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The EMU Enlargement and the Choice of the Euro Conversion Rates: Theoretical and Empirical Issues

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Abstract

The paper deals with the choice of the nominal euro conversion rates for the acceding countries upon their accession to EMU. The paper reviews theoretical models of equilibrium exchange rates as well as discusses their interpretation and the ensuing policy recommendations. Problems with empirical estimations of existing models are addressed. It is argued that despite several equilibrium exchange rate theories not all of them are useful for the real policy choice of the nominal conversion rate. This and the intrinsic uncertainty of equilibrium exchange rate estimates lead to the conclusion that the range of "optimal" euro conversion rates is quiet wide and other issues must be taken into account. In particular, a smooth transition to the euro conversion rate and minimisation of risks of potential shocks to the economy should be the key concern. Consequently, recommendations for the selection of nominal conversion rates are largely dependent on the current exchange rate regime.

1. Introduction

In May 2004, ten countries: Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia, Slovakia[1] are expected to join the European Union (EU). As EU members they will be obliged to enter European Monetary Union (EMU). The opt-out option (as in the case of the UK and Denmark) will not be available to them.

The standard path of accession to EMU requires staying in the ERM II system for at least two years and fulfilling Maastricht convergence criteria. Under the ERM II a candidate country's currency has to stay within +/-15% band against the euro central parity. The central exchange rate cannot be devalued and it could be adopted as the irrevocable fixing rate in EMU. Some revaluation is, however, possible during final negotiations between the acceding country and the European Central Bank (ECB). In this context an issue of choosing the appropriate fixing exchange rate and exchange rate regime strategy arises.

In 1999, countries that took part in stage III of the EMU establishment fixed their currencies to the euro at their ERM parities. They were initially set before 1979 and then devalued on several occasions. In the case of the UK, which joined the ERM in 1990, the conversion rate was chosen based on the purchasing parity criterion (MacDonald, 2000). What should be the strategy for current acceding countries?

A general view is that the central parity should reflect an equilibrium exchange rate (Buiter, 1999). However, adoption of this wisdom is not straightforward as no universal concept of equilibrium exchange rate exists. Each approach has different theoretical framework and therefore different policy implications. In order to have a meaningful discussion over the choice of the appropriate exchange rate, equilibrium conditions must be clearly defined.

Against this background this paper investigates various issues related to the choice of the nominal conversion rates upon the entry to EMU for acceding countries. It starts with the review of the evolution of exchange rate regimes in the countries under the investigation, as this factor is claimed to be important in this context. Then, a general background to the discussion on fixing nominal exchange rates in EMU is outlined in Section 3. Given several concepts of theoretical models of equilibrium exchange rates, they are shortly reviewed in Section 4 in the context of choosing nominal conversion rates. Section 5 deals with problems of testing and practical implementation of these models. As usefulness of some theoretical equilibrium exchange rate models and precision of their estimates raise some reservations, other important issues that should be taken into account in making the decision on the conversion rate are discussed in Section 6. Finally, all arguments are summarised and conclusions are drawn in Section 7.

[1] Empirical and statistical analyses covered in this paper will also refer to the acceding countries (Bulgaria and Romania). For the sake of brevity, the term "acceding countries" used in this paper will refer to both acceding and accession countries. Not all acceding economies are covered in statistical analyses due to the lack of data.

2. Exchange rate regimes in acceding countries

Prior to tackling the question of choosing the conversion rate upon the accession to EMU a description of the exchange rate regimes among acceding countries will be presented. Acceding countries adopted a wide range of different exchange rate regimes that in some cases underwent a significant evolution.

First, it must be stressed that a clear-cut classification of exchange rate regimes poses some problems. This especially applies to a free floating regime as its pure form is rather rare in the real world. As Calvo and Reinhart (2002) have suggested, many economies exhibit 'fear of floating' and in practice use interest rate and intervention policies whose effect is to steer nominal exchange rates. Thus, the problem of exchange rate regime classification boils down to a comparison of *de facto* and *de jure* exchange rate policies. On the other hand, fixed peg exchange rate regimes are more transparent given their institutional frameworks in the form of either currency board arrangement, adoption of foreign currency (e.g. dollarisation) or conventional peg to one specific foreign currency or a basket of foreign currencies.

At the beginning of the transformation process in some acceding countries in the early 1990s when high inflation was pervasive and stabilisation policies had to be put in place, many countries resorted to fixed pegs, but in the course of the transition they gradually moved towards more flexible exchange rate regimes. This was the case of the Czech Republic, Hungary, Poland, Slovak Republic as well as Romania, and was consistent with a general global trend.

In the Czech Republic a pegged exchange rate regime was in place since 1993 until 1997. In 1993, the koruna was pegged to the basket of the German mark and US dollar with a narrow fluctuations band. The band was gradually widened over this period. In 1997, on the event of the financial crisis the koruna was devalued and the inflation-targeting framework coupled with free floating exchange rate regime was introduced.

In Hungary, since 1989 the forint was pegged to the basket of currencies – composition of currencies in the basket and their weights were subject to changes over time. Along these changes the fluctuations band was gradually widened from 0.3% in 1992 to 2.5% in 1994. On many occasions the forint was discretionally devalued. In May 1995, a system of pre-announced monthly devaluation rates was introduced. In January 2000, the euro became the only reference currency and in May 2001 the fluctuation band was extended to 15%. Consequently, the exchange rate regime became compatible with the ERMII mechanism. In June 2003, the central parity was devalued from 276.1 to 282.36 HUF/EUR.

Cyprus, like Hungary, adopts currently a unilateral peg to the euro with a 15% fluctuation band which is compatible with the ERMII. The central parity rate is set at 1.7086 CYP/EUR.

Poland also began the transition period with a fixed peg regime. At the beginning of 1990 the Polish zloty was pegged to the US dollar and then in May 1991 to a currency basket, which consisted of the US dollar, German mark, British pound, French and Swiss francs. Before the end of 1991, the fixed peg was replaced with the crawling peg regime with a preannounced monthly

devaluation rate. The devaluation rate was lowered gradually from 1.8% to 0.3% in March 1999. At the same time the fluctuation band was widened from 0.5% to 15% in 1999. Upon the introduction of a euro at the beginning of 1999 the currency basket was amended to comprise the euro (55%) and the US dollar (45%) only. During the period with the crawling peg, the zloty was devalued discretionally several times. Finally, after the introduction of direct inflation targeting framework in 1999 the zloty was fully floated in April 2000.

In the Slovak Republic, the Slovak koruna was fixed to a multi-currency basket over the period January 1993 – October 1998. Until 1995, the fluctuation band was very narrow (+/-1.5%). Only in January 1996 the band was widened to 3%, then to 5% in July and finally to 7% in January 1997. Since July 1994, the currency basket included the German mark and the US dollar (60% and 40%, respectively). In October 1998, the currency basket peg and fluctuation band were abolished. Despite floating of the Slovak koruna the national bank used to intervene in the foreign exchange market.

From the very beginning of the transition Romania has pursued officially a free floating regime, but in reality it targeted the leu exchange rate. The management of the exchange rate was especially tight during periods of significant macroeconomic imbalances (Nerlich, 2002). Given low foreign reserves the introduction of a fixed peg was not possible. Informally, the US dollar and euro are the reference currencies.

Unlike the countries described above Slovenia remained with the exchange rate regime broadly unchanged since the beginning of the 1990s. Since 1991, the tolar has been closely managed on a gradually depreciating path. Currently the euro is used as an informal reference currency.

The second distinctive group of countries in CEE went for fixed peg regimes that have been sustained so far. This was the case of Estonia, Latvia and Lithuania. Estonia in 1992 introduced the currency board arrangement and pegged its kroon to the German mark at the rate 8 EEK/DEM and in 1999 it was re-pegged to the euro at the rate of 15.6466 EEK/EUR.

Lithuania went for a currency board type arrangement and in 1994 the litas was fixed to the dollar. In February 2002, it was re-pegged to the euro at the rate of 3.4528 LTL/EUR. Both in Estonia and Lithuania central bank authorities hold the view that the current fixing exchange rates should be sustained with a zero band in ERM II.

In 1997, the currency board arrangement was also established in Bulgaria in the aftermath of the financial crisis. The Bulgarian lev was pegged to the German mark at 1:1 and upon the introduction of euro in 1999 re-pegged to the euro at the rate of 1.9558 BGN/EUR. Before the 1997 crisis, the exchange rate regime in Bulgaria was perceived as a relatively free float (Corker *et al.*, 2000).

Table 1. Fixing exchange rates

	Current fixing rate
Estonia (kroon)	15.6466 per euro
Lithuania (litas)	3.4528 per euro
Bulgaria (lev)	1.95583 per euro
Latvia (lat)	0.7997 per SDR
Cyprus (pound)	1.7086 per euro

Source: National central banks.

In Latvia, since February 1994 the fixed exchange rate policy has been pursued. The lat was pegged to the basket of SDR currencies[2] (0.7997 LVL/SDR) with the normal fluctuation band of +/- 1%. At the same time a very liberal policy of capital movements has been adopted. Barriers to capital movement were early removed and the unlimited convertibility of the national currency was introduced.

The conventional fixed peg was also adopted by Malta. The Maltese lira is fixed to a basket consisting of the euro, dollar, and pound sterling. The allowed fluctuation band is only 0.25%.

3. EMU enlargement and conversion rates – a background

Before turning to a discussion on the conversion rates upon EMU accession, several general remarks are made. They are intended to set the research goal into a proper perspective. First, joining EMU is not only about a change in the exchange rate regime and fixing domestic currencies at some constant rate to euro. EMU members use the common currency and have single monetary policy. The underlying notion of EMU integration refers to a concept of a single market with free movement of goods, capital and labour. These conditions are aimed at better economic efficiency, greater competitiveness and economic integration and in turn some price level convergence. Thus, although the issue of selecting conversion rates may seem important, there are many other aspects of the economic integration in EMU that will determine stable and robust growth performance. Given this ultimate long-term goal of better economic prospect, the importance of the choice of particular conversion rate should not be overestimated.

Second, the EMU membership ultimately requires fixing the nominal exchange rate to the euro. Changes in nominal exchange rates are sensitive issues for economic policy given their impact on international competitiveness. This aspect usually dominates the whole discussion on exchange rates. Consequently, sectors directly exposed to international competition are primarily concerned[3]. Although a nominal exchange rate is only one of several determinants of international competitiveness (like prices, wages, prices of other production inputs, productivity, and profit margins, etc.) it is often believed to be a quick and effective remedy for problems with international

[2] For definition see http://www.imf.org/external/np/exr/facts/sdr.htm .

[3] These are tradables being usually classified as manufacturing goods, some services that are easily traded internationally, and also agricultural commodities.

competitiveness. Consequently, the nominal exchange rate and not the real one is the bone of contention in political debates. Given some price and wage rigidities this bias is to some extent justified, though adjustments in prices to nominal exchange rate changes should not be ignored. In theory changes in nominal exchange rate should be offset by corresponding changes in prices and initial conditions restored. Ignoring these adjustments could lead to inappropriate policy conclusions. Although the fixing of nominal exchange rate in EMU is irrevocable[4], the choice of the conversion rate by no means will have everlasting effects on an economy.

Apparently, a change in nominal exchange rate and in the exchange rate regime has far wider effects for an economy than only for competitiveness in tradables and national prices. In the era of largely liberalised capital flows, it has a potentially important impact on foreign denominated assets and liabilities. Because acceding countries are indebted in foreign currencies this effect should not be ignored[5]. In addition, consequences for domestic price stability and investors' confidence aspects should be also taken into account.

Third, while setting a euro conversion rate in each acceding country the interactions with other currencies should be taken into account. This refers to the notion of global consistency in exchange rate models discussed among others in Isard and Faruqee (1998) and Alberola *et al.* (1999). In theoretical models two-country framework with one bilateral exchange rate works fine, but when it comes to empirical analysis in the real world with many currencies this might not be a good approach. Given this fact and possibility that many of the acceding countries will join EMU at the same time or in relatively short intervals, considerations of equilibrium between the euro and acceding countries' currencies should be taken into account. When being mostly concerned about trade competitiveness, the number of currencies that should be incorporate into this analysis can be narrowed down to main trading partners. For most of acceding countries the EU (and euro zone) and the acceding countries themselves are the main trading partners (see Table A.2 and A.3 in Annex 2). Consequently, it would be justified to focus only on mutual exchange rates among acceding countries and the euro zone. It should be stressed that setting the 'internal' exchange rate right in the enlarged euro zone does not have to require the euro to be in equilibrium vs. non-EMU economies[6]. These two aspects could be treated as separate issues, and this paper will deal only with the former.

[4] As for the moment there are no legal provisions in EMU for changing the conversion rate or exiting the monetary union.

[5] See Table A.5 in Annex 2.

[6] Conversion rates could be treated as "internal" equilibrium rates for a block of countries. The "external" equilibrium exchange rate of the euro vs. other currencies could be investigated only after the formation of the enlarge euro-zone and incorporation of economic information from EMU trading partners.

4. Theoretical concepts of equilibrium exchange rate and the euro conversion rates

The economic literature dealing with theories of equilibrium exchange rate and assessment of misalignment as well as empirical testing of these theories has been proliferating in recent years – see for instance Williamson (1994), Allen and Stein (1995), Montiel (1997), MacDonald and Stein (1999), MacDonald (2000), and Isard *et al.* (2001). In general three approaches can be distinguished: fundamental equilibrium exchange rate (FEER), behavioural equilibrium exchange rate (BEER), and natural real exchange rate (NATREX). All of these concepts will be briefly discussed in order to be able to assess their usefulness in the context of the conversion rate choice.

The notion of FEER, popularised by Williamson (1985), is based on the concept of internal and external macroeconomic equilibrium. The former is defined in terms of output at the full-employment level as well as low and sustainable inflation, whereas the latter in terms of a sustainable and desired net flow of capital between countries that are internally balanced (Clark and MacDonald, 1999). The FEER indicates the exchange rate that would prevail under "ideal economic conditions". Thus, this approach should be viewed as normative. It simply boils down to the calibration of the exchange rate at a set of well-defined economic conditions (Clark and MacDonald, 1999).

The FEER approach states an equilibrium position that should be viewed as "statistic" one (MacDonald, 2000). Given its stock-flow inconsistency, it cannot represent true steady-state equilibrium. Wren-Lewis (1992) noted that the FEER approach assumes implicitly a convergence of the actual real effective exchange rate to its FEER value. Thus, a medium-run current account theory of exchange rate determination is embedded in this approach. It simply assumes that any divergence in an exchange rate will be eliminated, however the adjustment process is not explicitly demonstrated. The misalignment based on the FEER model should be interpreted as a misalignment resulting from the departure of macroeconomic variables from their fundamental-equilibrium levels (defined in terms of the internal and external balance). In a sense, the FEER points to the ideal situation with implicit equilibrium in all markets.

The behavioural equilibrium exchange rate (BEER) seeks explicitly relations between macroeconomic fundamentals and the exchange rate. Fundamentals are based on some theoretical framework and practically any exchange rate theory can be embedded in this approach. The estimation of BEER is usually done in a single-equation model, where real exchange rate is explained with eclectic fundamentals – based on various exchange rate theories like the balance of payments theory, Harrod-Balassa-Samuelson effect, uncovered interest parity, PPP, etc.[7] For

[7] The lack of a clearly defined underlining theoretical model and *ad hoc* selection of explanatory variables in some applications of BEER models was criticised by Stein (1999).

instance, Baffes *et al.* (1997) employed different factors – believed to be main determinants of exchange rate: terms of trade, indicator of economy openness (measured as imports plus exports over nominal GDP), resource balance to GDP (trade balance over GDP – in constant prices), investment share, whereas Clark and MacDonald (1999) – difference in real interest rates, relative government debt, relative ratios of tradables and nontradables prices, and net foreign assets.

The estimated BEER provides information about the current misalignment. The latter term means a misalignment stemming from transitory and random effects, i.e. factors not treated as "fundamental" determinants of the exchange rate (MacDonald, 2000). The BEER method also makes it possible to calculate a "fundamental" equilibrium exchange rate and in turn the total misalignment (as in the notion of FEER). This concept was dubbed with acronym PEER – permanent equilibrium exchange rate and should be treated as a way of calibrating BEER at equilibrium values (MacDonald, 2000). For this purpose MacDonald (2000) uses the Gonzalo and Granger (1995) methodology, which allows for extraction of the permanent component from a vector of cointegrated variables in the Johansen cointegration system. This method does not have sound theoretical foundations and like the commonly used Hodrick-Prescott filter is mechanical in nature. Thus, the PEER decomposition allows for distinction to what extent a misalignment implied by the BEER is permanent or transitory.

Another concept of equilibrium exchange rate is NATREX which shares some common features with both FEER and BEER models. This approach initiated by Stein (1990) and thoroughly discussed in Allen and Stein (1995) focuses on explanation of medium and long-run real equilibrium exchange rate. The acronym "natural" is motivated by the fact that the model assumes the exchange rate to converge "naturally" to its long-run equilibrium, i.e. it is a self equilibrating framework. The equilibrium exchange rate is defined as the rate that ensures the balance of payments equilibrium in the absence of cyclical factors, speculative capital movements and changes in international reserves (Gandolfo and Felettigh, 1998). As in the case of FEER the underlining notion refers to internal (an economy at its capacity output) and external equilibrium (in terms of the balance of payments). However, as opposed to FEER, the NATREX dynamic theoretical framework is stock-flow consistent and the shift from medium to long-run equilibrium could be demonstrated explicitly. The NATREX approach could be treated as a class of models. A particular form of this model can be constructed so as to reflect some specified features of a given economy (Gandolfo and Felettigh, 1998). The NATREX models are usually built around four blocks: the production function, investment function, social saving function, and balance of payments equation. The most commonly pursed method of empirical testing is exactly the same as for the BEER models, where real exchange rate is regressed on selected fundamentals. In the case of the NATREX approach, these fundamentals are derived explicitly form the reduced form equations of the underling model. There were also attempts to estimate the whole model of simultaneous equations directly (for instance Gandolfo and Felettigh, 1998).

Finally, the purchasing power parity (PPP) model should be mentioned. It is a building block of many macroeconomic models and has been a subject of many theoretical and empirical

investigations. The PPP paradigm assumes that a nominal exchange rate of any two currencies should reflect closely relative purchasing powers of the two monetary units as represented by national price levels (Isard *et al.*, 2001). The strong version of PPP requires that a nominal exchange rate and price ratio should be related exactly one for one. Consequently, the real exchange rate should be constant. In the weak version of PPP, the coefficient of price ratio could be different from one and the real exchange rate is expected to be only stationary (i.e. mean reverting). It should be mentioned that the PPP model should be rather treated as condition of international arbitrage and not as an exchange rate determination theory *per se* (see below).

Having briefly surveyed selected concepts of equilibrium exchange rate their usefulness for choosing the euro conversion rates could be assessed. The "fundamental" concepts of equilibrium exchange rate (FEER, NATREX and PEER) assume explicitly that this rate is consistent with the internal and external equilibrium in the entire economy. They refer to long-term equilibrium exchange rates, and thus are not the most appropriate concepts of assessing the current misalignment. Although they are interesting theoretical concepts, they do not necessarily provide practical guidelines for short-term policy choices[8]. In the case of choosing the euro conversion rate it could be argued that it is not justified to base these rates on long-term equilibrium concepts. Such benchmarks implicitly assume that the economies are at long-term equilibrium (externally and internally balanced) and it would not make sense to expect the acceding countries to meet this condition when joining EMU. This could be a good long-term goal, but not a current reference point. In the context of setting nominal parity, it seems better to think about the "equilibrium exchange rate" as a level of exchange rate that is consistent with other macro variables for a given point in time and which does not have to be a steady state exchange rate in a sense of sustainable equilibrium. In this respect, the "behavioural" concepts of equilibrium exchange rate seem to be better suited, as they could be expected to identify some "equilibrium" given the set of current fundamental determinants.

Apparently behavioural approaches are not ideal either. The assessment of current misalignment depends on how well a given theory or set of theories capture exchange rate dynamics. For instance, a BEER model may indicate a misspecification or omitted variable problem[9] rather than the misalignment stemming form random effects (i.e., everything which is not explained by the "true" model). In practice it is difficult to choose an exact form of the exchange rate determination model. However, if the estimated model demonstrates good explanatory properties, then the assessment should be less controversial.

Another possible theoretical framework for selection of the conversion rates is the PPP model. Although it was criticised as a good metric of exchange rate misalignment (see Williamson (1994b) and MacDonald (2000)), it poses some theoretical characteristics that make it attractive for the

[8] See Section 6 for further discussion of this issue.

[9] An estimation of eclectic BEER models poses less risk of omitted variable problem than estimation of one specific and narrowly defined model of exchange rate determination (like uncovered interest rate parity or PPP). Similar point was made by Stein (1999).

choice of conversion rates. The PPP refers to the international arbitrage that equilibrates internationally prices of tradables. In a sense it is a behavioural concept which reflects the current state of economies and does not refer to a theory-underpinned steady-state equilibrium. As was argued above this feature makes it a good theoretical concept of selecting the conversion exchange rates. On the other hand, for this particular reason PPP has been disregarded as "fundamental" equilibrium exchange rate benchmark. However, in a theoretical world with perfect competition, no obstacles to trade, transport costs, etc. PPP exchange rate could be viewed as "fair" value guaranteeing the international arbitrage.

5. Equilibrium exchange rate models in practice

In the previous section it was conclude that "behavioural" concepts of equilibrium exchange rate seems more appropriate for the selection of the euro conversion rates upon EMU accession. Having a proper and meaningful theoretical framework, however, is not sufficient for providing real policy recommendations. It must also be operational. Thus, in this section problems with testing and practical application of theoretical concepts of equilibrium exchange rates are discussed.

In many papers in which real equilibrium exchange rates[10] are estimated, the real (effective) exchange rate based on consumer prices is used. In such cases, the real exchange rate (q) could be disaggregated:

$$q = q_T + \beta(p^*_{NT} - p^*_T) - \alpha\,(p_{NT} - p_T). \qquad (1)$$

The first term is the real exchange rate deflated with prices of tradables only (p_T and p^*_T) – q_T, and the latter two are a ratio of relative prices between two countries (p_T and p^*_T – are domestic and foreign prices of tradables, and p_{NT} and p^*_{NT} non-tradables, respectively). This disaggregation is derived based on domestic and foreign inflation equations given by:

$$p = (1-\alpha)\,p_T + \alpha\,p_{NT} \quad \text{and} \quad p^* = (1-\beta)\,p^*_T + \beta\,p^*_{NT}. \qquad (2)$$

α and β are shares of non-tradable prices in the overall price index[11]. The disaggregation in equation (1) highlights two distinctive effects – one concerns the competitiveness in the tradable sector (as measured by real exchange rate) and the second a relative internal prices ratio. If one is mostly interested in international competitiveness (as discussed in Section 3), than the analysis of q_T should be the main focus[12].

[10] For instance, MacDonald and Wojcik (2003), and Alberola *et al.* (1999).

[11] For the sake of simplicity in many applications this issue is ignored and the shares are implicitly assumed to be the same. In estimations the constant is ignored.

[12] There are, however, models for which changes in relative prices do matter for international competitiveness. By incorporating a distribution sector (non-tradables services) into production of tradables, they allow for the impact of non-tradables prices on competitiveness of tradables (for further details see MacDonald and Ricci (2001) or Lee and Tang (2003)). These issues will be discussed in more details in the latter part of the paper.

In the short run under floating exchange rate regimes, changes in nominal exchange rate could be very abrupt and hard to explain. Large shifts in nominal exchange rates could impact significantly on the economy if price rigidities exist. For instance, a significant nominal appreciation of domestic currency may lead in the short run to contraction in profit margins, employment, wages and output. High volatility of nominal exchange rates and price rigidities gave rise to the stylised fact that nominal exchange rates are key drives of changes in real exchange rates under floating regimes. Figures in Annex 3 prove that this is the case for acceding countries.

Thus, under free floating regimes it seems that the main problem of testing exchange rate models and explaining changes in real exchange rates lies in the determination of nominal exchange rates – especially in the short and medium run. Against this background, the empirical finding by Meese and Rogoff (1983) can be quiet discouraging. They tested forecasting properties of various exchange rate models[13] by comparing out-of-sample forecasts based on the actual values of explanatory variables with a random walk forecast. It was found that in the short-run (over 1 to 12-month horizon) the latter is far better in terms of forecast accuracy than any of the exchange rate models available at that time. The development of new models and their forecast tests in 1980s and 1990s did not change much the result. The structural models proved to forecast better only in the long run – beyond one year (Rogoff, 2001). On the other hand, under fixed exchange rate regimes the main challenge in understanding moves in real exchange rates lies in explaining movements in relative prices of non-tradables and tradables.

In addition, modelling exchange rate determination in the case of acceding countries may prove difficult due to the fact that there are very few cases of pure free float. Consequently, very few observations could be identified when nominal exchange rates (and in turn real) have been fully stochastic variables determined by market forces and not steered by deliberate exchange rate interventions. In this context econometric investigation of non-stochastic variables should not be expected to render robust results.

Table 2. Correlation between real euro exchange rate and relative prices – flexible regimes

Country	*CZE*	*HUN*	*POL*	*ROM*	*SLK*	*SLO*
Correlation coef.	0.008	0.062	0.422	0.453	0.461	-0.083
Period	94:1 03:4	96:1 03:4	94:1 03:4	98:1 03:4	96:1 03:4	94:1 03:4

Source: Author's calculations base on IFS-IMF, OECD and national sources.

Notes: Correlations are based on annual growth rates for quarterly data. The real euro exchange rate is defined as nominal euro exchange rate multiplied by euro-zone inflation and divided by domestic inflation. Relative prices are defined as ratio of domestic to euro-zone relative prices (non-tradables vs. tradables). Tradable prices are defined in terms of producer prices in manufacturing and non-tradable prices as consumer prices of services.

[13] They tested flexible-price monetary model (Frenkel-Bilson), the sticky-price monetary model (Dornbusch-Frankel), and the Hooper-Morton model.

Table 3. Correlation between real euro exchange rate and relative prices – fixed pegs

Country	*EST*	*LAT*	*LIT*
Correlation coef.	0.898	0.641	0.682
Period	94:1 03:2	94:1 03:2	94:1 03:2

Source: Author's calculations base on IFS-IMF, OECD and national sources.

Notes: Correlations are based on annual growth rates for quarterly data. The real euro exchange rate is defined as nominal euro exchange rate multiplied by euro-zone inflation and divided by domestic inflation. Relative prices are defined as ratio of domestic to euro-zone relative prices (non-tradables vs. tradables). Tradable prices are defined in terms of producer prices in manufacturing and non-tradable prices as consumer prices of services.

Given the above considerations, it can be argued that for countries with more flexible exchange rate regimes, approximation of real exchange rates with relative prices[14] is a very poor proxy. This fact is evident in figures in Annex 3. On the other hand, in countries with fixed exchange rate, there is a higher correlation between changes in relative prices and real exchange rates deflated with consumer prices.

At this point it should be noted that at the beginning of the transition process in CEE countries high inflation was prevalent. This applied to both tradables and non-tradables prices and was attributable to price liberalisation and fiscal imbalances monetised by central banks. During this period, high inflation was the key driver of real exchange rates (those defined in terms of consumer price index as well as prices of tradables only). Thus, the real appreciation of exchange rates at the beginning of the transition period could be a different phenomenon, difficult to explain with standard exchange rate models[15].

Most of empirical studies in empirical estimations use a common numeraire currency for bilateral exchange rates[16]. This contradicts to the global consistency condition mentioned in Section 3. In the case of acceding countries this might seem to be less of a problem as trade and financial links are largely limited to the euro zone (see Table A.2 and Table A.3). However, in case of countries with more diversified foreign links in terms of trading partners, estimation of one bilateral exchange rate without taking into account the rest of the world may lead to biased results. For instance while testing PPP hypothesis there are no reasons to expect that domestic prices of tradables converge to prices in only one country, if trade relations are maintained with many other countries.

Given these general conceptual problems with estimating equilibrium exchange rate models, operational problems of particular models will be discussed. One problem with BEER models is that they are highly data demanding – both with regard to data coverage and length of time series. An estimation of these models boils down to finding long-run elasticities. Given the common presence of non-stationary time series, these elasticities are estimated in the cointegration

[14] The relative prices are most commonly explained by the Harrod-Balassa-Samuelson (HBS) effect, however, there are two other explanations provided in Bergstrand (1991). These are the demand effect and relative endowments in factors of production.

[15] The appreciation of real exchange rates in CEE economies at the beginning of transition period was investigated in Grafe and Wyplosz (1997).

[16] This is the case among others of Lee and Tang (2003) and MacDonald and Wojcik (2003). Some exceptions to this treatment are Alberola *et al.* (1999) and Rahn (2003).

framework (either in VAR or single equation models). Models are usually estimated using annual or quarterly time series. As comparable and consistent data set for acceding countries is available only from the beginning of the 1990s and if one wants to include several explanatory variables in a model, econometric robustness of such estimations could be questioned. The problem of weak power of unit root tests when tested variables are close to unit root and occurrence of structural breaks in the series do not make things easier (Maddala and Kim, 1998). This leads also to another practical problem of dealing with a mixture of stationary and non-stationary variables in the cointegration analysis.

The problem of short time series for estimation of equilibrium exchange models could be circumvented by application of panel techniques. Panel estimations have become recently a workhorse of empirical tests in international economics. As indicated in a survey by MacDonald (1998) panel estimations tend to render better results in terms of economic and statistical properties, than single-equation estimations. Recently, several methods of estimation of dynamic panel models have been popularised, in particular panel Dynamic OLS (Mark and Sul, 2002 and Kao and Chiang, 2000), Pooled Group Mean Estimator (Pesaran *et al.*, 1999), panel Fully Modified OLS (Pedroni, 2001). These methods were employed for estimation of equilibrium exchange rates for selected CEE countries in Kim and Korhonen (2002) – PMGE, MacDonald and Wojcik (2003) – DOLS, and Rahn (2003) – FMOLS.

However, given the aim of estimating a particular exchange rate for a given country, panel models although render more robust econometrically results, tend to ignore country-specific factors. Thus, they are better suited for providing evidence on some general economic theory than for assessing country-specific variables like it is the case of conversion rates selection. In addition, problems of stationarity and cointegration are further complicated in comparison to the time-series models (Pesaran, 2000, Maddala and Kim, 1998, and Pedroni, 1999).

Estimation of simple PPP models is also subject to serious practical problems. Empirical investigation of the PPP hypothesis has been proliferating[17]. It seems that a consensus emerged that the PPP hypothesis is a long term phenomenon. Estimating and testing of PPP is usually done using time series of price indices as price level data is not easily available. Different models (absolute vs. relative PPP hypothesis) and tests (either testing stationarity of real exchange rates or estimating coefficients for relation between nominal exchange rates and corresponding price indices in a home country and foreign country) have been pursued. The most commonly quoted problems with difficulties in finding evidence for PPP hypothesis (see Cecchetti *et al.*, 2000) relates to the distinction between tradables and non-tradables (which is far from clear in practice), tariff and non-tariff trade barriers, monopolistic practices for pricing to segmented markets, imperfectly competitive markets where changes in prices are costly, transport costs, and differences in indirect taxes.

[17] For instance see: Rogoff (1996), Pedroni (2001), Moon and Perron (2002), Bayoumi and MacDonald (1998).

There is in addition one important aspect in testing of PPP – i.e. the distinction between exchange rate regimes. Given that the PPP refers primarily to international arbitrage and not to determination of nominal exchange rate *per se*, it seems more reasonably to expect to find evidence for PPP under fixed exchange rate regimes than under free floats. The arbitrage is less likely to occur when changes in nominal exchange rates are very volatile and unpredictable as international comparison of prices is more difficult and the arbitrage more risky[18]. In this respect, a market power to affect international prices should be also mentioned. Given small shares of acceding countries in European markets (see Table A.4), one should not expect a too significant impact of domestic prices in these countries on prices in the euro-zone economies. But the opposite causality seems to be more likely. This point relates also to the issue of exchange rate pass-through. In general, theoretical and empirical evidence (a more pervasive pricing-to-market effect in economies with monopolistic competition markets, and higher share of non-tradables in the structure of the economy and consumption) suggest a weaker pass-through (from changes in nominal exchange rates to inflation) in developed economies as opposed to developing countries[19].

Disregarding the problems of testing the PPP model using time series, in order to get some benchmark for the conversion rates a comparison of price levels could be undertaken. Data on comparable price levels for the EU and acceding countries are collected by Eurostat, however in practice, it is difficult to decide what basket of goods and services should be used. This choice is crucial for calculations of PPP exchange rates (see Table A.6 in Annex 2). The PPP exchange rates differ a lot depending on the particular category of goods and services being used. A similar sensitivity of PPP models have been also noted by Isard *et al.* (2001). Besides data on price levels is available with a significant time lag and revisions are a common practice[20]. This makes the PPP method unattractive for timely policy recommendations.

It is interesting to note that for almost all countries and categories of goods and services the PPP exchange rates were stronger than (i.e. below) annual market exchange rates (see Table A.6). It should be also noted that in general categories of goods that seems to be more tradable (for instance durable goods or investment in machinery and equipment) are closer to market exchange rates than other categories. This common pattern could suggest some systemic reason behind these differences. One hypothesis could refer to the input of non-tradable prices (the concept discussed among others by MacDonald and Ricci (2001) and Lee and Tang (2003)). In countries which have lower relative costs of services, one could expect lower (observed) price of tradables – if cost of services are believed to consist a part of observed tradable prices[21]. From Table A.6 it is evident that relative price levels of services in acceding countries are much lower

[18] For instance, Wei and Parsley (1995) find a positive relation between deviation from PPP and nominal exchange rate volatility.

[19] These aspects require an empirical investigation on its own, which lies beyond the scope of this paper.

[20] See Eurostat web site for more details.

[21] See Annex 1 for mathematical prove of this hypothesis. Price levels collected in PPP surveys in the joint Eurostat-OECD project refer to final consumer prices and thus should be expect to contain the component of services (for instance retail trade mark-ups, transport costs, etc.).

than those for goods (as indicated by more appreciated exchange rates). In addition, a positive and close to 1 correlation coefficient between PPP exchange rates for services and those for goods was found[22]. These facts give support to the hypothesis of the impact of non-tradables prices on price of tradables in the sample of 12 acceding countries. This is consistent with Lee and Tang (2003) who found empirical evidence for the impact of non-tradable processing on prices of tradables. Thus, it should be noted the PPP exchange rates as a benchmark for conversion rates are downward biased (i.e. indicate too appreciated exchange rates), however little can be said precisely about the magnitude of this effect.

Finally, it should be mentioned that "fundamental" models of equilibrium exchange rates, although disregarded as suitable for setting the euro conversion rates, also suffer from practical drawbacks. A calibration of FEER model or estimation of NATREX and PEER models requires sometimes arbitrary assumptions and are subject to some uncertainty given the problems with definition of variables and finding corresponding real data. In particular, the FEER models require using the non-observable variables of potential output and as noted by Bayoumi *et al.* (1994) and IMF (1998) plausible estimates of FEER may vary quite substantially[23]. The most common way of testing NATREX models shares the same problems as in the case BEER models.

6. Guidelines for choosing the euro conversion rates

From the discussion so far we have learned that despite a number of equilibrium exchange rate models, not all of them are appropriate for choosing the conversion rates upon the accession to EMU. On top of this, all of these concepts suffer from important operational problems casting doubts on the precision of their point estimates of equilibrium exchange rates. This critique does not mean, however, that all these models and their estimations should be discarded entirely. Still, some useful information could be elicited if only interpreted carefully[24].

So what are other considerations that should be taken into account and could help in making the decision on the conversion rates? First, as pointed by IMF (1998) a complete assessment of exchange rate misalignment should not be based simply on model estimates, but take into account a broader range of macroeconomic issues like policy-mix, structural factors, stage of development, etc. If one is interested primarily in international competitiveness than a more detailed analysis of this issue could be conducted. This would involve investigation of different determinants of wages, productivity, prices of other production inputs, as well as other potential factors driving nominal exchange rates – capital inflows, interest rate differential, etc.

[22] These correlations were calculated for 12 EU acceding counties, and the results were little changed if different categories of goods and services were used.

[23] See Rawdanowicz (2002) for operational problems with estimation of FEER.

[24] For a survey of empirical estimations of equilibrium exchange rate for selected accession countries refer to Egert (2003).

Disregarding problems with empirical measurement of equilibrium exchange rates and ensuing misalignments, another practical issue arises. What should be done if the misalignment is diagnosed? How the equilibrium could be achieved and what are the implications for the choice of the euro conversion rates? Theoretical models do not give clear answers for these questions. In the case of BEER models, the current misalignment is defined in terms of model residuals, which may stem either from "temporary" shocks or misspecification of the model. For "fundamental" NATERX models, it seems that nothing is to be done as the long run equilibrium is achieved "naturally" (i.e. via defined interactions with other variables in the model), unless long-term fundamental determinants are changed. In the case of FEER no dynamics is explained and no clear implications on adjustment to equilibrium can be learned. It should be also mentioned that as fundamentals and some exogenous parameters in BEER and NATREX models change, the long-run equilibrium could change as well. Thus, reaching the exchange rate equilibrium could be like chasing a constantly changing benchmark.

Given these considerations, setting a nominal euro parity based on the equilibrium value does not solve the problem of reaching this equilibrium. Shifting a nominal exchange rate could not be enough to achieve the internal and external equilibrium for the entire economy. Although one can expect some impact of nominal exchange rates on fundamentals like productivity, saving and investment ratios, consumption, public debt, etc., pinning down the exact channels in a dynamic environment with price adjustments and other shocks to the economy looks very difficult. Besides one could expect some lags in the convergence to equilibrium. Only in the PPP model, the adjustment in nominal exchange rate at given point in time that leads to price levels equalisation between any two countries can consequently restore equilibrium.

While deciding for a change in nominal exchange rate upon accession to ERM II/EMU, consequences of this change should be addressed. In this respect a potential nominal shock to the economy and reactions of financial markets are discussed. The first issue primarily refers to identification of impacts on trade flows, firms' profits, employment, etc. According to a conventional macroeconomic analysis, a too strong exchange rate spurs recessionary effects and the undervalued currency expansionary ones. It is often the case that, not only the mere fact of misalignment is important, but its magnitude. One could expect a non-linear relation between nominal exchange rates and real performance[25]. But also price adjustments and revaluation of foreign currency denominated assets and liabilities should be taken into account. Understanding this problem is very important in the context of EMU membership. Acceding countries will have to meet Maastricht criteria, so while setting conversion rates other macro objectives than simply correcting the nominal exchange rate misalignment should have been taken into account (for instance inflation, interest rates, and debt targets).

In the case of acceding countries there might be arguments for asymmetric effects of choosing a "too strong" than a "too weak" conversion exchange rate. Given the importance of export markets for

[25] For further discussion of these issues refer to Collins and Razin (1997). They found out empirically that only very high overvaluation leads to slower GDP growth, and medium and high under-valuation to higher growth.

the total economy for each acceding country (as proxied by shares in total GDP – see Table A.4) on the one side and the euro zone on the other side, as well as a potential power to affect international prices, the effects of potential short-term disadvantage in competitiveness seem to be far less acute for the euro zone than for acceding countries. In terms of potentially higher inflation induced by a depreciation of domestic currency (a "too weak" conversion rate variant), if countries do not suffer from significant macroeconomic imbalances and purse stable and low-inflation oriented policies (the latter is currently the case in many acceding countries), this option should not pose major threats. Nonetheless, more simulations of these effects for each country separately would be needed for more justified and robust conclusions. The investigation of these issues could be also augmented by the assessment of a position in the business cycle and expectations for monetary conditions in the EMU just after the accession. Recommendations for choosing a weak or strong conversion rate should be different if a country is in a boom phase and euro-zone interest rates are expected to be less restrictive (for instance due to inflation differences), than in the opposite situation.

Financial markets reactions and expectations are also potentially important aspects. Given that acceding countries must stay at least for 2 years in ERM II without devaluing the central parity, this gives some scope for an adjustment in nominal exchange rate. If the desired nominal exchange rate differs significantly from the current level of exchange rates, then credible announcement of central parity in ERM II may allow for a gradual convergence to this rate. As Reluga and Szczurek (2002) pointed out, it is very likely that the market exchange rate will converge to the announced nominal exchange rate parity, if this announcement is fully credible[26]. The nominal convergence of exchange rates was clearly visible among others in the case of Spain and Portugal prior to their accession to EMU (see Annex 3).

However, if financial markets realise that the choice of a weak exchange rate is simply a way to deal with some other structural problems in the economy, then the undermined confidence of foreign investors could cause more harm than good[27]. An illustrative example is the Hungarian case with the devaluation of the forint central parity in June 2003. This move was intended to ease the appreciation pressure for domestic manufacturers. However, the loss in competitiveness was not only attributable to the strong nominal forint exchange rate, but also to buoyant growth in wages (primarily in the public sector, but in manufacturing as well). In addition, Hungary pursued loose fiscal policy which was responsible for fuelling wages, household consumption and in turn inflation. After the realignment of the forint central parity against the euro on June 4, the market reaction was very nervous and the forint depreciated significantly (see Section 2). When the forint approached 270 HUF/EUR the National Bank of Hungary decided to raise interest rates by 100 basis points to 7.5%. This measure did not render the expected effects and monetary policy was tightened again on June 19. That time by 200 basis points up to 9.5%. In the aftermath, market yields and the forint exchange rate started to stabilise. The forint exchange rate, however, still remained below the central parity (5%-10% below the parity – prior

[26] Such conclusions are based on Krugman (1988) and Ichikawa *et al.* (1990) models of a credible exchange rate band.

[27] The mechanism here could be compared to the second generation models of currency crises.

to the realignment in 2003 it stayed below 10% of the central parity). In this case, the realignment of the central policy took place at the cost of higher interest rates, and did not solve the problem of fast growth in wages and international competitiveness.

7. Conclusions

This paper deals with the choice of nominal conversion rates upon the accession to EMU for its prospective members. It has been stressed that pegging national currencies to the euro is only one of many aspects of EMU membership and its consequences should be relatively short-lived. Trade competitiveness issues are the main concerns behind adjustments in nominal exchange rates, however other determinants of international competitiveness should not be ignored. A general view is that the central parity should reflect some equilibrium position. It has been argued that despite several theories of equilibrium exchange rate not all of them are useful for the real policy choice of the nominal conversion rate. The selection of a particular theoretical model determines interpretation of potential exchange rate misalignment and policy implications. It has been argued that BEER and PPP models seem to be better theoretical concepts for the selection of conversion rates, but they suffer from many estimation problems (like other concepts), which diminish their attractiveness for the practical policy decisions.

The problems with choosing an appropriate theoretical framework of equilibrium exchange rate and the intrinsic uncertainty of equilibrium exchange rate estimates, gives support to the conjecture that the range of “optimal” conversion exchange rates is quiet wide and other issues must be taken into account when making this decision. Concerns about international competitiveness should be augmented by interactions of nominal exchange rates with other macro variables and other macro objectives (for instance inflation, interest rates, and debt targets in the context of Maastricht criteria).

In addition, the role of financial markets was stressed and it was argued that it is not only important what exchange rate is chosen, but also how and in what circumstances. A smooth transition to the euro conversion rate and minimisation of risks of potential shocks to the economy should be the key concern behind the choice of the conversion rate. In this respect, recommendations for the selection of nominal conversion rates should be dependent on the current exchange rate regime. Given the lack of precise theoretical and empirical guidelines from equilibrium exchange rate models, the countries with fixed exchange rate regimes (Estonia, Lithuania, Bulgaria, Latvia and Malta) seems to be better off to leave their current fixing rates unchanged (see Table 1). In this group of countries, the recommendation is not that straightforward for Latvia and Malta. These countries peg to the basket of currencies. Consequently, at some point the basket should be changed to contain the euro only.

Similarly in countries, which currently adopt ERMII compatible exchange rate regimes (Hungary and Cyprus), no change in central parity should be administered if there is no sound evidence that the nominal exchange rate is the factor hurting macroeconomic performance.

A more problematic choice is for countries with more flexible exchange rates regimes (Poland, the Czech Republic, the Slovak Republic, and Romania) as there is no existing nominal reference

point. For these countries a more detailed and country-specific analysis of the issued discussed in this paper should be undertaken. In particular the consequences of changes in a nominal exchange rate on trade competitiveness, inflation, and debt repayments should be taken into account. The same recommendations apply to Slovenia with its *de facto* crawling peg regime.

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Annex 1. Prices of services vs. prices of goods and PPP exchange rates

If the observed consumer prices could be split between internal price (i.e. the true price of tradable good only) and cost of services included in the "observed" price:

$$p = p_I + s \qquad (1)$$

then the corresponding PPP exchange rate for "pure" tradable is given by:

$$e_I = p_I / p_I^* \qquad (2) \qquad (* – \text{foreign country})$$

and for "observed" prices of tradables:

$$e = (p_I + s)/ (p_I^* + s^*) \qquad (3)$$

Then rewriting (3) we can obtain:

$$p_I - e\, p_I^* = e\, s^* - s \qquad (4)$$

Substituting the first term in equation (4) with equation (2) we obtain:

$$p_I^*(e_I – e) = e\, s^* - s \qquad (5)$$

Because $(e\, s^* - s) > 0$ ($e > e_s = s/s^*$ – this is the PPP exchange rate for services and it is in fact lower that for tradables – see Table A.6), $e_I > e$ (if $p_I^* > 0$). Thus, the "observed" PPP exchange rate if believed to contain cost of non-tradable services by definition must be more appreciated that the PPP exchange rate base on "pure" prices of tradables.

Annex 2. Statistical data

Table A. 1. Classification of exchange rate regimes in acceding countries

	Exchange rate regime	*Currency*	*Features*
Currency Board			
Bulgaria	Currency board to the euro	Bulgarian lev	Introduced in 1997
Estonia	Currency board to the euro	Estonian kroon	Introduced in 1992
Lithuania	Currency board to the euro	Lithuanian litas	Introduced in 1994; re-pegged from the US dollar to the euro in February 2002
Conventional fixed peg			
Latvia	Peg to the SDR	Latvian lat	Exchange rate band +/-1%
Malta	Peg to a basket	Maltese lira	Currency basket (euro, US dollar, pound sterling): exchange rate band +/-0.25%
Unilateral peg to the euro with +/-15% fluctuation band			
Cyprus	Peg to the euro, with +/-15% fluctuation bands	Cyprus pound	
Hungary	Peg to the euro, with +/-15% fluctuation bands	Hungarian forint	Direct inflation targeting
Managed float			
Romania	Managed float	Romanian leu	Currency basket (US dollar, euro) is used informally as reference
Slovakia	Managed float	Slovakian koruna	
Slovenia	Managed float	Slovenian tolar	Prominent role for monetary aggregates; the euro is used informally as reference currency
Independent float			
Czech Republic	Free float	Czech koruna	Direct inflation targeting
Poland	Free float	Polish zloty	Direct inflation targeting

Source: Global Britain, June 2003, www.globalbritain.org

Table A. 2. Export shares in acceding countries, 2002 (% of total exports)

	AC10	*AC12*	*EU12*	*EU15*	*EU22*	*EU25*	*EU27*
BUL	3.4	6.0	51.5	55.2	54.9	58.6	61.2
CZE	16.3	17.4	61.8	68.2	78.0	84.5	85.7
CYP	1.8	3.3	18.5	38.2	20.3	40.0	41.5
EST	13.4	13.4	41.5	60.0	54.8	73.3	73.3
HUN	6.7	9.5	68.6	74.4	75.3	81.1	83.9
LAT	17.3	17.3	30.2	61.3	47.6	78.6	78.6
LIT	23.1	23.2	25.8	47.8	48.9	70.9	71.0
MAL	3.7	4.3	34.7	43.6	38.4	47.3	47.9
POL	11.1	12.0	59.0	69.3	70.1	80.4	81.3
ROM	6.0	7.7	62.0	67.9	68.0	73.9	75.7
SLK	29.3	30.6	56.2	59.9	85.5	89.3	90.5
SLO	7.5	8.5	58.0	62.6	65.5	70.1	71.1

Source: Direction of Trade Statistics, IMF.

Notes: The shares refer to exports (only goods) of the countries listed in the first column to country-block listed in the first row as a ratio to total exports. AC10 acceding countries (CZE, CYP, EST, HUN, LAT, LIT, MAL, POL, SLK, SLO); AC12 – acceding countries (AC10) and accession countries (BUL and ROM); EU12 – euro zone countries; EU15 – European Union countries; EU22 = EU12 + AC10; EU25 = EU15 + AC10; EU27 = EU15 + AC12.

Table A. 3. Import shares in acceding countries, 2002 (% of total imports)

	AC10	*AC12*	*EU12*	*EU15*	*EU22*	*EU25*	*EU27*
BUL	5.4	7.8	45.2	49.8	50.7	55.2	57.6
CZE	12.5	12.6	65.5	71.9	78.0	84.4	84.5
CYP	1.3	1.8	39.6	50.4	40.9	51.7	52.2
EST	9.1	9.2	38.8	51.8	47.9	60.9	61.1
HUN	6.9	8.1	53.3	57.9	60.3	64.8	66.0
LAT	23.2	23.5	39.9	52.6	63.1	75.8	76.0
LIT	10.4	10.7	34.9	44.3	45.4	54.7	55.0
MAL	1.3	2.5	43.9	52.0	45.1	53.3	54.5
POL	7.9	8.3	52.8	61.4	60.7	69.3	69.7
ROM	8.9	9.9	52.5	57.4	61.4	66.3	67.3
SLK	21.6	21.9	46.0	49.8	67.6	71.4	71.7
SLO	8.5	9.7	63.6	67.7	72.1	76.2	77.4

Source: Direction of Trade Statistics, IMF.

Notes: The shares refer to imports (only goods) of the countries listed in the first column from country-block listed in the first row as a ratio to total imports. AC10 acceding countries (CZE, CYP, EST, HUN, LAT, LIT, MAL, POL, SLK, SLO); AC12 – acceding countries (AC10) and accession countries (BUL and ROM); EU12 – euro zone countries; EU15 – European Union countries; EU22 = EU12 + AC10; EU25 = EU15 + AC10; EU27 = EU15 + AC12.

Table A. 4. Shares of exports in GDP, 2002

	Total	*EU12*	*EU15*
BUL	32.5	16.8	18.0
CZE	43.2	26.7	29.5
CYP	9.6	1.8	3.7
EST	61.7	25.6	37.0
HUN	45.8	31.4	34.1
LAT	23.8	7.2	14.6
LIT	33.2	8.6	15.9
MAL	58.0	20.1	25.3
POL	19.0	11.2	13.2
ROM	24.9	15.4	16.9
SLK	53.3	29.9	32.0
SLO	41.8	24.2	26.1
			AC12
EU12			1.6

Source: Direction of Trade Statistics, IMF and ECB.
Note: The shares (exports of goods to GDP) refer to exports of the countries listed in the first column to country-block listed in the first row.

Table A. 5. Foreign debt, 2002

	Foreign debt (1)	*Foreign debt within one year (2)*	*GDP (3)*	*(1) / (3)*	*(2) / (3)*
BUL	7782	946	15563	50.0	6.1
CZE	13449	5727	69509	19.3	8.2
CYP	9533	3993	10135	94.1	39.4
EST	1731	2299	6503	26.6	35.3
HUN	21266	9057	65843	32.3	13.8
LAT	1667	803	8403	19.8	9.6
LIT	3001	1444	13783	21.8	10.5
MAL	6089	3347	3863	157.6	86.6
POL	38925	13109	189275	20.6	6.9
ROM	8914	2397	45749	19.5	5.2
SLK	6170	2819	23686	26.1	11.9
SLO	6383	1464	21996	29.0	6.7

Source: Foreign debt – Joint BIS-IMF-OECD-World Bank statistics on external debt; GDP – IFS, IMF.
Notes: Foreign debt – the stock at the end of 2002 in million US dollars. It is a sum of: A Bank loans, B Debt securities issued abroad, C Brady bonds, D Non-bank trade credits, E Multilateral claims, F Official bilateral loans (DAC creditors). Foreign debt within 1 year is a sum of H Debt securities issued abroad – due within a year, I Non-bank trade credits – due within a year, and G Liabilities to banks – due within a year. GDP in current prices converted to US dollars at annual average market exchange rates.

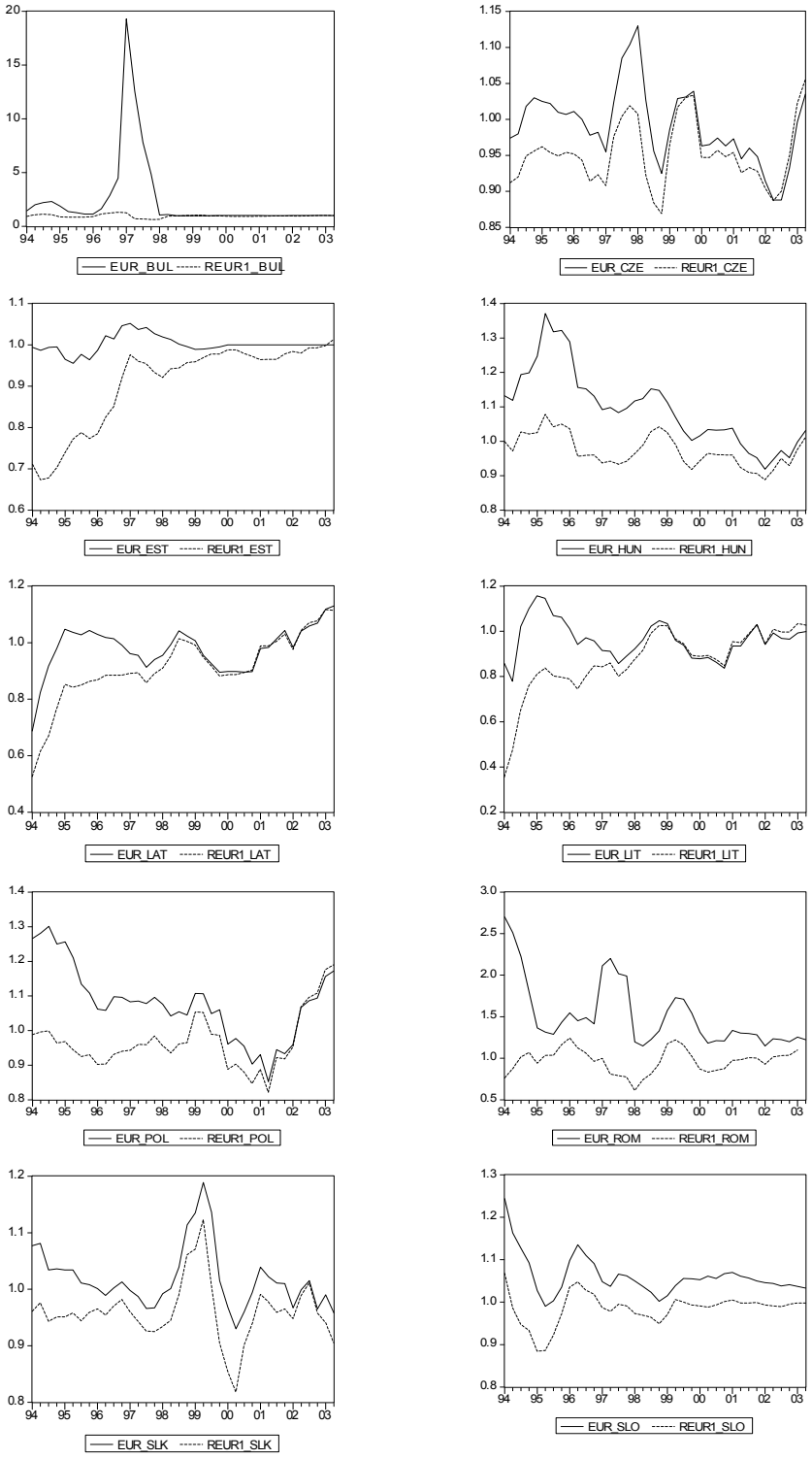
Table A. 6. PPP exchange rates, 1999 (national currency per euro)

	CZE	*HUN*	*POL*	*SLK*	*BG*	*EE*	*LV*	*LT*	*RO*	*SI*	*MT*	*CY*	*EURO12*
Market exchange rate in 1999	**36.83**	**252.65**	**4.23**	**44.07**	**1.96**	**15.64**	**0.62**	**4.26**	**16335.30**	**193.65**	**0.425**	**0.578**	**0.939**
Total goods	21.71	156.01	2.66	23.77	0.81	10.21	0.43	2.69	6948.41	157.41	0.359	0.460	1.062
Consumer goods	22.20	154.27	2.69	22.87	0.83	9.58	0.42	2.63	7068.13	163.45	0.375	0.510	1.084
Non durable goods	20.96	147.33	2.52	21.82	0.80	9.12	0.38	2.46	6849.81	165.98	0.371	0.476	1.132
Semi durable goods	22.64	148.35	2.71	22.44	0.79	10.65	0.55	2.97	4923.20	157.15	0.340	0.483	1.119
Durable goods	26.84	192.44	3.56	28.91	0.99	10.42	0.51	3.08	10771.04	159.70	0.425	0.682	0.932
Capital goods	21.69	162.80	2.63	25.66	0.77	11.81	0.45	2.96	6887.54	151.85	0.338	0.385	1.030
Food and non-alcoholic beverages	18.30	137.06	2.34	22.50	0.84	9.68	0.42	2.56	7186.38	186.66	0.384	0.489	0.990
Alcoholic beverages, tobacco and narcotics	23.94	156.48	2.96	21.61	0.74	10.83	0.54	3.16	7710.40	139.57	0.602	0.641	0.820
Clothing and footwear	21.65	144.96	2.50	20.15	0.80	10.26	0.54	2.82	4072.66	144.81	0.330	0.456	1.296
Furnishing, households Equipment, routine household maintenance	20.71	144.63	2.56	21.87	0.54	9.16	0.38	2.37	5415.47	131.56	0.371	0.466	0.949
Transport	21.87	189.36	2.82	20.23	0.90	9.35	0.45	2.48	8077.79	155.36	0.429	0.492	1.076
Machinery and equipment	30.12	205.47	3.58	35.50	1.23	14.32	0.54	3.58	11085.03	181.70	0.434	0.564	0.966
Total services	9.82	73.09	1.40	8.68	0.33	4.58	0.17	1.00	3319.87	103.51	0.29	0.38	0.771
Consumer services	11.03	87.05	1.62	9.95	0.42	5.48	0.21	1.17	4496.40	112.89	0.37	0.39	0.784
Government services	8.54	60.35	1.16	7.55	0.24	3.66	0.12	0.83	2109.20	91.83	0.21	0.38	0.753
Collective services	10.78	74.27	1.32	9.06	0.23	3.98	0.14	0.97	2229.36	96.83	0.22	0.34	0.803
Individual services	7.31	51.29	1.04	6.75	0.24	3.39	0.11	0.74	1996.78	88.15	0.20	0.41	0.698

Source: PPP exchange rates – Eurostat and OECD, market exchange rates (national currency per euro, annual average) – IFS, IMF.
Notes: Exchange rates refer to domestic currency per euro, but in case of EURO12 it is the euro per US dollar.

Annex 3. Figures

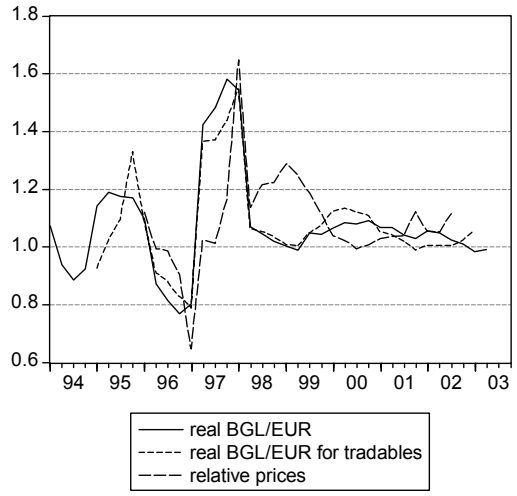
Figure 1. Nominal and real euro exchange rates (yoy change)

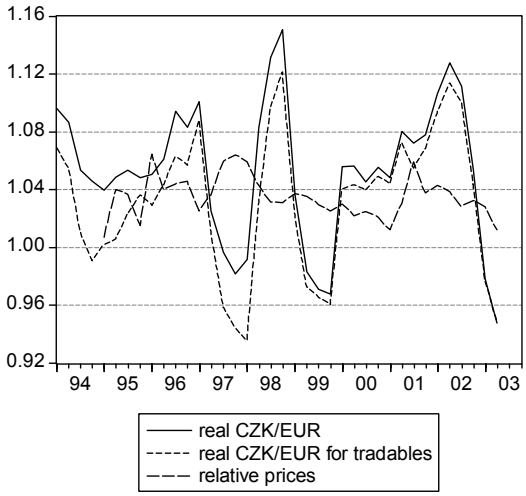


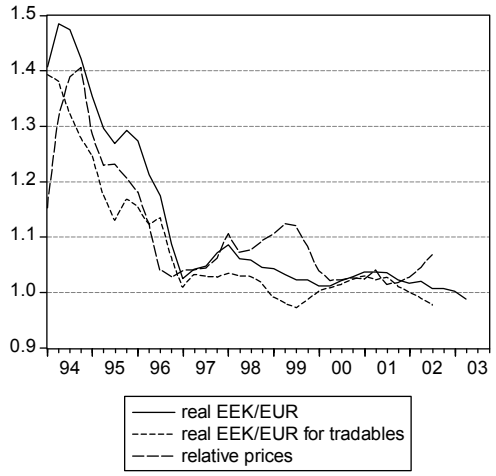
Source: IFS-IMF, ECB, and national sources.

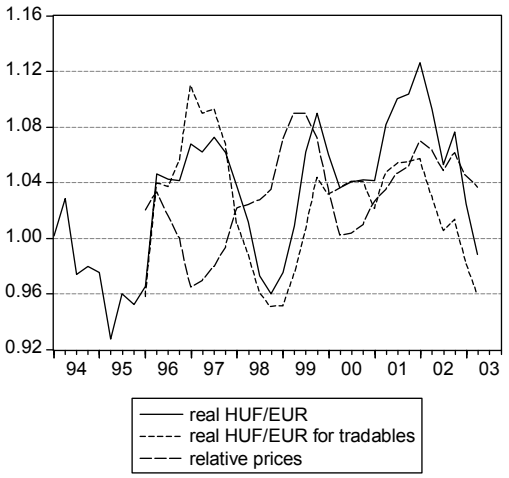
Note: EUR_xxx – nominal euro exchange rate and REUR1_xxx – real euro exchange rate (deflated with consumer prices).

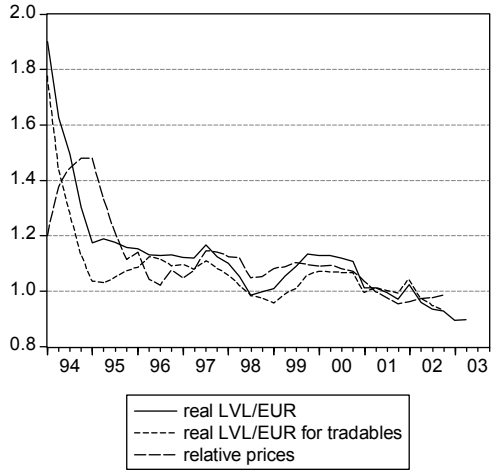
Figure 2. Real euro exchange rates and relative prices (yoy changes)

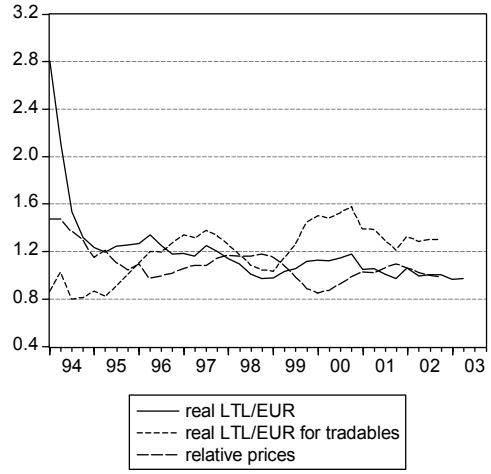


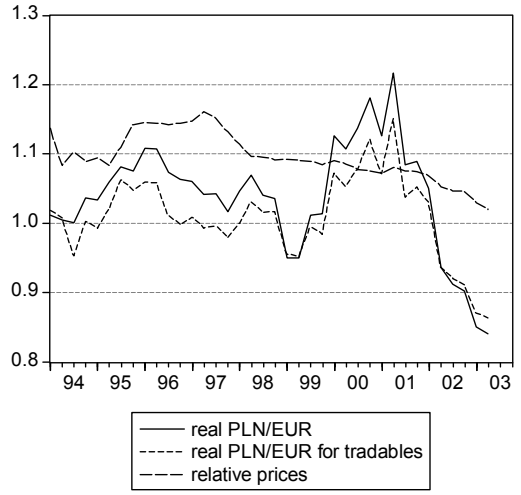


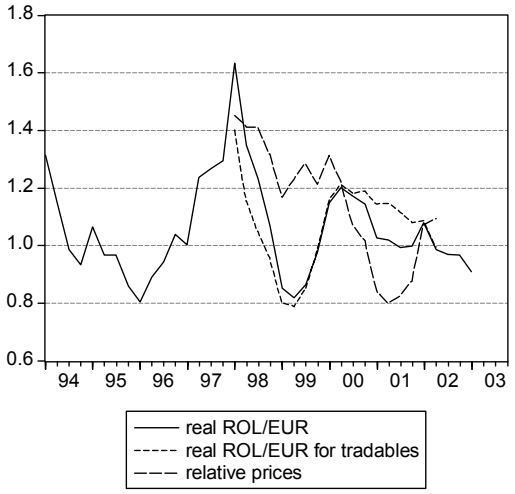


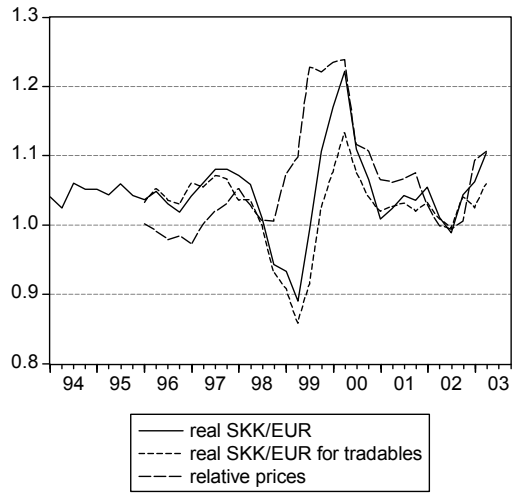


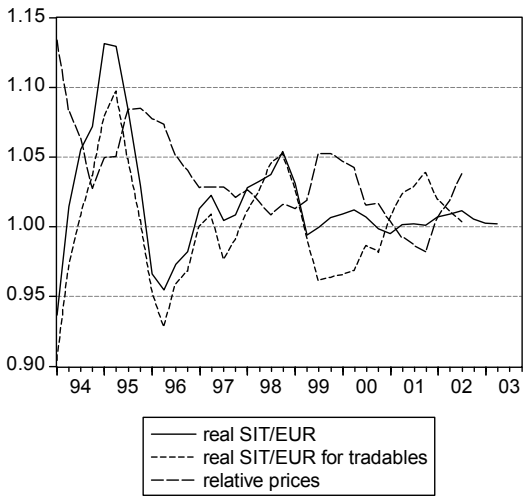






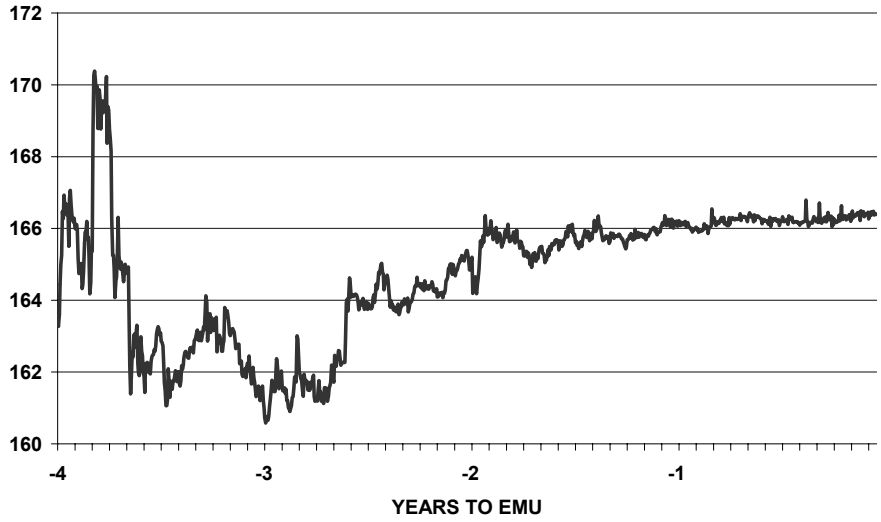






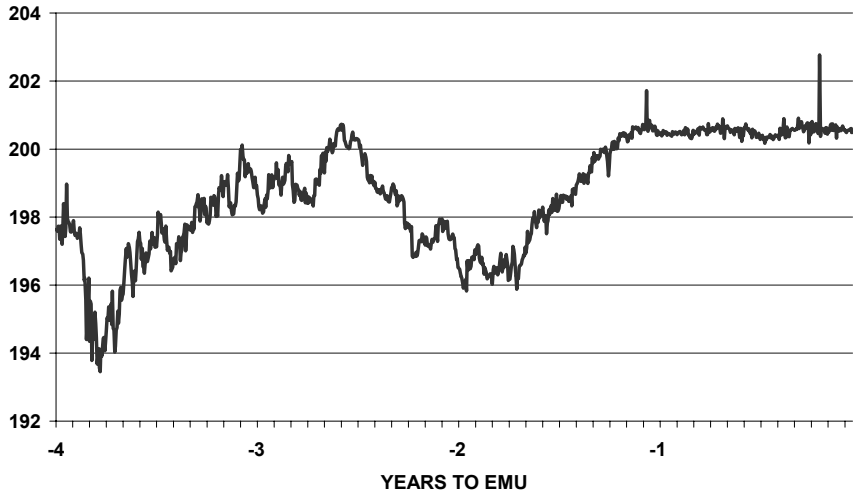
Source: IFS-IMF, ECB, and national sources.

Figure 3. Peseta-euro exchange rate (daily quotations)



Source: Reluga and Szczurek (2002).

Figure 4. Escudo-euro exchange rate (daily quotations)



Source: Reluga and Szczurek (2002).