro, we discuss possible exit strategies and quantitatively assess the effects of the peg arrangements by means of simulation.

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1 Introduction

On May 1, 2004, ten countries became new member states of the European Union, thus raising the EU's population by 20%. After this successful enlargement round the main challenges EU integration policies will have to cope with in the years to come are twofold. On the one hand, those EU members that have not yet joined the euro area will have to adjust their economic policies in order to reach the next level of integration: the adoption of the euro. Apart from the pursuit of stability-oriented monetary and fiscal policies, the key requirement for reaching this level is participation in the Exchange Rate Mechanism II (ERM II) for at least two years, which involves, in particular, an agreement on the central parity. This challenge has renewed interest in the literature on the determination of equilibrium exchange rates.[1]

On the other hand, a major direction of integration policies will be the further enlargement of the EU. In principle, there is a wider range of countries that may potentially have a perspective of EU membership in the remote future, but there are four countries that are already one step ahead and have already submitted their membership applications: Bulgaria, Croatia, Romania and Turkey. Bulgaria and Romania have already started negotiations about EU accession with a prospective entry date of 2007 and therefore have the status of an accession country. Negotiations with Bulgaria were preliminarily closed on June 15, 2004. Croatia and Turkey on the other hand have submitted their application for EU membership. Croatia will start accession negotiations with the EU in 2005. Turkey has official candidate status, the decision about the opening of negotiations with Turkey is expected for end-2004.

In this paper we will focus on exchange rate issues in these four accession and candidate countries. After the successful completion of the last enlargement round, it seems natural to focus on the further integration steps. Apart from the monetary and fiscal policy challenges on the way to EU membership, exchange rate policies and the driving forces of exchange rate movements are of special interest for these countries. This paper therefore aims at assessing the suitability of exchange rate strategies and the possible misalignment[2] of the currencies since the beginning of the 1990s. Strong and persistent exchange rate misalignment may be a hindering factor in the period prior to and during ERM II participation and bears the risk of speculative attacks.

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[1] For a literature survey on equilibrium exchange rate estimation with a focus on the new EU member states, see e.g. Égert (2003).

[2] An exchange rate is regarded as misaligned if its realized values persistently deviate from its equilibrium trend.

In order to evaluate the existence and persistence of exchange rate misalignments, we will proceed with a case-by-case study of the linkages between exchange rates and other economic variables. To be more specific, we will follow different approaches for the countries with mostly freely floating currencies (Romania and Turkey) and for those which had fixed or narrow-band exchange rate pegs during most of the 1990s (Bulgaria and Croatia). In the first case, we will follow the monetary model of the exchange rate to estimate the long-run elasticity of the exchange rate to changes in the fundamentals. Based on these parameter estimates, we will calculate the implied equilibrium exchange rate (defined as the long-run relationship found in the data between the nominal exchange rate and macroeconomic fundamentals) and the corresponding exchange rate misalignments.

For the second case of fixed exchange rates (currency board), the monetary model of the exchange rate is inappropriate. However, the countries in this group may consider the introduction of more flexible exchange rate regimes. On the one hand, relatively flexible exchange rate regimes may be more appropriate for these countries after financial stabilization has been achieved. On the other hand, early (voluntary) exits from fully fixed exchange rates are generally recommended. Ghosh et al. (2002) and Frankel (2003) argue that fixed exchange rate regimes are subject to increased vulnerability under increased capital mobility. As a result, a relaxation of exchange rate policies may be part of capital account liberalization, or a reaction to an increased integration of these countries into international financial markets. Finally, voluntary exits from currency boards or comparably fixed exchange rates may prevent possible exchange rate misalignments with their adverse effects on competitiveness.

Therefore, we will follow an indirect approach in order to evaluate whether the currency board in Bulgaria and the unofficial narrow-band peg in Croatia are appropriate. Using a panel including six Central and Eastern European countries (Czech Republic, Hungary, Poland, Slovenia, Slovak Republic and Romania; CEECs) and Turkey, we will estimate the monetary model of the exchange rate. These panel parameter estimates will then be used to study the dynamics of "hypothetical" equilibrium exchange rates against the euro as derived from the macroeconomic fundamentals in Bulgaria and Croatia for the peg period.

The structure of the paper is as follows. Section 2 discusses the various exchange rate strategy options for the potential EU candidate and accession countries and briefly reports on the institutional settings of the exchange rate

market for the four countries under study. Section 3 presents a simple theoretical version of the monetary model of exchange rate determination. Section 4 shows the empirical results of the estimation of the monetary model for Romania and Turkey as well as an evaluation of exchange rate misalignments. For Bulgaria and Croatia we follow an indirect approach that is presented in section 5. Section 6 gives some policy implications and concludes.

2 Exchange rate strategies for four potential EU member states

2.1 Monetary integration and exchange rate regimes

The current ten new EU member states have shown that there are many ways to approach monetary integration. From fixed exchange rate pegs or currency board arrangements to freely floating currencies their exchange rate regimes showed all variants of flexibility in the runup to EU membership.[3] This indicates that there is no unique solution as to the optimal exchange rate strategy on the way to monetary integration.[4] With the participation in ERM II, however, the option set becomes smaller as this framework is not compatible with fixed exchange rates to other currencies than the euro, crawling peg regimes or free floats without bands. In the case of currency boards arrangements the compatibility is assessed on a case-by-case basis.

It has been argued in the literature that the world is moving toward bipolarism with countries having either a free-floating currency or a hard peg, e.g.

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[3]Currently two countries (Estonia and Lithuania) have currency boards based on the euro. Both countries have kept this arrangement in place even after joining ERM II on June 27, 2004. Four countries have a fixed-peg arrangement: Latvia has a narrow-band peg to the Special Drawing Rights, Malta to a currency basket including the euro, the U.S. dollar and the pound sterling; Hungary and Cyprus have their currencies pegged to the euro with a wide band. Two countries (Slovakia, Czech Republic) have a managed float regime, Poland has a freely floating currency. Finally, until June 2004 Slovenia followed a de facto crawling peg despite its declared policy of free floating. Since June 27, 2004, Slovenia has participated in ERM II with standard fluctuation bands of $\pm 15\%$ around the central rate against the euro.

[4]In principle, small and relatively open economies with close trade links and a tight business cycle correlation with the euro area can be expected to profit most from exchange rate stability and suffer less from the loss of monetary policy autonomy (see Fidrmuc and Korhonen, 2003, for an assesment of this issue in the framework of Central and Eastern European countriess). Notice that countries such as Estonia and Lithuania have opted for currency board arrangements based on the euro, and Latvia and Malta pegged their currency to currency baskets with a narrow fluctuation band. At the other end of the scale we could situate Poland, the largest country in the region, whose exchange rate is freely floating.

a currency board. The question is to what extent a proper free-float regime is actually a feasible option for small and open economies such as the current and potential new EU members. A symptom often found in emerging market economies is what Calvo and Reinhart (2002) have termed "fear of floating." For a small open economy, the impact of exchange rate fluctuations on trade and inflation is expected to be considerable so that exchange rate stability is a desirable asset. This implies that even economies with officially freely floating currencies may show substantial interventions, which effectively limit exchange rate flexibility. The new classification of exchange rate arrangements in Reinhart and Rogoff (2004, extended working paper version with country specific information 2002) makes considerable adjustments to the IMF's official classification by focussing on de facto exchange rate policies instead of official announcements.

A specific factor that severely limits exchange rate strategy options is the degree of dollarization (or euroization in the European context) of the economy.[5] The extreme case of complete and official dollarization is one where the foreign currency is the only legal tender.[6] But there are also other cases, which are considered unofficial dollarization. This is the case if the foreign currency is used as a substitute for the domestic currency for some monetary services or if prices and wages are set in the foreign currency. Usually, the degree of dollarization is measured by the fraction of trade done in the foreign currency or by the share of foreign currency deposits in broad money. For a highly dollarized economy, the benefits of a freely floating currency are severely limited, as the exchange rate does not function as a shock absorber. Exchange rate movements directly feed into the domestic price level, with import prices being mostly affected and prices at a later stage of the production chain reacting in a less than proportional way. The higher the degree of dollarization the lower the power of monetary policy in controlling inflation. Even in countries with officially floating currencies, monetary policy may therefore engage in substantial exchange rate interventions.

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[5] In the academic literature the term dollarization is commonly used for the predominant use of any foreign currency in a country and need not necessarily refer to the U.S. dollar. For the general discussion we will follow this approach, but we will use the term euroization in later sections when we directly refer to the predominant use of the euro in a country outside the euro area. For a discussion on the pros and cons of euroization in Europe, see e.g. Begg et al. (2003).

[6] For small open economies that have a close economic involvement with the euro area the immediate unilateral adoption of the euro may sound like an appropriate strategy. In this case they would effectively circumvent the usual three-stage process toward adopting the common currency. From the political rather than the purely economic perspective, it should be emphasized that the European Union does not support this unilateral approach.

2.2 Exchange rate regimes in Bulgaria, Croatia, Romania and Turkey

The four countries of interest differ significantly in terms of both current exchange rate regime and historical institutional framework. The order of the countries in discussion in this subsection is chronological according to their EU membership application dates.

Turkey has a long tradition in exchange rate pegs. Since the 1930s, it has experienced periods of pegs to the pound sterling, the French franc, the U.S. dollar, the Deutsche mark and the euro. During most of the 1980s and 1990s, the Turkish exchange rate system was a managed float. Turkey adopted convertibility of the lira in early 1990. An increased degree of dollarization was accompanied by a real exchange rate appreciation, and the unsustainable policy mix led to a foreign exchange crisis in early 1994, which entailed a sharp exchange rate correction. Inflation subsequently reached levels of more than 120%. A disinflation program adopted at end-1999 aimed at reducing inflation to below 10% by end-2002, relying on monetary control and a depreciation of the currency according to a preannounced schedule (exchange rate basket: USD 1 + EUR 0.77). Against the background of unsustainable short-term indebtedness, widening current account deficits and serious weaknesses in the banking sector, the program proved to be insustainable, as it pushed the economy into recession and led to the surrender of the crawling peg regime in February 2001. The following months brought a sharp depreciation of the currency with the real effective exchange rate dropping by 20%. The success of this last stabilization program stems from the broader base of the structural reforms, which included a reform of the banking sector. In May 2004, Turkey saw one-digit inflation rates for the first time since 1972, which makes it appear realistic that the country could reach its goal of an annual inflation rate of 12% in 2004. The macroeconomic progress and political stability led to a substantial reduction of currency substitution by the U.S. dollar and the euro, which was followed by a gradual appreciation of the lira.

In Bulgaria and Romania the main steps toward European integration ran in parallel. Romania was the first country of Central and Eastern Europe to have official relations with the European Community, having entered into first agreements already in the 1970s. More than other transition economies, Bulgaria and Romania have been affected by the decade-long Yugoslav crisis, which obstructed transport links and trade and impeded FDI inflows. In both countries the particularly difficult initial conditions for transition were reinforced by inconsistent macroeconomic policies, political instability and

sluggish structural reforms. The accumulation of problems led to a banking crisis in both countries in the second half of the 1990s.

Bulgaria suffered at least three financial crises during the 1990s. In 1996 the strong depreciation of the leu led prices to explode and was followed by mass bank runs. Initial measures failed to restore confidence, the exchange rate collapsed and led to full-fledged hyperinflation in the first two months of 1997. GDP dropped by almost 10% in 1996 and by more than 5% in 1997. The large-scale depreciation of the exchange rate led to an irreversible process of currency substitution, thereby further limiting the central bank's ability to control inflation. On July 1, 1997, Bulgaria moved from a free- or managed-float system of the leu toward a currency board arrangement (first based on the Deutsche mark, then on the euro). Confidence was immediately restored after the announcement of the regime shift, even before its implementation. Inflation quickly fell to single-digit levels by mid-1997. Since this major restructuring, Bulgaria has experienced macroeconomic stability and strong growth despite adverse external shocks (Russian crisis, global financial crisis, Kosovo conflict), with average growth rates since 2000 reaching almost 5%. Despite the currency board arrangement, inflation remained high with average inflation coming to more than 6% since 2000. This appears to be related to external factors such as oil prices, the U.S. dollar exchange rate or the adjustment of administered prices and seems not to signal a serious competitiveness problem, given that unit labor cost developments remained moderate.

Romania's banking crisis lasted longer than Bulgaria's, but was less severe. The new government that came to power in 1996 launched a structural reform program, which included the tightening of monetary policy, the liberalization of the official exchange rate and the acceleration of privatizations. Although a foreign exchange market was created already in 1992, administrative controls over the official exchange rate were maintained until the end of 1996. In January 1997, the three main exchange rates were unified. Since then Romania's leu has officially remained a freely floating currency, although central bank interventions exceed what is normally considered a managed-float regime. Since early 2001 the new scheme presented in Reinhart and Rogoff (2004) has consequently classified the exchange rate regime as a de facto crawling band with a band width of +/–5%.

The situation in Croatia is usually cited as a classical example for the fear of floating. The Croatian economy is highly euroized with widespread asset substitution and an indexation of prices to the exchange rate. The high degree of euroization had its origin in the war period of the early 1990s, when

foreign currency was also used as a means of payment. While Croatia is considered an intermediate case in terms of openness with the ratio of imports to GDP averaging no more than 53% between 1991 and 2000, 73% of Croatia's trade in 2003 was carried out in euro. This high degree of euroization implies that Croatia's economic policy is strongly focused on exchange rate stability. Since the end of the war of the early 1990s monetary policy has been characterized by a very low tolerance of exchange rate movements (from October 1994 to January 1, 1999, vis-à-vis the Deutsche mark, since then vis-à-vis the euro) and a pronounced activism of the central bank on foreign currency markets. This strategy initially proved very successful in ending hyperinflation and in stabilizing the economy in the aftermath of the Croatian war, but the exchange rate anchor remained in place even after successful stabilization in the mid-1990s. The new classification presented in Reinhart and Rogoff (2004) attributes Croatia a de facto band of the kuna around the Deutsche mark and the euro with a band width of $+/- 2\%$, respectively. This de facto fixed peg stands in contrast to the official managed-float classification.

3   Fundamentals and the exchange rate: A simple monetary model of exchange rate determination

In this section we present a simple monetary model of exchange rate determination. As already put forward in the previous sections, the institutional setting of the exchange rate market for the countries under observation (with a view to exchange rate regimes) differs strongly. In order to empirically assess the importance of fundamentals in exchange rate developments and consequently to evaluate possible exchange rate misalignments, we will apply two different methodologies, depending on whether the country enjoyed sufficient flexibility in the exchange rate regime to be modelled using a classical flexible price monetary model.

For Romania and Turkey we will use a fully specified monetary model with purchasing power parity in tradable prices in order to assess the exchange rate's long-run elasticity vis-à-vis the fundamentals. This will allow us to evaluate possible exchange rate misalignments in these countries. The low exchange rate volatility in the fixed-peg or narrow-band settings in Bulgaria and Croatia, however, does not allow for an explicit estimation of the long-run elasticities of the exchange rate vis-à-vis the fundamentals. We will therefore assume that the parameter estimates drawn from a panel of seven past and future accession countries based on a similar monetary model also

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hold for Bulgaria and Croatia. This indirect approach will allow us to simulate exchange rate movements in the absence of fixed exchange rate regimes and to evaluate possible misalignments of the currencies.

We have to keep in mind that our indirect method relies on strong assumptions concerning the homogeneity of the panel's parameter estimates for Bulgaria and Croatia. There is no doubt that projections with estimates obtained from economies under a flexible exchange rate regime, and thus with exchange rate policies that differ from those being studied, may not be directly applicable to countries with a fixed exchange rate regime. It should be noticed, however, that we do not aim at interpreting the projected trajectories in a purely quantitative manner. The "hypothetical" exchange rate developments that are obtained from the panel estimates when using Bulgarian and Croatian data will be interpreted as overall over-/undervaluation pressures and potential competitiveness problems, and not directly as quantifications of misalignments. However, this approach may become more relevant if currency board countries decide to adopt more flexible exchange rate regimes. In that sense we can use our estimations to evaluate the risks associated with a regime shift. Actually, several CEECs included in our panel moved from relatively fixed exchange rate regimes toward managed or free floating during the economic transition. This feature of our panel as well as similar long-run targets of the current monetary policy (that is, preparing for the future adoption of the euro) provide some economic rationale for this method.

The general model used in all four cases is a simple monetary model of exchange rate determination, where purchasing power parity (PPP) holds exclusively on tradable prices. This assumption, proposed by Clements and Frenkel (1980), implies that the Balassa-Samuelson effect may play a role in the determination of nominal exchange rates and has recently been used for analyzing of exchange rates in transition countries by Crespo-Cuaresma et al. (2004).

We apply this model to the four countries under observation (noted as domestic economies) and the euro area (representing the foreign country). Following the literature we assume log-linear money demand functions in the domestic and foreign economy, with similar income and interest rate elasticities,

$$m_t - p_t = \alpha y_t - \beta i_t, \tag{1}$$
$$m_t^* - p_t^* = \alpha y_t^* - \beta i_t^*, \tag{2}$$

where m_t denotes money demand, p_t denotes the price level, y_t denotes output

(all in logs) and i_t is the interest rate in the domestic economy. Variables with asterisks refer to the foreign economy. Assume that PPP in tradable goods holds approximately, so that

$$e_t = (p_t^T - p_t^{T*}) + \varepsilon_t, \tag{3}$$

where e_t is the nominal exchange rate (in logs), p_t^T is the (log) price of tradable goods and ε_t is an *iid* error. Assume further that the overall price levels, p_t and p_t^*, are weighted averages of the price of traded (p_t^T) and nontraded goods (p_t^{NT}) with equal weights (θ and $1-\theta$) across countries,

$$p_t = \theta p_t^T + (1 - \theta)p_t^{NT}, \tag{4}$$
$$p_t^* = \theta p_t^{T*} + (1 - \theta)p_t^{NT*}. \tag{5}$$

Using (1), (2), (3), (4) and (5), we can arrive at the following expression for the nominal exchange rate,

$$e_t = \frac{1}{\theta}(m_t - m_t^*) - \frac{\alpha}{\theta}(y_t - y_t^*) + \frac{\beta}{\theta}(i_t - i_t^*) - \frac{(1 - \theta)}{\theta}(p_t^{NT} - p_t^{NT*}) + \varepsilon_t. \tag{6}$$

Notice that this expression can be rewritten in terms of the real exchange rate $(q_t = e_t + p_t^* - p_t)$ after some manipulation, resulting in a relationship between the real exchange rate, the real interest rate and the other fundamentals in the monetary model put forward above. In this sense, the specification given by (6) can be thought of as a nominal version of a Behavioral Equilibrium Exchange Rate (BEER) model as proposed by MacDonald (1997) and Clark and MacDonald (1998).

If the uncovered interest rate parity (UIP) is assumed to hold, then

$$i_t - i_t^* = \mathbf{E}_t(e_{t+1}) - e_t, \tag{7}$$

where $\mathbf{E}_t(\cdot)$ refers to the conditional expectation operator using information up to period t. Using (7) in (6) and assuming rational expectations, recursive forward substitution results on[7]

$$e_t = \frac{1}{\theta}(m_t - m_t^*) - \frac{\alpha}{\theta}(y_t - y_t^*) - \frac{(1 - \theta)}{\theta}(p_t^{NT} - p_t^{NT*}) + \frac{1}{1 + \beta/\theta}\varepsilon_t, \tag{8}$$

which will be our baseline specification for the estimation of the long-run relationship between the exchange rate and the fundamentals implied by the monetary model.

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[7]See, for example, Groen (1998, 2002).

In the empirical implementation we will not impose the parameter restrictions implied by (8) explicitly, and instead estimate the unconstrained model[8]

$$e_t = \gamma_0 + \gamma_1(m_t - m_t^*) + \gamma_2(y_t - y_t^*) + \gamma_3(p_t^{NT} - p_t^{NT*}) + \varepsilon_t. \qquad (9)$$

The parameter estimates will then be used to estimate the exchange rate that corresponds to the development of money supply, real growth of industrial production and price developments. This estimated exchange rate trend can then be confronted with realized movements to detect periods of under- or overvaluation of the currency. Longer intervals of sustained deviations could indicate serious external imbalances and a potential loss of international competitiveness.

4 Estimation of the monetary model: The case of Romania and Turkey

The data used to estimate the model described above for the Romanian leu and the Turkish lira against the euro stem from the International Monetary Fund's International Financial Statistics and the Vienna Institute for International Economic Studies' Database on Eastern Europe and Eurostat.[9] The production variable used is the industrial production index, the monetary aggregate is M2 and the variable reflecting the price of nontradables will be proxied by the ratio of the consumer price index to the producer price

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[8]The reason for deviating from the exact parametrization given by (8) is that the point estimates of the structural parameter corresponding to the weight of tradable goods in the consumer price index (θ) appears greater than one in practically all of the estimations carried out for Romania and Turkey. Notice that estimates of θ greater than one revert the sign of the long-run effect of the nontradable price differential on the exchange rate. This result, which may appear puzzling, can be explained in the light of the monetary model. The theoretical model put forward with PPP in tradable prices is assumed to hold continuously, inducing thus an elasticity of $1/\theta$ for the differential in the monetary aggregate. If it was the case that the adjustment is a slow and partial one, the estimate attached to the money supply differential for short samples will actually appear smaller than one. A long-run elasticity estimate which is smaller than one for the money supply differential can only be obtained for estimates of θ which are greater than one as the reduced form parameter attached to $(m_t - m_t^*)$ is of the form $1/\theta$ in the monetary model described above. Detailed results of the structural parameter estimates are available from the authors upon request.

[9]The close trade links of these countries with the euro area suggest that exchange rate movements against the euro are of higher relevance for exchange rate considerations than the fluctuations against other currencies, and in particular the U.S. dollar. We also performed estimations based on the exchange rate against the U.S. dollar, which are available upon request.

index.[10] The variables in model (9) present nonstationary features,[11] thus (9) can be interpreted as the long-run equilibrium acting as an attractor in the $(e_t, (m_t - m_t^*), (y_t - y_t^*), (p_t^{NT} - p_t^{NT*}))$ plane. This implies that cointegration methods will be used to estimate the underlying parameters in the specification proposed.

Using different methods to estimate the long-run relationship table 1 presents the parameter estimates for Romania and Turkey. The column labelled OLS presents the results of the estimation using least squares, which does not correct for the potential serial correlation of the error term and endogeneity of the regressors. We attempt to correct the estimates of the long-run parameters using two additional alternative methods: dynamic OLS (DOLS, Stock and Watson, 1993) and the method proposed by Phillips and Loretan (1991) (PL). The DOLS specification augments the OLS specification by adding leads and lags of the first differences of the regressors. The specification that is actually used in order to estimate the long-run parameters is

$$
\begin{aligned}
e_t \;=\; & \gamma_0 + \gamma_1(m_t - m_t^*) + \gamma_2(y_t - y_t^*) \; + \gamma_3(p_t^{NT} - p_t^{NT*}) + \qquad (10) \\
& + \sum_{k=-k_1^1}^{k=k_1^2} \gamma_k \Delta(m_{t-k} - m_{t-k}^*) + \sum_{k=-k_2^1}^{k=k_2^2} \rho_k \Delta(y_{t-k} - y_{t-k}^*) + \\
& + \sum_{k=-k_3^1}^{k=k_3^2} \xi_k \Delta(p_{t-k}^{NT} - p_{t-k}^{NT*}) + \mu_t,
\end{aligned}
$$

where μ_t is assumed to be an *iid* error. Phillips and Loretan (1991), by contrast, propose to estimate the long-run elasticities implied by a cointegration relationship by using a specification that includes leads and lags of the differenced regressors as well as lags of the deviations from the cointegration

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[10]See Égert and Lommatzsch (2004) and Crespo-Cuaresma et al. (2004) for a discussion on the use of the CPI-to-PPI ratio as a proxy of the Balassa-Samuelson effect in Central and Eastern European economies.

[11]Detailed results from different unit root tests applied to the variables are available from the authors upon request.

relationship. For our model, this implies estimating an equation such as

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\begin{aligned}
e_t \;=\; & \gamma_0 + \gamma_1(m_t - m_t^*) + \gamma_2(y_t - y_t^*) \; + \gamma_3(p_t^{NT} - p_t^{NT*}) + \hspace{3em} (11) \\
& + \sum_{k=-k_1^1}^{k=k_1^2} \gamma_k \Delta(m_{t-k} - m_{t-k}^*) + \sum_{k=-k_2^1}^{k=k_2^2} \rho_k \Delta(y_{t-k} - y_{t-k}^*) + \\
& + \sum_{k=-k_3^1}^{k=k_3^2} \xi_k \Delta(p_{t-k}^{NT} - p_{t-k}^{NT*}) + \sum_{k=-1}^{k=-k_4^2} \kappa_k(e_{t-k} - \gamma_0 - \gamma_1(m_{t-k} - m_{t-k}^*) - \\
& - \gamma_2(y_{t-k} - y_{t-k}^*) \; - \gamma_3(p_{t-k}^{NT} - p_{t-k}^{NT*})) + \mu_t,
\end{aligned}
$$

where μ_t is assumed to be an *iid* error. Notice that the inclusion of lagged deviations from the long-run equilibrium induces parameter nonlinearity in (11). The estimates for the PL method are obtained using nonlinear least squares. Table 1 also presents the results of the augmented Dickey Fuller test (ADF) applied to the deviations of the long-run equilibrium implied by each one of the methods.[12] For the case of Turkey, the model was estimated for the whole available sample and for the sample excluding the period corresponding to the peg (1999–2001), with no significant change in the results. The results presented in table 1 correspond to the sample without the peg. All models include a constant in the cointegration relationship, which is not reported in the tables.

The estimates of the long-run elasticities for both countries have the correct signs and are highly significant for practically all estimation methodologies (the PL method for Turkey being an exception). The estimated parameters corresponding to money supply differentials are in line with those reported in the empirical literature of the monetary model of exchange rate determination for both cases. While the estimate of γ_1 for Turkey is not significantly different from one independently of the method used, the estimate for Romania is relatively lower, indicating some degree of sluggishness in the adjustment to PPP. The estimates of the long-run income elasticities implied by the exchange rate model for the ROL/EUR exchange rate are in the range of values obtained using pooled estimates reported in Crespo-Cuaresma et al. (2004) for a panel of six CEECs including Romania, with a relatively high elasticity for industrial production[13] and a relatively low elasticity to price

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[12] The DOLS and PL specification were estimated using three lags and leads of the first difference of the regressors and as many lags of the deviations of equilibrium as appeared significant (three or four, depending on the currency). The ADF test includes as many lags of the first difference of the error correction term as necessary to remove the autocorrelation in the residuals of the test equation (with a maximum of twelve lags).

[13] The importance of production dynamics in short-run developments of the exchange

developments as compared to the panel results and to the results for Turkey.

For the case of Turkey, the PL method tends to find no significant long-run effects of industrial production differentials on the nominal exchange rate against the euro, while OLS and DOLS present significant point estimates that are lower in absolute value than those found for Romania. The estimates of γ_3 are higher in absolute value than those obtained for Romania and than the estimates reported in Crespo-Cuaresma et al. (2004) for CEECs, indicating a higher sensitivity of the exchange to relative price developments in Turkey.

Using the cointegration relationships implied by the estimates in table 1, we constructed deviations from the exchange rate against the euro implied by fundamentals for Romania and Turkey. The log deviations are plotted in figures 2 and 3. The overall dynamics of the deviations from the estimated cointegration relationship are similar across estimation methods, although there are significant differences concerning the level of deviation. For both currencies, the volatility of the deviations around the exchange rate implied by fundamentals is visibly higher in the first part of the sample. For Romania, less volatile deviations are observable as of 1999, while in Turkey, deviations stabilize already around the beginning of 1998. With the exception of those emerging from the OLS estimate, deviations from the estimated equilibrium in Romania tend to show an overall undervaluation of the currency for the period reviewed, except for the second half of 1998. The Turkish lira was mostly undervalued until the beginning of 1998. Since 1998 the lira has remained closer to equilibrium than in the period before, with clear under-valuation pressures in the beginning of 1998 (reflecting the negative effects of the Russian crisis) and in the aftermath of the currency crisis and the abandonment of the disinflation program in 2001. The most recent estimates seem not to indicate persistent exchange rate over- or undervaluations.[14]

5 Fundamentals and fixed exchange rates: The case of Bulgaria and Croatia

Under the policy of fully fixed exchange rates (currency boards or comparably credible fixed exchange rate regimes), money supply is endogenous. In the benchmark case of a currency board, the monetary base is fully cov-

rate of the Romanian leu was also highlighted by the Granger causality test results in Gueorguiev (2003) for the case of the exchange rate against the U.S. dollar.

[14]For a recent assessment of exchange rate misalignments of the Turkish lira against the U.S. dollar see e.g. Özlale and Yeldan (2004).

ered by foreign exchange reserves. Furthermore, the change in money supply is determined by international transactions (trade and capital flows). This ensures the sustainability of currency boards (Ghosh et al., 2000), because capital flights automatically reduce the monetary base, which strengthens the exchange rate.

Under currency boards and comparably fixed exchange rate regimes (de facto currency boards), demand for domestic money directly determines money supply, while the exchange rate remains exogenous. Correspondingly, the monetary approach to the exchange rate is not appropriate in this case. However, fundamentals still have a crucial importance for those countries. On the one hand, exchange rate-based stabilization may trigger rapid consumption growth as a result of lower interest rates and the improvement of the banking sector. This economic environment makes it more difficult for the country implementing a currency board to reach the levels of inflation in the anchor economy (the euro area in the case of Bulgaria and Croatia). As a result, the exchange rate may deviate increasingly from its hypothetical fundamental levels prevailing under free floating. Thus, these countries may face growing competitiveness problems, even though output growth and capital inflows ensure the sustainability of policies. Possibly, the deterioration of competitiveness is reversed in late stages of reforms after structural reform come fully into effect.

On the other hand, fixed exchange rate regimes (but less so credible currency boards) are generally seen as more vulnerable to capital flights or sudden stops of capital inflows (see Milesi-Ferretti and Razin, 1999). Ghosh et al. (2002) recommend voluntary early exits from fixed exchange rate regimes after the aims of financial stabilization, sufficient disinflation and credibility of the national monetary policy have been achieved. However, optimal timing is crucial for the success of this strategy. A country has to preannounce its monetary strategy and prove the credibility of its monetary policy during this process. In general, this means that exchange rate policy should avoid exchange rate misalignments before the liberalization of exchange rates.

Bulgaria, and to a lesser degree also Croatia, face specific monetary policy challenges. Both countries have the prospect of becoming integrated to the EU relatively fast and eventually adopting the euro. Therefore, they may circumvent the problem of an optimal timing of their exits from fixed exchange rate regimes by a long-term strategy toward euro adoption. As part of this policy, countries can avoid the flexibilization of exchange rates. For example, Estonia and Lithuania continue their policy of fixed exchange rates

with zero fluctuation bands in ERM II.[15] Insofar as the macroeconomic policy mix ensures financial sustainability, possible exchange rate misalignments (overvaluation) are to some degree less important in this very specific case, because the Balassa-Samuelson effect results in a continuous appreciation of the exchange rate.

In addition to the previous arguments, we have to keep in mind that both Bulgaria and Croatia show a history of low (zero or nearly zero) exchange rate volatility. In the case of Croatia, the de facto peg of the Croatian kuna to the euro with a band width of about $\pm 2\%$ is motivated by the high degree of dollarization of the Croatian economy. Bulgaria, by contrast, was unsuccessful with inflation stabilization until 1997, so that the implementation of a currency board arrangement was basically the only way to quickly stabilize inflation and inflation expectations. In both cases, exchange rate movements are not flexible enough to directly estimate a monetary model.

Our approach is therefore to estimate a monetary model derived in section 4 for a panel of seven former and current candidate countries (Czech Republic, Hungary, Poland, Romania, Slovak Republic, Slovenia and Turkey). The panel specification is similar to equation (9),

$$e_{it} = \gamma_0 + \gamma_1(m_{it} - m_t^*) + \gamma_2(y_{it} - y_t^*) + \gamma_3(p_{it}^{NT} - p_t^{NT*}) + \varepsilon_{it}, \qquad (12)$$

where the variables have the same notation as above, but the error term ε_{it} is assumed to be composed of a fixed country effect, a fixed time effect, (common to all countries in the panel) and a country-specific white noise error. Panel unit root tests carried out for the variables of the model give evidence that the specification given by (12) should be estimated using panel cointegration methods.[16] We then use the estimated coefficient to simulate a "hypothetical" relative path of the equilibrium exchange rate against the euro (driven by relative developments in macroeconomic fundamentals in these countries as compared to the euro area) for Bulgaria and Croatia during the peg period.

Table 2 presents the estimates for the panel using different methods for a balanced panel between January 1994 and May 2003. Similarly to the previous section, we estimate the monetary model of exchange rates by DOLS,

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[15] After a careful assessment of appropriateness and sustainability of the currency boards in Estonia and Lithuania, both countries joined the ERM II on June 27, 2004, with their existing currency board arrangements based on the euro in place. This move imposes unilateral commitments on these countries, while no obligations are foreseen for the ECB.

[16] Results of panel unit root tests according to Im et al. (2003) are available from the authors upon request.

which is also recommended by Kao and Chiang (2000). Furthermore, panel data enables us to include time effects (time dummies), which may correspond to some general external development (e.g. external shocks such as the Russian crisis). Alternatively, we estimate a DOLS specification accounting for the contemporaneous correlation in the errors across countries by a seemingly unrelated regression (SUR). These specifications are denoted in table 2 by DOLS-T and DOLS-SUR, respectively. We also report the test statistics for the ADF test for panel cointegration proposed by Kao (1999). These test statistics are adjusted for the potential endogeneity of the cointegrating variables, making use of the long-run conditional variance of the residuals (see Kao, 1999, for a discussion).

Our results show that the model parameters are very robust to the formulations of the estimation equation.[17] The results of panel estimations are comparable to the previous results for Romania and Turkey. The panel estimates, especially the estimated coefficient for the industrial production differential in several specifications, may be considered to be closer to generally reported results (see Groen 1998 and 2002). Surprisingly, the inclusion of time effects does not contribute to the quality of estimations. In particular, the coefficient for industrial production is close to zero and insignificant. Furthermore, the panel ADF test rejects the cointegrating relationship for this specification. Sensitivity analyses show that this is especially attributable to the obsevations corresponding to Turkey. This may indicate that different shocks have occured in Turkey and in other candidate countries in the mid-1990s. The results improve also if we use shorter time periods (e.g. from 1995 to 2003) for the estimation.[18]

In order to create the "hypothetical" path of the fundamentals-driven exchange rate for the peg period in Bulgaria and Croatia, we will use the parameter estimates obtained by DOLS and the corresponding fundamentals of these two economies.[19] Given that the parameter estimates are obtained using a panel with fixed effects where the countries of interest were not included, a decision has to be taken as to how to normalize the level of the implied equilibrium exchange rate. In the case of Bulgaria this normalization is set by assuming that the level of the exchange rate corresponded to the

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[17]This statement is further confirmed by sensitivity analyses for a comparable panel presented in Crespo-Cuaresma et al. (2004).

[18]The corresponding results are not reported here but are available from the authors upon request.

[19]When interpreting the results, we should keep in mind that exchange rate misalignments estimated on the basis of panel data tend to show greater volatility than those directly based on the individual time series (see e.g. Égert and Halpern, 2004).

value implied by the fundamentals, on average, in the second half of 1998. For Croatia we will assume that the exchange rate corresponded to the one implied by the fundamentals in October 1994, when the peg was introduced. Figures 4 and 5 present the evolution of the actual exchange rate and the "hypothetical" fundamentals-driven exchange rate for the two economies. Fixed effects implied by this procedure are of appropriate size according to the criteria proposed by Maeso-Fernandeza et al. (2004). In particular, fixed effects derived for Bulgaria are slightly higher than fixed effects estimated in the original sample, while they are much more similar to other CEECs in the case of Croatia. This observation corresponds broadly to the similarities between the analyzed countries. Thus, the fixed effects used here for Bulgaria and Croatia effectively adjust for structural characteristics of the individual countries.

Bulgaria

Some interesting features can be observed in the case of Bulgaria. Prior to the 1997 crisis, the exchange rate was significantly overvalued[20] as compared to the exchange rate implied by macroeconomic fundamentals. Furthermore, the size of depreciation during hyperinflation roughly corresponds to the one implied by the fundamentals-driven exchange rate. We can see a dampened overshooting behavior of the implied monetary exchange rate, which is mainly attributable to the development of the interest rate differential. Since the introduction of the currency board, the "hypothetical" exchange rate has followed a depreciating path. On the one hand, this development may imply that the Bulgarian currency is overvalued again in the last part of the sample. This behavior pattern follows the so-called exchange rate-based stabilization syndrome (see Ghosh et al., 2002). On the other hand, we can see that the "hypothetical" exchange rate has stabilized in 2001, which indicates that the Bulgarian economy has adjusted to a new exchange rate regime under the currency board. Actually, the deviations between the "hypothetical" and the actual exchange rates are more difficult to interpret in this case because of statistical changes and a currency revaluation after the currency crisis of 1997.

Inflation remained relatively high in Bulgaria (above 5% at the end of 2003). Under fixed exchange rates, a persistent inflation differential with respect to the anchor country may lead to an overvaluation of the real exchange

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[20]This conclusion is, however, sensitive to the specification of the constant term in the simulation, which was discussed above. By contrast, alternative derivations of the constant term would lead to a confusing behavior of the exchange rate especially during the currency crisis in 1997.

rate and, accordingly, to a fall in the competitive position in the economy. One way to assess this risk is to analyze the current account position. The Bulgarian current account deficit widened sharply from 0.5% of GDP in 1998 to 8.3% in 2003. This was the result of strong growth in consumer goods imports, but mainly also of the increase in imports of investment goods. The gap is, however, largely covered by FDI inflows and official financing. While initially most of this financing came through privatization revenues, Bulgaria also managed to draw substantial funds from nonprivatization direct investment after the privatization process slowed down. The fiscal account, by contrast, was close to balance in recent years and did therefore not increase the current account deficit further. Overall, this picture suggests that the overvaluation does not pose a substantial risk to the economy.

To evaluate the evolution of competitiveness in the Bulgarian economy in view of a possible exchange rate overvaluation, it is useful to examine unit labor cost developments. From 2000 to 2002, the annual change of unit labor costs was only around 2.5%, despite an average inflation rate of almost 8% in those three years. The reason was a rapid productivity increase. The Bulgarian economy is in a comparatively early stage of development, and thus still provides sufficient margins for productivity gains. These favorable labor cost developments helped sustain the favorable competitive position of the economy in spite of a possible overvaluation of the currency. The IMF shares the view that price and wage indicators do not indicate a loss in competitiveness, suggesting that the real exchange rate appreciation since mid-1997 has to a large extent been attributable to the Balassa-Samuelson effect and to price liberalization (see e.g. IMF, 2000). The most recent data for the year 2003 may, however, point to potential risks, with unit labor costs increasing by more than 7%.

Croatia

Figure 5 presents the dynamics of the simulated equilibrium exchange rate against the actual exchange rate for Croatia. In the light of the developments of the fundamentals-driven exchange rate, the level of the peg appears extremely (and increasingly) overvalued. To assess whether a sustained and widening overvaluation of the currency poses a risk to competitiveness, we again examine balance of payment developments. Since 1998, the current account deficit has been at around 6% of GDP on average. Behind this figure stands a huge trade deficit of around 20% of GDP, resulting from the failure to adjust the export structure to new demand. This high trade deficit is counterbalanced by a positive service balance as a result of income from tourism as well as by the inflows of funds from expatriates. From 1998 to

2003, the current account deficit was entirely financed by FDI inflows, which have also amounted to 6% of GDP on average since 1998. This suggests that the high current account deficit is nevertheless sustainable. But the most recent developments may point to a certain risk. The current account deficit has widened in recent years from 2.5% of GDP in 2000 to almost 7% in 2003, while FDI inflows have remained relatively stable.[21] If the current account deficit continues to widen and this development is not matched by increasing FDI inflows, this may point at increasing difficulties with the overvaluation of the currency.

A second factor to keep in mind, especially when evaluating the competitive position of the economy, are unit labor cost developments. These seem not to indicate an unsustainable situation, as both inflation and the increase in unit labor costs showed rates of below 2% in 2003.

A highly relevant aspect for the feasibility of an exchange rate relaxation are the costs associated with such a policy shift. One argument put forward by the supporters of the current regime is the high degree of euroization of the economy. If asset and commodity prices as well as wages are set in euro, a devaluation of the exchange rate directly feeds into the domestic price level, leading to higher inflation and a redistribution within the economy. Billmeier and Bonato (2002) argue that euroization is mostly limited to financial assets (asset substitution, savings in foreign currency and foreign currency-dominated or indexed loans), while retail prices are hardly affected by exchange rate movements. Strict exchange rate targeting may therefore not be necessary. The authors suggest a gradual shift away from the past policy of exchange rate targeting.

Furthermore, figure 5 may overestimate the actual degree of overvaluation because the use of foreign currencies in the Croatian economy lost importance during the period analyzed. Stix (2003) reports that the share of Croatian respondents holding foreign currencies declined from almost 60% in 1997 to about 20% in 2001. Even though these numbers cannot be translated one to one into standard monetary aggregates, they show that a significant part of M2 growth has actually been offset by corresponding declines of unreported foreign currency holdings.

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[21] It should be noted that the current account deficit in 2003 is biased to a certain extent by a one-off event in the same year. A patent transfer of the Croatian pharmazeutical company PLIVA d.d. to a branch in Hungary was not accompanied by a financial counterflow, so that it worsened the current account deficit. According to the 2003 Annual Report of the Hrvatska narodna banka the current account deficit amounts to 6% of GDP when this factor is excluded.

While these results seem to downgrade the cost of a change in the exchange rate regime on grounds of inflation considerations, they ignore the potentially high costs for financial stability. If an important part of liabilities is denominated in foreign currency, exchange rate movements have direct consequences for the level and sustainability of debt and the stability of the banking system. Exchange rate fluctuations may therefore entail severe costs for the economy and may in extreme cases lead to a banking crisis. The confidence of the economy highly depends on the stability of the financial sector. Certainly, these considerations significantly limit the set of options for future exchange rate policies.

6   Policy implications and conclusions

This paper focuses on the exchange rate challenges in the four countries that currently have declared their interest in becoming a member of the European Union in the near future: Bulgaria, Croatia, Romania and Turkey. While Romania is already in the mid of accession negotiations and Bulgaria has preliminarily closed them on June 15, 2004, Croatia will start negotiations at the beginning of 2005 and Turkey still waits for the European Council to decide on the opening of negotiations. All of these countries share the challenge of choosing of the appropriate exchange rate strategy in the runup to EU membership and to an eventual adoption of the euro once they fulfill the convergence criteria.

Given the substantial differences in past exchange rate policies, we adopt different approaches in assessing the appropriateness of exchange rate strategies and studying the connections between exchange rates and other economic variables. For the countries with currently freely floating currencies, i.e. Romania and Turkey, we follow the monetary model to evaluate the importance of fundamentals for exchange rate fluctuations. The comparison of realized exchange rates with the equilibrium exchange rate (as derived from the estimated elasticities and the macroeconomic fundamentals) reveals no substantial over- or undervaluations of the currencies in the end of the sample. In both countries, the deviations around the equilibrium exchange rate became less volatile over time.

Bulgaria and Croatia, by contrast, follow a fixed-peg and narrow-band exchange rate policy respectively. In these cases, we use estimates of the monetary model of exchange rate determination obtained from a panel including six CEECs and Turkey. We address possible exit strategies from

the current fixed exchange rate regimes, which are presently discussed in the literature (see Ghosh et al., 2002, and Billmeier and Bonato, 2002). In particular, we present the dynamics of "hypothetical" equilibrium exchange rates against the euro computed on the base of macroeconomic fundamentals in Bulgaria and Croatia.

We find some deviation of this "hypothetical" exchange rate level, which can be explained partially by factors specific to these countries (the previously high degree of informal dollarization, structural changes etc.). Furthermore, major economic variables in these economies confirm the sustainability of financial developments. Nevertheless, our results indicate possible depreciation trends if these countries exit the current currency board or narrow peg strategy, respectively. From this perspective, a continuation of the current exchange rate regimes and a long-term preparation for euro adoption apprears to be an optimal exchange rate strategy for Bulgaria and Croatia.

Acknowledgments

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	Romania			Turkey		
	OLS	DOLS	PL	OLS	DOLS	PL
γ_1	0.840***	0.854***	0.876***	0.981***	0.996***	0.947***
	(0.008)	(0.011)	(0.018)	(0.091)	(0.014)	(0.070)
γ_2	−0.610***	−1.299***	−1.137***	−0.545***	−0.880***	−0.796
	(0.109)	(0.125)	(0.210)	(0.142)	(0.189)	(0.805)
γ_3	−0.258*	−0.980***	−0.728**	−2.024***	−2.033***	−1.779
	(0.156)	(0.191)	(0.322)	(0.224)	(0.309)	(1.321)
ADF test	−3.910***	−4.919***	−3.764***	−4.221***	−4.488***	−4.459***

Standard errors in parenthesis. *(**)[***] indicate significance at the 10% (5%) [1%] level.

Table 1: Generalized monetary model estimates of local currencies against the euro: Romania and Turkey

	OLS	DOLS	DOLS-T	DOLS-SUR
γ_1	0.842***	0.887***	0.926***	0.875***
	(0.006)	(0.010)	(0.040)	(0.005)
γ_2	−0.332***	−0.352***	−0.094	−0.373***
	(0.042)	(0.043)	(0.191)	(0.029)
γ_3	−1.601***	−1.598***	−1.399***	−1.590***
	(0.085)	(0.093)	(0.449)	(0.051)
Panel ADF test	−12.249***	−12.532***	−0.514	−12.498***

Standard errors in parenthesis. *(**)[***] indicate significance at the 10% (5%) [1%] level.

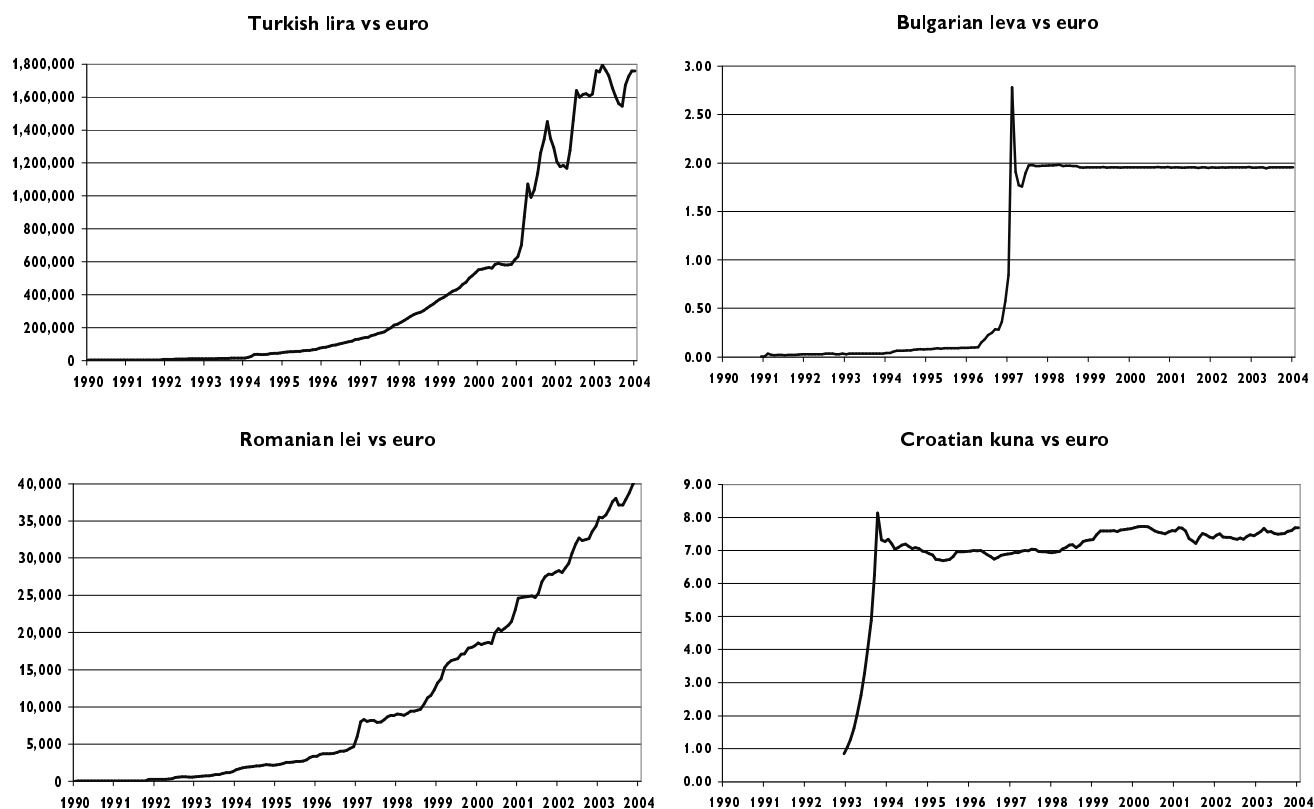Table 2: Monetary model estimates for a panel of accession countries

Figure 1: Exchange rate developments in Turkey, Bulgaria, Romania and Croatia. Local currency against the euro, monthly averages for the period from 1990 to 2003. Source: IMF.
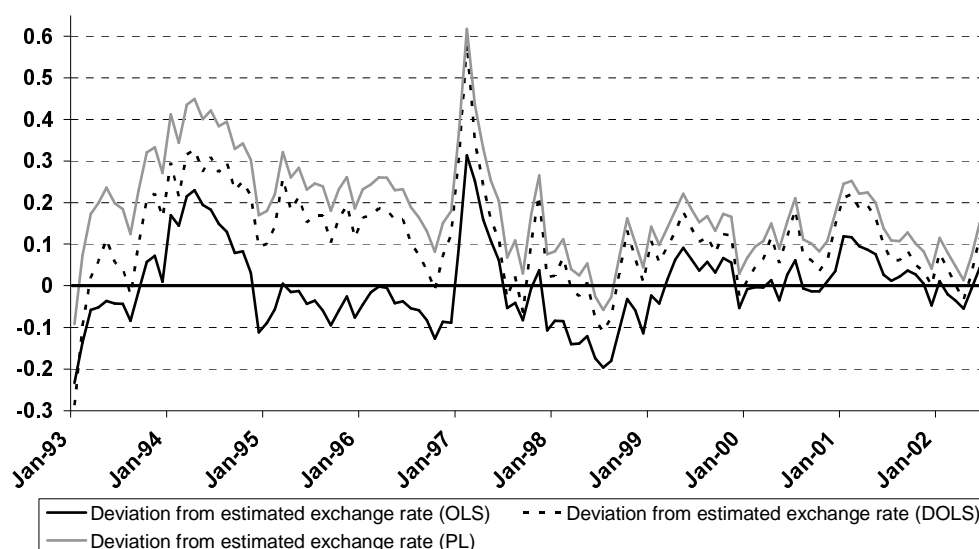
Figure 2: Romania: Deviations of the actual exchange rate from the estimated exchange rate, January 1993 – July 2002. Comparison of results based on OLS, dynamic OLS and PL model.
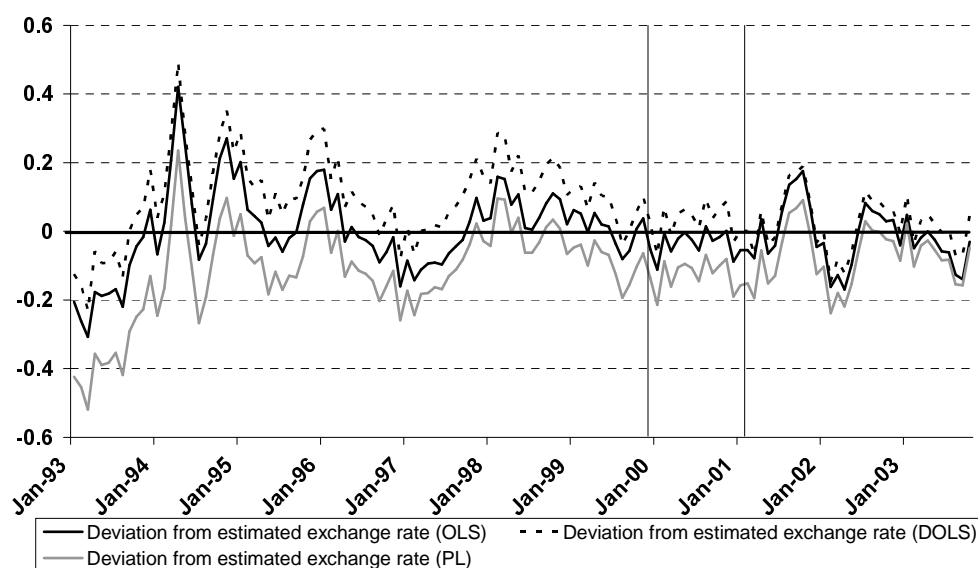
Figure 3: Turkey: Deviations of the actual exchange rate from the estimated exchange rate, January 1993 – October 2003. Comparison of results based on OLS, dynamic OLS and PL model. The area between the vertical lines indicates the period in which a crawling peg regime was applied.
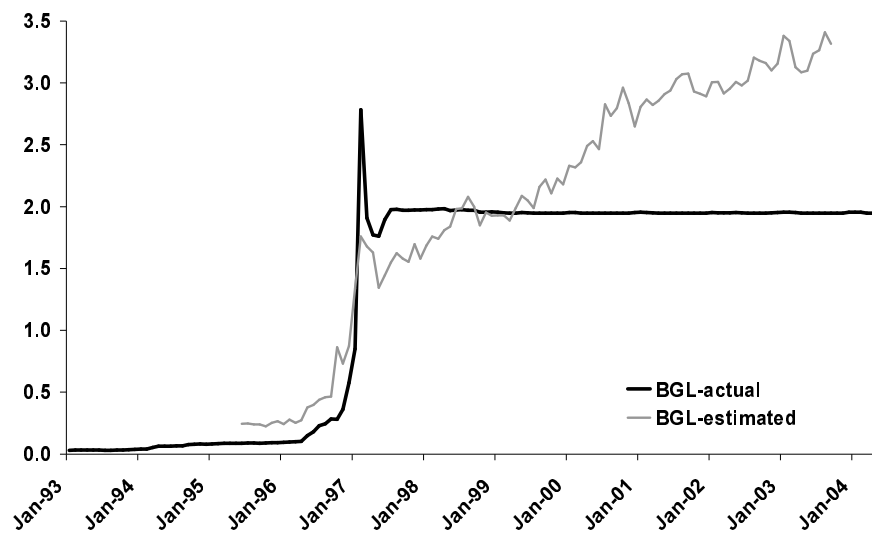
Figure 4: Bulgaria: Hypothetic equilibrium exchange rate versus actual exchange rate, January 1993 – May 2004
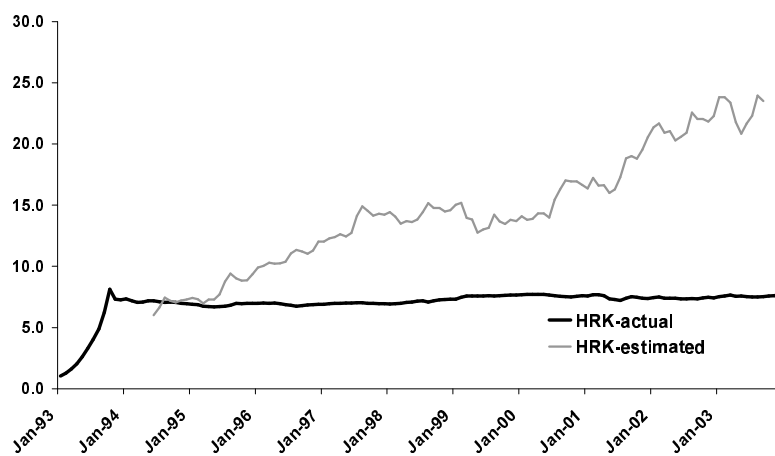

Figure 5: Croatia: Hypothetic equilibrium exchange rate versus actual exchange rate, January 1993 – December 2003