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***Asymmetric Fluctuation Bands in ERM and ERM-II:  
Lessons from the Past and Future Challenges  
for EU Acceding Countries***

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# Asymmetric fluctuation bands in ERM and ERM-II: Lessons from the past and future challenges for EU acceding countries

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## ABSTRACT

The forthcoming EU enlargement raises a series of questions related to the new entrants' entry to Exchange Rate Mechanism II and their subsequent adoption of the single currency. In this paper, the issue of how to determine the central parity for the acceding countries with which to enter ERM-II is tackled. This is followed by a discussion of the asymmetric nature of the fluctuation bands around the central parity that could be deemed as compatible with the Maastricht criterion on exchange rate stability, i.e. +2.25%/-15% within the officially announced  $\pm 15\%$  fluctuation margins. Then, practices of the European Monetary Institute/ECB and the European Commission are compared when assessing the criterion on exchange rate stability. With this as a background, hypothetical ERM-II is constructed for 4 acceding countries with flexible exchange rate regimes so as to assess *ex post* the sustainability of these countries' participation in ERM-II. Based on this, given *ex post* exchange rate variability and the limited intra-marginal intervention facilities ERM-II participant countries have at their disposal, the defence of the asymmetric band appears a tricky task even though the +2.25% limit on the weaker side of the band is rendered somewhat intangible by a 10-day moving average rule used by the EMI/ECB and further flexibility is given to the system in that a depreciation of more than 2.25% is not automatically viewed as a non-fulfilment of the criterion on exchange rate stability.

JEL: E31, F31, O11, P17

Keyword: exchange rate, exchange rate mechanism, ERM, EU enlargement, asymmetric band, Maastricht criteria, exchange rate stability

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## I. Introduction

Acceding countries are expected to join the European Union (EU) in May 2004. However, this does not imply immediate membership in the Exchange Rate Mechanism II (ERM II) or the immediate adoption of the euro. Yet, given that the Growth and Stability Pact will apply from the outset of EU accession, new member states are supposed to strive to proceed with fiscal consolidation. Further to this, the acceding countries have accepted the *acquis communautaire*. This implies that they should thrive for adopting the euro. So, the Maastricht criteria are expected to be fulfilled at a foreseeable horizon given that any formal opt-out from EMU membership, of the kind obtained earlier by Denmark and the UK, is no longer possible. Nonetheless, the example of Sweden clearly shows that even without formal opt-out, countries have a great deal of flexibility as to when and how to adopt the euro.

In this paper, the prospects of the criterion on exchange rate stability is analysed for acceding countries. Thus, it is of interest to start with reviewing the current state of compliance with the other Maastricht requirements, i.e. the criteria on inflation, long-term interest rate and public finances.

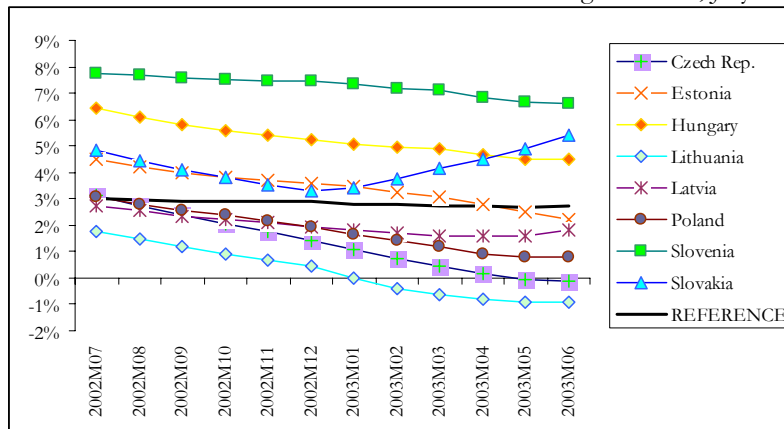
Without diving into much detail, Figure 1. is very telling about the convergence acceding countries underwent as regards inflation. Based on HICP obtained from Eurostat, Lithuania and Latvia have been complying with the criterion on inflation since 2000, whereas the Czech Republic and Poland have been meeting the Maastricht benchmark since August 2002. Estonia dived below the target value in May 2003, whereas Hungary, Slovakia and Slovenia have still some work to do. Measuring convergence in terms of long-term interest rates, trouble is that only a handful of countries have issued government bonds with a maturity of 10 year. The reason for this is either narrow financial markets or the low level of public debt, which dismisses the need to issue such bonds. In any event, the Czech Republic has already reached not only the Maastricht criterion but also levels of the three best performing EU countries<sup>2</sup>, whilst Hungary and Poland converged quickly to the target (Figure 2.)<sup>3</sup>

As for public finances, there seems no problem with regard to the public debt over GDP ratio: all countries are well below the 60% mark. By contrast, although the public deficit to GDP ratio around 3-4% in the late 1990s, a considerable deterioration has been taking place recently with public deficit figures going well beyond 3%, shown in Table 1., in the cases of the Czech Republic, Hungary, Slovakia and to a lesser extent for Poland. However, the 3 Baltic countries and Slovenia seem to have been complying nicely with the 3% target for the last couple of years. It should be noted that, remarkably enough, Estonia exhibits budget surplus coupled with an extremely low level of public debt as low as 4%.

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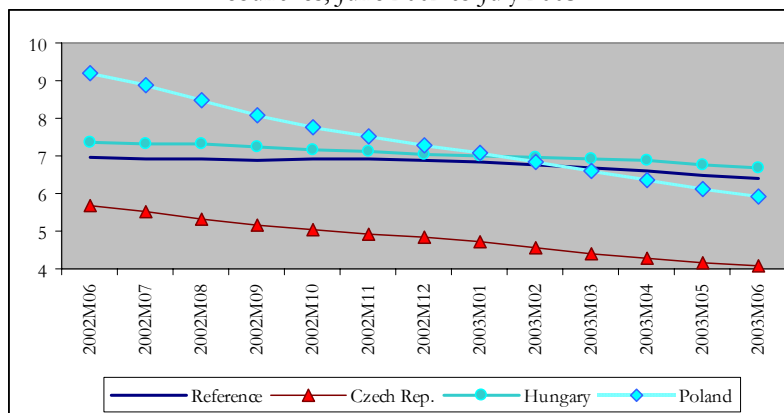
<sup>2</sup> One prominent feature of the Maastricht criteria on price and interest rate stability is that the calculation of the benchmark inflation and interest rate considers not only EMU member states but also non-participating EU-countries. As a result, the criteria can be partly determined by pre-ins such as Denmark, Sweden and the UK.

<sup>3</sup>The criteria on inflation and interest rates are determined in accordance with the convergence reports of the EMI/ECB and the European Commission, i.e. the average rate of inflation is calculated as the latest 12-month average inflation relative to the previous 12-month average and the average interest rate is a 12-month average. Data are shown for the last 12 months as if the examination of the Maastricht criteria took place now.

**Figure 1.** The Maastricht criterion on inflation and HICP in acceding countries, July 2002 to June 2003


Source: NewCronos, Eurostat

Note: In accordance with the Maastricht criterion on inflation, the inflation series are computed as the latest 12-month average HICP inflation relative to the previous 12-month average.

**Figure 2.** The Maastricht criterion on interest rates and 10-year government bonds in 3 acceding countries, June 2002 to July 2003


Source: National statistical sources for the Czech Republic, Hungary and Poland and NewCronos of Eurostat for the EU-15.

Note: In accordance with the Maastricht criterion on interest rates, the series are calculated as 12-month averages of 10-year bond yields. The reference value is obtained as the arithmetic average of 10-year bond yields of the three best performing countries in terms of the inflation criterion.

**Table 1.** State of the public sector

	2001	2002	2003	2004	2001	2002	2003	2004
	Government deficit/GDP (in %)				Public debt/GDP (in %)			
	Execution	Execution	Forecast	Forecast	Execution	Estimation	Forecast	Forecast
Czech Rep.	-5.5	-6.5	-6.3	-5.9	23.6	25.6	27.8	31.3
Estonia	0.5	1.3	-0.5	-0.6	4.8	4.4	4.2	3.9
Hungary	-4.2	-9.1	-4.9	-3.7	53.0	52.9	52.4	51.4
Latvia	-1.9	-2.5	-2.9	-2.6	15.9	16.8	18.0	18.6
Lithuania	-2.3	-1.8	-1.9	-2.0	23.1	23.6	23.6	23.4
Poland	-3.1	-4.2	-4.2	-4.0	38.7	43.3	45.2	46.0
Slovakia	-5.4	-7.7	-5.3	-3.8	43.0	39.3	38.9	38.8
Slovenia	-2.5	-1.8	-1.5	-1.2	27.5	27.9	26.0	25.2

Source: European Commission (2002, 2003)

In the remainder of the paper, we briefly touch upon the main features of exchange rate regimes in acceding countries. Then, the question of how to determine the entry parity for acceding countries to ERM-II and to the euro zone is dealt with. Subsequently, ERM and ERM-II are put under the microscope in an attempt to disentangle the real nature of the Maastricht criterion on exchange rate stability. This is followed by the construction of a hypothetical ERM-II for 4 acceding countries with flexible exchange rate regimes so as to assess *ex post* the sustainability of these countries' participation in ERM-II. Finally, some concluding remarks are provided.

## II. Exchange rate regimes in acceding countries

The analysis of exchange rate regimes in acceding countries reveals two prominent features presented in Table 2. The first is the strong polarisation to be observed across countries. At the onset of the economic transition from plan to market, all countries, with the exception of Slovenia, had either a tightly pegged system or a currency board. While countries with currency board conserved their system, the rest moved towards more flexibility and eventually ended up with floating or pegged systems with large bands on the grounds of full liberalisation of the capital accounts going hand in hand with strong FDI and portfolio investment inflows.

Second, the currency basket/reference currency witnessed a shift in favour of current EMU countries' currencies and then the euro. In 1991, the only country using 100% euro equivalent currency (German mark) as a reference currency was Slovenia. By 2003, 6 other countries joined the group where the euro constitutes 100% either of the currency basket or the reference currency in managed floating as shown in Table 3.

**Table 2.** Exchange rate regimes in acceding countries, 1990-2003.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Estonia	--	-- <sup>a</sup>	0	0	0	0	0	0	0	0	0	0	0	0
Latvia	--	-- <sup>a</sup>	0	0	0	0	0	0	0	0	0	0	0	0
Lithuania	--	-- <sup>a</sup>	1	1	1-0	0	0	0	0	0	0	0	0	0
Slovenia	-- <sup>a</sup>	3	3	3	3	3	3	3	3	3	3	3	3	3
Hungary	1	1	1	1	1	1-2	2	2	2	2	2	2-4-5	5	5
Poland	1	1	2	2	2	4	4	4	4	4	4-7	7	7	7
Slovakia	1	1	1	1	1	1	5	5	5-6	6	6	6	6	6
Czech Rep.	1	1	1	1	1	1	5	5-6	6	6	6	6	6	6

(a) No home currency in circulation

0: formal or de facto currency board

1: peg to a currency or to a basket with fluctuation margins less than or equal to  $\pm 2.25\%$

2: crawling peg with fluctuation margins of less than or equal to  $\pm 2.25\%$

3: float with active management by monetary authorities (implicit crawling peg)

4: crawling peg with fluctuation margins of more than  $\pm 2.25\%$

5: peg to a currency or a basket with fluctuation margins of more than  $\pm 2.25\%$

6: float with heavy regular interventions

7: free float punctual intervention

 Regime shift

**Table 3.** Weight of EMU currencies/euro in the currency basket<sup>1</sup>, 1990-2003

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Slovenia</b>	--	100	100	100	100	100	100	100	100	100	100	100	100	100
<b>Estonia</b>	--	--	100	100	100	100	100	100	100	100	100	100	100	100
<b>Czech Rep.</b>	58	58	58	65	65	65	65	100	100	100	100	100	100	100
<b>Slovakia</b>	58	58	58	60	60	60	60	60	100	100	100	100	100	100
<b>Hungary</b>	50	50	50	50	70	70	70	70	70	70	100	100	100	100
<b>Lithuania</b>	--	--	0	0	0	0	0	0	0	0	0	0	100	100
<b>Poland</b>	0	40	40	40	40	40	40	40	40	55	--	--	--	--
<b>Latvia</b>	--	--	0	0	0	0	0	0	0	0	0	0	0	0

(1) target currency in the case of managed float

### III. How to manage the transition towards full euro area membership?

With EU accession blinking at the horizon, it seems right to think about with which exchange rate regimes CEE countries should aim at adopting the euro. For the European Union has not ruled out the possibility of participating in ERM-II with a currency board arrangement linked to the euro, Estonia and Lithuania may be in a position not to give up their current exchange rate system within the framework of ERM-II<sup>4</sup>. By contrast, crawling pegs and floating regimes without central parity and bands are incompatible with ERM-II and therefore will have to be abolished. For all countries, issues of paramount importance to be answered are the choice of the entry parity, the size of the fluctuation bands and the interventions at the limits and within the bands. These questions are being addressed one by one in what follows.

#### III. A. How to determine the central parity for entry to ERM-II?

The question of determining the central parity for ERM-II based on which the EMU central parity could be fixed afterwards is akin to assess the equilibrium real and nominal exchange rate. The underlying idea is to investigate the extent of a possible misalignment of the real effective exchange rate from which the over- or undervaluation of the actual real exchange rate against the euro can subsequently be extracted. Finally, assuming that any real misalignment is best corrected by nominal exchange rate movements due to sticky prices, the equilibrium nominal parity is obtained when the observed nominal exchange rate against to euro is modified by taking account of the size of the real misalignment.

Hereafter a brief summary of the different approaches aimed at estimating equilibrium real exchange rates is presented followed by the presentation of empirical results obtained for the 8 acceding countries.<sup>5</sup>

The most conventional tool for assessing equilibrium real exchange rates is the concept of purchasing power parity (PPP hereinafter). Because of the presence of the non-tradable sector and due to large differences in productivity levels between the acceding countries and the euro area, price levels in the acceding countries, expressed in euro, are well below that prevailing in Euroland. It means that the acceding countries' currencies appear systematically undervalued in terms of absolute PPP.

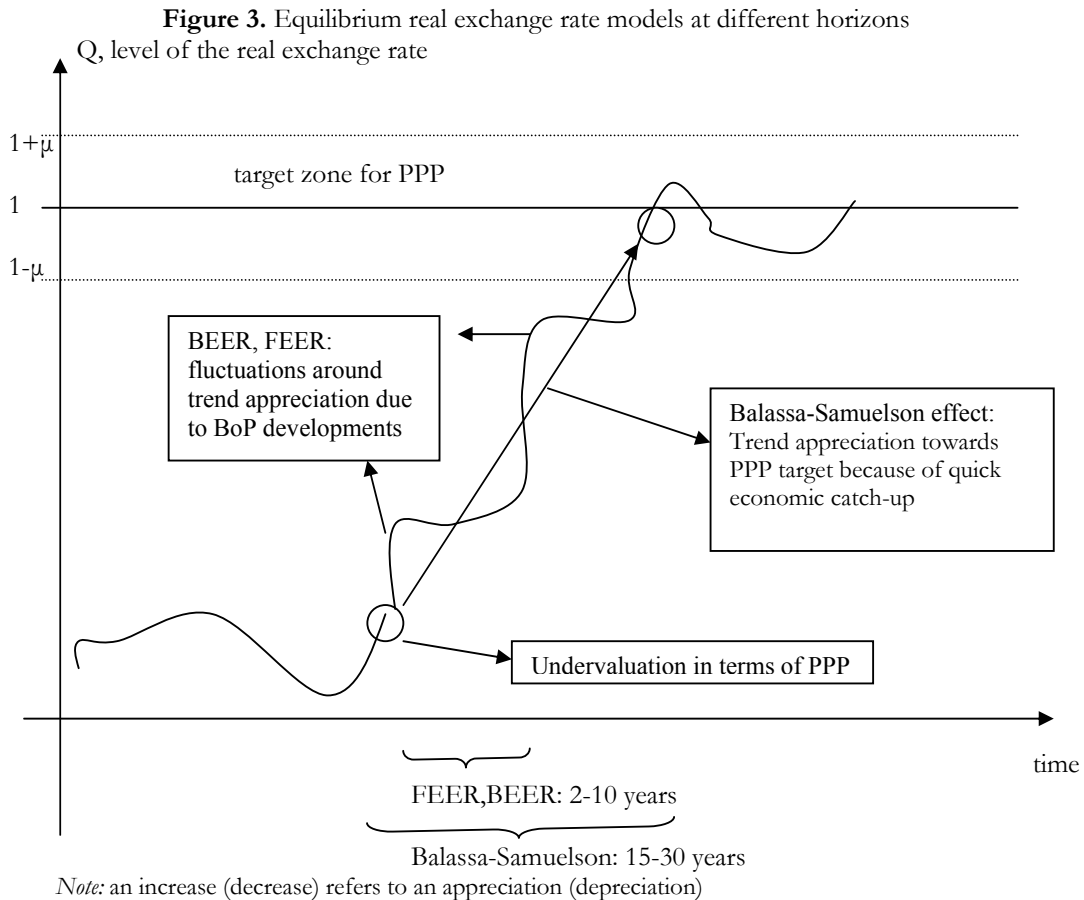
<sup>4</sup> European Economy, Supplement C, 2001, pp. 3: "Although Currency Board arrangements cannot be regarded as an acceptable substitute for participation in ERM II, they may in some circumstances constitute an appropriate unilateral commitment within ERM II".

<sup>5</sup> This section draws heavily on Égert (2003a)

Nonetheless, in a quick catch-up process, productivity levels are expected to increase rapidly to levels found in developed countries. Because the level of and changes in productivity are usually linked to the level and development of wages in the traded-goods sector, catch-up in productivity levels is translated into higher price level mainly through price increases in non-tradable goods. And this is the reason why the real exchange rate would converge towards the target value given by absolute PPP, i.e. why the real exchange rate would experience a trend appreciation. This phenomenon is termed as the Balassa-Samuelson effect in the literature. And this is the reason why relative PPP does not hold, i.e. the real exchange rate is not constant or stationary.

It is important to recognise that absolute PPP tends to hold over the very long horizon, that is in secular terms and that the Balassa-Samuelson effect is able to provide good guidance for equilibrium real exchange rates in the longer run, i.e. 15-30 years when cyclical effects do not blur the picture.

When it comes considering the medium term, that is the period over which cyclical effects strongly shape real exchange rate movements and when monetary and fiscal policy, and the co-ordination failure between them are able to impact on real exchange rates, two other approaches seem more appropriate: the fundamental equilibrium exchange rate (FEER) and the behavioural equilibrium exchange rate (BEER). Figure 3. hereafter provides an overview on the interconnection of the different approaches and on the time horizon they are expected to be of analytical use.



There is an ever growing empirical literature aimed at assessing exchange rate misalignments in acceding countries. A first strand of papers use the Balassa-Samuelson framework. Although some studies such as Golinelli and Orsi (2001), Rother (2002) and Sinn and Reutter(2001) generally find that the bulk of real appreciation is explained by productivity gains, Kovács(2001), Kovács et al. (2002), Mihaljek (2002), Égert(2002) and Égert et al.(2003) have recently reported results suggesting that the Balassa-Samuelson effect is only part of the story and only part of the observed real appreciation can be attributed to the Balassa-Samuelson effect. The reason for this finding is that PPP does not hold for the open sector since the PPI-based real exchange rate has also appreciated even though to a lesser extent than the CPI-based real exchange rate. (the B-S effect is expected to explain the difference between the CPI and PPI-deflated real exchange rates). Nevertheless, the acceding countries' currencies are not necessarily overvalued because of the followings:

- 1.) The overwhelming majority of the literature did not address the issue whether or not the real exchange rate was over- or undervalued at the outset of the transition. If they had been fairly valued, the actual real exchange rate would have appreciated faster than the equilibrium real exchange rate. Consequently, it should be overvalued by now. But Halpern and Wyplosz (1997) and Krajnyák and Zettelmeyer (1998) have reported a strong undervaluation at the beginning of the transition period. This means that the “excess” appreciation of the actual real exchange rate (the difference between the appreciation of the actual and equilibrium real exchange rate) has only been a convergence towards its equilibrium level.
- 2.) Tradable prices also contain non-tradable components. Part of the appreciation of the PPI-based real exchange rate could also be accounted to the B-S effect. The distribution sector may also play an important role here (MacDonald and Ricci (2001))
- 3.) New technology and higher productivity led to an improvement in goods quality. As changes in the quality of goods have been even more rapid than in Western European economies, adjustment of prices for quality improvements is an even higher challenge implying that the measurement error is bound to be substantial.
- 4.) A trend increase in disposable income per capita results not only in an increased demand for non-tradables but also in a rise in the demand for tradable goods, which may exert an upward pressure on tradable prices. However, this is expected to be a medium-term phenomenon.
- 5.) Real exchange rates based on CPI indexes are not fully consistent. As shown in Égert (2003b), using the same weights for tradable and non-tradable goods in CPI would result in a slightly higher appreciation, whereas eliminating regulated non-tradable prices from CPI would substantially decrease the extent of the real appreciation. As a result, perceived appreciation is higher than the “true one”.

Whereas the Balassa-Samuelson literature has so far failed to provide ready-to-use estimates on the equilibrium real exchange rate, the body of literature employing the FEER and BEER approaches has come up with some concrete estimates regarding equilibrium real exchange rates even though burdened by considerable model and econometric uncertainties<sup>6</sup>.

Papers employing the BEER and FEER approaches to the 8 acceding countries are presented in Table 4. What emerges from this overview is that as far as Poland goes, there are currently signs, though not irrefutable, of a misalignment. In the case of Hungary, most estimates find no misalignment prior to the abandon of the crawling peg. Since then, the nominal exchange rate appreciated by more than 10% coupled with a positive inflation differential vis-à-vis its trading partners that may have resulted in a not equilibrium appreciation of the forint. This is acknowledged by Csajbók and Kovács (2002), although without giving precise estimates on the size of the misalignment.

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<sup>6</sup> For potential pitfalls, see Égert (2003a).



**Table 4.** The magnitude of misalignment in acceding countries

<i>Country</i>	<i>Author</i>	<i>Year</i>	<i>Mis.</i>	<i>Country</i>	<i>Author</i>	<i>Year</i>	<i>Mis.</i>		
<b>Czech R.</b>	Šmidková (1998)	1996	Eff: -1%- +5%	<b>Lithuania</b>	Alonso-Gamo et al. (2002)	2002	Eff:-5%		
	Begg et al. (1999)	1997	Eff: NM						
	Frait-Komárek (1999)	1998	Slightly +						
	Coudert-Couhard (2002)	2001	Eff: NM%		<b>Poland</b>	Begg et al. (1999)	1997	Slightly +?	
	Kim-Korhonen (2002)	1999	Eff: -10%				Kim-Korhonen (2002)	1999	Eff: NM
	Lommatzsch-Tober (2002b)	2001	Eff: 0%-+15%				Lommatzsch-Tober (2002b)	2001	Eff: +10%
Égert-Lahrèche (2003)	2001	Eff:+15%		Coudert-Couhard (2002)		2001	Eff: +2% Eur:+3%		
<b>Estonia</b>	Begg et al. (1999)	1997	Eff: NM		Égert-Lahrèche (2003)	2001	Eff: +15%		
	Filipozzi (2000)	1999	Eff: +5%		Rawdanowicz (2002)	2002	Eff: NM		
	Randveer –Rell (2002)	2000	Eff: NM	<b>Slovakia</b>	Rubaszek (2003)	2002	Eff: NM		
	Coudert-Couhard (2002)	2001	Eff: NM			IMF (1998)	1997	Eff: NM	
						Begg et al. (1999)	1997	Eff: NM	
<b>Hungary</b>	Avallone- Lahrèche (1999)	1997	Eff: NM		Kim-Korhonen (2002)	1999	Eff: NM		
	Begg et al. (1999)	1997	Eff: Slightly +		Égert-Lahrèche (2003)	2001	+8%		
	Coudert (1999)	1997	USD: NM	<b>Slovenia</b>	Begg et al. (1999)	1997	Slightly +?		
	Kim-Korhonen (2002)	1999	Eff: +40%			Coudert-Couhard (2002)	2001	Eff: NM	
	Coudert-Couhard (2002)	2001	Eff: NM			Égert-Lahrèche (2003)	2001	Eff: NM	
	Lommatzsch-Tober (2002b)	2001	Eff: NM						
	Égert-Lahrèche (2003)	2001	Eff: NM						
	Csajbók-Kovács (2002)	2002	Eff: overvalued						

*Note:* Mis.=misalignment, positive figures indicate overvaluation whereas negative figures stand for undervaluation, Eff: in effective terms, Eur: against the euro, NM: no misalignment

### III.B. How rocky a road ahead for achieving nominal exchange rate stability?

#### *The experience of ERM and ERM-II*

In accordance with Articles 3 of protocol No. 21 (ex. 6) of the Maastricht Treaty establishing the European Community, the criterion on nominal exchange rate stability is defined as follows: “*The criterion on participation in the Exchange Rate mechanism of the European Monetary System (...) shall mean that a Member State has respected the normal fluctuation margins provided for by the Exchange Rate Mechanism of the European Monetary System without severe tensions for at least the last two years before the examination. In particular, the Member State shall not have devalued its currency's bilateral central rate against any other Member State's currency on its own initiative for the same period*”.

Before the 1993 ERM crisis, the prevailing  $\pm 2.25\%$  fluctuation bands<sup>7</sup> provided a yardstick for interpreting the criterion on exchange rate stability: A currency was viewed to meet the criterion insofar its bilateral nominal exchange rates vis-à-vis the other participating currencies were kept within a tunnel of 4,5% around the central parity without severe tensions. However, because of the widening of the bands to  $\pm 15\%$  prompted by the crisis, the interpretation of the criterion became less clear-cut. It is evident that exchange rate fluctuations of 30% are far from being providing exchange rate stability. Therefore, and not surprisingly, “*the normal fluctuation margins (...) without severe tensions*” has given rise to alternative but not necessarily conflicting practices when interpreting the criterion.

<sup>7</sup> An exception was Italy as the lira was allowed to fluctuate in a band of  $\pm 6\%$  against the other participating currencies.

What do past convergence reports tell us?

Article 121 of the Maastricht Treaty stipulates that both the European Commission and the EMI/ECB are to examine the state of convergence of the member states. These convergence reports are then to be submitted to the Council of the EU that, based on the recommendation of the European Commission, judges upon whether a given country “...fulfils the necessary conditions for the adoption of a single currency”. Therefore, it is of great interest to analyse the convergence reports with a particular emphasis laid on how the criterion on exchange rate stability is interpreted. In accordance with the *equal treatment principle*, the way the criterion is interpreted in the past would also determine how it will be applied to countries wishing to join the euro zone in the future. This appears to be confirmed in point 8 of the statement of the ECOFIN meeting held in April 2003: “*The assessment of the fulfilment of the Maastricht convergence criteria (...) will ensure equal treatment between future Member States and the current participants in the euro area.*”

In its convergence report 1998, the *European Monetary Institute* (EMI henceforth) considered a currency stable in the event that it was traded close to its unchanged central parity<sup>8</sup>. In the report, all bilateral exchange rates are considered, and this using a 10-day moving average based on daily data at business frequency<sup>9</sup>. Whether or not several tensions characterised the foreign exchange market of a given country was assessed based on so-called tension indicators such as exchange rate volatility and short-term interest rate differentials. Exchange rate volatility was calculated against the German mark<sup>10</sup> whereas the three-month interbank interest rates of the country under consideration were compared with a weighted average of 5 countries, namely Austria, Belgium, Germany, the Netherlands and France. However, it should be noted that no explicit guidance was provided by the EMI to clarify what “traded close” meant and how much exchange rate volatility and how big an interest rate differential would have meant a breach of the criterion on exchange rate stability.

The assessment practice of the *European Commission* was different and much more explicit than that of the EMI and the ECB. According to the convergence report 1998 of the European Commission, the widening of the fluctuations margins were originally meant to be transitory so as to prevent the complete collapse of ERM. At the same time, the report also acknowledges that because no officially announced return to the  $\pm 2.25\%$  bands occurred, the wider bands should somehow be taken account for during the convergence assessment. Inter alia for this purpose, the European Commission introduced the *median currency*. The median currency is defined as the currency the deviation of which from its ECU central parity was the “median” deviation among the participating currencies. In more practical terms, for each participating country<sup>11</sup>, the deviation of the bilateral exchange rate against the ECU from its official ECU central parity is determined. Subsequently, the countries are ranked and the 6<sup>th</sup> out of the 11 participating currencies is chosen in the ranking. It should be noted that the median currency is chosen on a daily basis, implying that the currency chosen as the median currency could have changed day-by-day. Furthermore, deviations are measured in terms of daily data and not on the basis of a 10-day moving average.

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<sup>8</sup> “... in the assessment of exchange rate developments the emphasis is placed on exchange rates being close to the central rates.” EMI(1998), pp. 37.

<sup>9</sup> EMI (1998), pp. 53.

<sup>10</sup> “Annualised monthly standard deviation of daily percentage changes of the exchange rate against the DEM, in percentages” EMI(1998), pp. 53.

<sup>11</sup> Before the entry of Greece the following countries were already participating in ERM: Austria, Belgium, Denmark, France, Finland, Germany, Ireland, Italy, Netherlands, Portugal and Spain.

For the criterion on exchange rate stability to be fulfilled, a given currency's bilateral exchange rate vis-à-vis the median currency's official bilateral parity should be kept within a fluctuation band of  $\pm 2.25\%$ . The use of the median currency ensures higher flexibility because the bilateral exchange rates of the participating countries could have been deviating by up to  $\pm 4.5\%$ <sup>12</sup> instead of the  $\pm 2.25\%$  bandwidth that prevailed for all the currencies simultaneously in the pre-crisis ERM.

However, it is also reckoned explicitly<sup>13</sup> that a deviation exceeding  $\pm 2.25\%$  against the median currency will not automatically imply the violation of the criterion on exchange rate stability. Whether or not a larger deviation corresponds to a violation of the normal fluctuation margins or to severe tensions hinges largely on how long the deviation lasts, how high it is, and, most importantly, whether it occurs in the weaker or the stronger side of fluctuation band. On page 153 of the Convergence Report 1998, the following is written: "... it seems reasonable to exclude movements above the 2.25% range against the median currency as a possible cause for non-fulfilment of the criterion". In other words, the fluctuation band around the median currency is 2.25% on the weaker side and much wider, up to 15% on the stronger one.

This asymmetry stems from the reading of the criterion on exchange rate stability according to which "...the Member State shall not have devalued its currency's bilateral central rate against any other Member State's currency on its own initiative for the same period". By contrast, the criterion is largely silent on the re-valuation of the central parity. From this follows that exchange rate stability means the lack of devaluation or depreciation, which might entail inflation through imported inflation and expectations while revaluation or appreciation is not viewed dangerous for price stability. In addition, unilateral devaluation is also likely to hurt, at least in the shorter run, competitiveness of other member states.

Last but not least, another difference is worthwhile mentioning that is not linked to the size of the fluctuation but rather to the duration of ERM participation. It is well known that Finland and Italy entered and re-entered ERM respectively in October and November 1996. This implies that at the time of the assessment, i.e. in March 1998, both of them spent less than two years in the Exchange Rate Mechanism. The EMI took into consideration the respective 16.5- and 15-month stays as the reference period for examining exchange rate stability, whereas the European Commission considered as if the two countries had spent 24 months in ERM by analysing exchange rates from March 1996 to February 1998.

The above analysis is based on the convergence reports related to ERM. As regards ERM-II, only one current euro zone member state, notably Greece, went through it. The practice of the EMI in its 1998 convergence report is followed by its successor, the ECB when analysing the state of convergence of Greece in 2000 and that of Sweden in 2000 and 2002 (ECB(2000) and ECB(2002)). As also done in the European Commission's convergence report on Greece, exchange rate stability is assessed in two stages. In a first step, exchange rate stability is analysed in ERM according with practices as in EMI (1998) and European Commission (1998). The second stage then involves the investigation of the Greek drachma's developments against the euro. The method applied by the ECB is the same as before, i.e. no clear definition of exchange rate stability is given. By contrast, the European Commission applies explicitly the asymmetric criterion against the euro<sup>14</sup>.

<sup>12</sup> Note that this is the maximum span allowed between the strongest and the weakest currencies.

<sup>13</sup> European Commission (1998), pp. 153.

<sup>14</sup> "... For Greece ... the euro based approach would imply that ... a distinction would be drawn between movements above the 2.25% upper margin and movements below the 2.25% lower margin, with only the latter potentially indicating severe tensions within ERM-II", European Commission (2000), pp. 68.

The last and not negligible difference between the European Commission and the EMI/ECB is this: Albeit both the European Commission and the ECB are required to prepare a convergence report when a given country is analysed to see whether it complies fully with the Maastricht criteria, it is the European Commission that makes a direct recommendation to the Council. However, this does not mean that the final decision by the Council will correspond to this proposition. And the EMI/ECB can also have a certain impact on the final decision through different formal and informal channels.

**Table 5.** Comparison of the practical interpretation of the criterion on exchange rate stability by the EMI/ECB and the European Commission

	European Commission	EMI/ECB
<b>ERM</b>		
<i>Reference period</i>	2 years for all countries: March 1996-February 1998	2 years: : March 1996-February 1998 except for Italy and Finland (15 and 16.5 months)
<i>Reference currency</i>	Median currency	Bilateral
<i>Reference fluctuation band</i>	2.25% and -15%	“close to parity”
<i>Reference time series</i>	Daily exchange rate	10-day moving average
<i>Tension indicators</i>	Duration and size of large deviations Size of forex interventions	Exchange rate volatility against DEM Short-term interest rate differential against a basket of 5 participating countries
<b>ERM-II</b>		
	Reference currency is EUR. Otherwise the same	Reference currency is EUR. Otherwise the same
<b>Decision making</b>	Recommendation to the Council as to whether a given country complies fully with the Maastricht criteria	No direct decision making but influence on the final decision through different formal and informal channels

#### Widening the horizon of the analysis

When it comes to examine the variation of the exchange rates in ERM and to conclude on whether or not a given country meets the criterion on exchange rate stability, the following benchmark currency could be used:

- The ECU
- The median currency proposed by the European Commission
- Bilateral exchange rates (no benchmark currency) used by the EMI/ECB
- The strongest currency of the system
- The German mark
- The synthetic euro (only ex post and only for information)

In what follows, we attempt to compare the historical records of the different approaches. Maximum deviations from the central parity are looked at first followed by the discussion of the asymmetric feature of ERM and ERM-II. Starting by examining maximum deviations against the ECU, summarised in Table 5. and depicted in Figure 4 reveals that there was indeed a more narrowly defined implicit nominal exchange rate target. Instead of the  $\pm 15\%$  bands, all countries involved in the Exchange Rate Mechanism two years prior the launch of the euro<sup>15</sup> made considerable efforts to keep their currency in a band of  $\pm 2.25\%$ .

<sup>15</sup> The reference period considered in the European Monetary Institute’s convergence report is March 1, 1996 to February 28, 1998. Two exceptions are Finland and Italy: Finland joined ERM on October 15, 1996, whereas Italy re-joined the club on November 25 the same year. Hence, Finland spent only 16.5 months, and Italy a mere 15 months before examination, that is not even 1.5 year. And the EMI considered only the period the two countries spent in ERM as the reference period. By contrast, the European Commission examined the period from March 1996 to February 1998 for Finland and Italy.

However, two observations deserve further examination. The first one is that, during the reference period of March 1996 – February 1998, almost all currencies exited the implicit 2.25% narrow band on the stronger side. The same applies to the weaker sides as the currencies depreciated against the ECU central parity (see columns 2-5 of Table 6.), which made a devaluation of the central parity necessary to respect the narrow band. This is very clear using daily observations and remains evident based on 10-day moving averages<sup>16</sup>, the latter being roughly 0.5% lower than the former. On March 17, 1998, a multilateral parity adjustment took place that witnessed the devaluation of 2,68% of the central parity of all but one participating currencies and a re-evaluation of the Irish pound of 3,09%. Afterwards, the 2.25% on the weaker side of the fluctuation band was strictly respected (see columns 7 and 9 in Table 5.).

The answer to this depreciation is to be sought in the fact that the ECU was a composite currency that also included the non-participating British pound. But at the same time, countries such as Austria and Finland that joined the EU in 1995 and participated subsequently in ERM were not considered in the ECU<sup>17</sup>. The reason for the depreciation above the 2.25% limit is explained by the strong, 25% appreciation of the British pound against the German mark over the period 1996-1998 that fed back into the central parity because of the high share of the British currency in the ECU basket<sup>18</sup> (Figure 6.). This large appreciation of the British pound may be a big reason for not using the ECU as a real benchmark.

Yet the use of ECU exchange rate series reveals the salient feature of ERM, i.e. the asymmetric nature of the implicit fluctuation band. Although the  $\pm 2.25\%$  band is not strictly respected either side against the ECU's central parity for daily exchange rates, excess appreciation appears systematically higher than excess depreciation. In addition to this, when 10-day moving averages are examined, it turns out that 7 out of 11 countries had an appreciation higher than 2.25% against the central parity (against 10 out of 11 for daily data), whilst a depreciation exceeding 2.25% occurred only for 4 out of 11 countries (against 8 out of 11 for daily data).

But it should be also made clear that in general these excess deviations vis-à-vis the central parity still remained in a narrow band of maximum  $\pm 5\%$ . And another, and probably stronger piece of evidence for asymmetry is the following: Depreciation never went beyond 5% whereas excess appreciation exceeded the central parity by up to 10% in Ireland. It should be also noted that the maximum deviations occurred mainly at the beginning of the reference period.

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<sup>16</sup> The reason why 10-day moving averages are also reported is that the EMI examined nominal exchange rate stability using such a moving average that smoothes out short-term fluctuations

<sup>17</sup> This is at least as incoherent as the calculation of the Maastricht criterion on inflation given that inflation rates of Denmark, the UK and Sweden can also serve as a basis for the inflation criterion even though these countries have decided not to adopt the euro yet.

<sup>18</sup> It should also be noted that the appreciation of the Irish pound had also an affect. However, because of its low weight in the ECU basket, its overall impact was eclipsed by the British pound.

**Table 6.** Maximum appreciation and depreciation against the official central parity of the ECU in ERM, 1996-1998

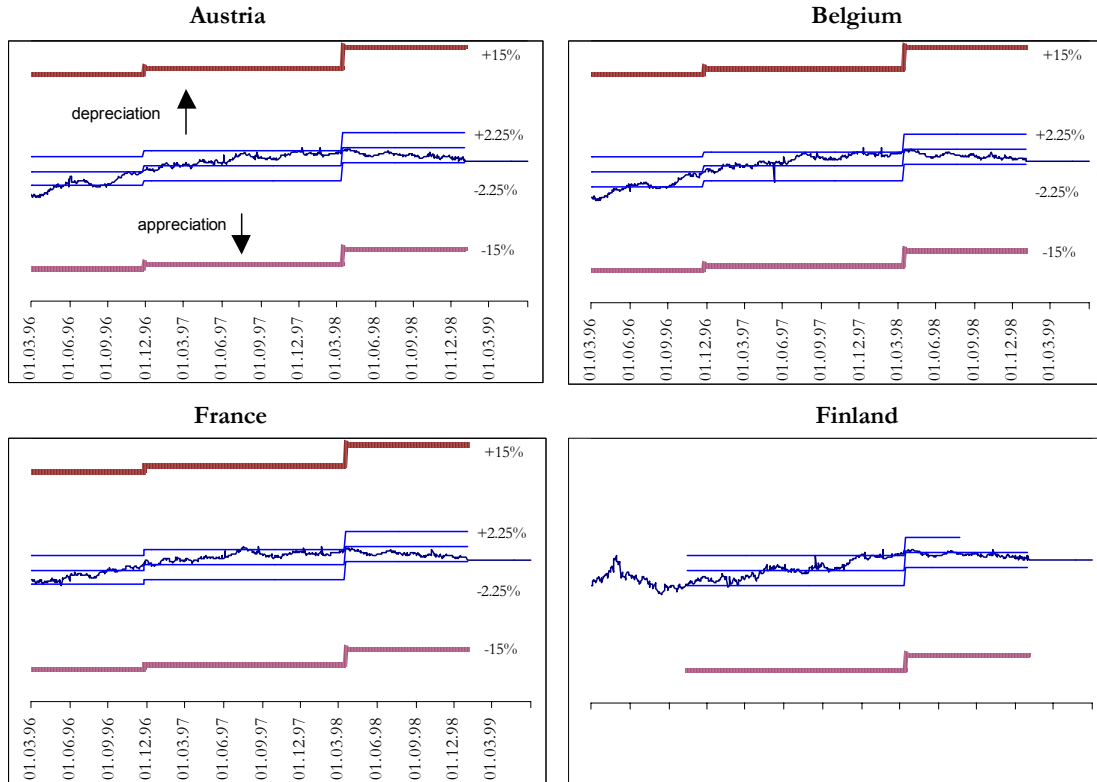
	APPR	DEPR	APPR	DEPR	APPR	DEPR	APPR	DEPR
	01/03/1996 – 28/02/1998 <sup>1</sup>				17/03/1998 – 31/12/1998			
	DAILY OBS.		10-DAY MA		DAILY OBS.		10-DAY MA	
Austria	4.034%	2.808%	3.904%	2.221%	2.022%	-0.162%	1.681%	-0.282%
Belgium	4.411%	2.833%	4.199%	2.215%	1.765%	-0.126%	1.594%	-0.268%
Denmark	-2.103%	3.513%	-1.980%	2.840%	-1.249%	0.607%	-1.121%	0.492%
France	2.346%	2.661%	1.900%	2.499%	1.991%	-0.205%	1.662%	-0.346%
Finland	2.431%	3.091%	2.086%	2.550%	1.169%	0.566%	0.789%	0.377%
Germany	4.083%	2.803%	3.870%	2.183%	1.926%	-0.140%	1.660%	-0.271%
Ireland	10.061%	0.253%	9.694%	0.018%	2.964%	-0.978%	2.772%	-1.299%
Italy	1.100%	2.660%	0.754%	2.384%	1.359%	0.545%	0.980%	0.251%
Netherlands	4.793%	2.923%	4.515%	2.216%	1.980%	-0.095%	1.642%	-0.255%
Portugal	3.692%	2.676%	3.151%	1.983%	1.948%	0.038%	1.638%	-0.220%
Spain	5.247%	2.204%	4.950%	1.557%	1.929%	0.794%	1.636%	-0.486%

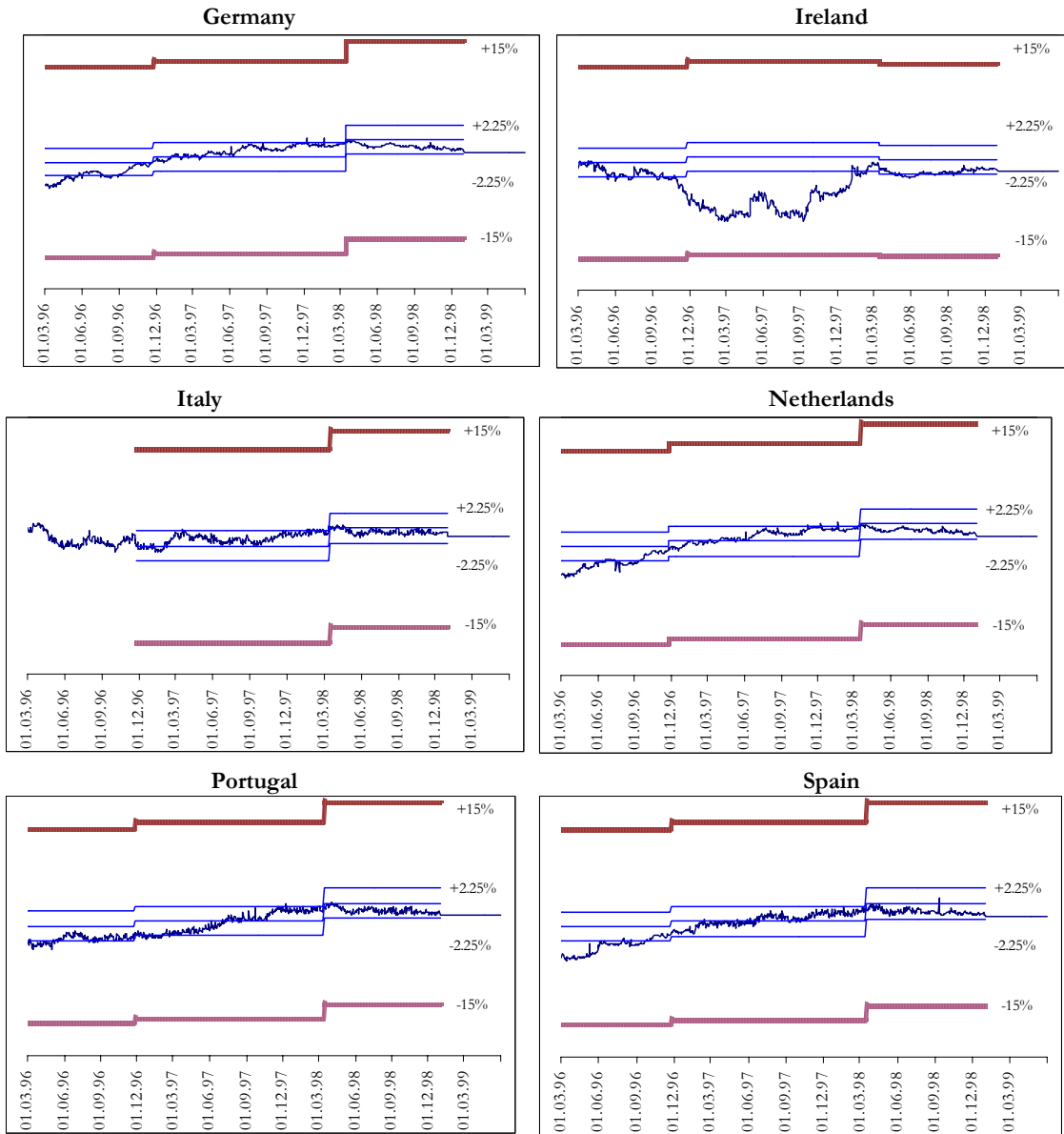
Source: Authors' own calculations.

Note: APPR and DEPR refer to the maximum appreciation and depreciation. DAILY OBS.= daily observations, 10-DAY MA = 10-day moving average. Negative values for appreciation (depreciation) mean that the exchange rate stayed in the other part (weaker/stronger) part of the fluctuation band.

(1) For Finland and Italy, the period starts on October 15, and on November 25, 1996, respective dates of (re-)joining ERM.

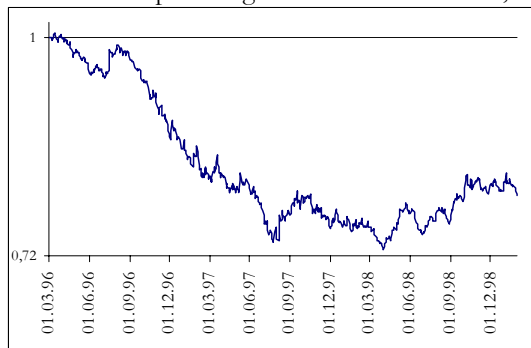
**Figure 4.** The Exchange Rate Mechanism from March 1996 to February 1998, with daily data and against the ECU central parity





Source: Authors' own calculations based on central parities against the ECU obtained from various issues of the Statistical Bulletin of the National Bank of Belgium and exchange rate series against the ECU coming from the Pacific Exchange Rate Service of the University of British Columbia.

Figure 6. The British pound against the German mark, 1996-2003.



Maximum deviations from the median currency's central parity are given in Table 7, which indicates much narrower bands compared with the case of the ECU. Asymmetry seems less pronounced in this case. However, excess deviation on the weaker side of the band is a feature only at the outset of the reference period given that it disappears for all countries considered, i.e. France, Finland, Ireland and Italy when the period October 1996- February 1998 is taken into consideration.

**Table 7.** Maximum deviations from the median currency, 1996-1998 (%).

	<b>APPR</b>	<b>DEPR</b>
<b>Austria</b>	0.31	0.47
<b>Belgium</b>	0.44%	0.44%
<b>Denmark</b>	0.04%	1.41%
<b>France</b>	0.05%	<b>2.35%</b>
<b>Finland</b>	<b>3.74%</b>	<b>4.21%</b>
<b>Germany</b>	0.34%	0.46%
<b>Ireland</b>	<b>10.91%</b>	<b>4.21%</b>
<b>Italy</b>	1.84%	<b>7.82%</b>
<b>Netherlands</b>	0.93	0.30
<b>Portugal</b>	<b>2.76</b>	1.36
<b>Spain</b>	<b>2.61%</b>	0.00%

Source: European Commission (1998), pp. 157

Note: APPR and DEPR refer to the maximum appreciation and depreciation. Italy and Finland are considered as if they had participated in ERM from March 1996.

It appears useful to have a quick look at the pair-wise bilateral exchange rates of ERM participants. The 4.5% bandwidth provided by the use of the median currency is widely reflected in bilateral data.. Furthermore, Table 7. yet clearly indicates deviations from the median currency exceeding 2.25% on either side. On the weaker edge, the French franc and the Irish pound exited the 2.25% mark against respectively 6 and 5 fellow currencies. Note that this happened at the very beginning of the reference period for a very limited period of time. However, following the definition of the reference period used by the European Commission (1998), that is considering Finland and Italy as if they had participated in ERM from March 1996, would lead to the conclusion that both currencies had depreciated by more than 2.25% against the bilateral central parities adopted upon their entry to ERM for a number of consecutive months. This problem pops up for every benchmark currency and reflects the dilemma whether a longer period of excess depreciation in ERM or the violation of the 2-year duration of ERM participation should be viewed as more severe. Apparently, the Commission's approach tends towards to the latter, whereas the EMI considers the former as more severe. In any event, the final judgement includes a great deal of flexibility<sup>19</sup> and is mainly based on the observation that both currencies became very stable towards the end of the reference period.

On the stronger fluctuation margin, the most obvious excess deviation is that of Ireland as the Irish pound appreciated by more than 10 % against the other currencies following the aforementioned ephemeral depreciation of more than 2.25% against the overwhelming majority of currencies at the outset. In addition to that, the Finnish markka, the Portuguese escudo and the Spanish peseta also underwent an appreciation of more than 2.25% vis-à-vis 5 currencies.

<sup>19</sup> Recall that the European Commission (1998) reckons that a non-fulfilment of the  $\pm 2.25\%$  fluctuation bands around the median currency does not automatically imply non-fulfilment of the criterion on exchange rate stability.



**Table 8.** Maximum deviations from the bilateral central parity, 1996-1998 (%).

	Austria	Belgium	France	Finland	Ireland	Italy	Netherlands	Portugal	Spain
Austria	----	0.1	2.2	-0.2	<b>3.9</b>	1.1	0.0	1.1	0.1
Belgium	0.4	----	<b>2.5</b>	-0.2	<b>4.2</b>	1.1	0.1	1.4	0.2
France	0.2	0.3	----	-0.1	1.9	0.6	0.3	0.0	-0.2
Finland	<b>3.0</b>	<b>3.1</b>	<b>3.6</b>	----	-0.3	<b>3.0</b>	<b>2.9</b>	1.4	2.1
Ireland	<b>11.8</b>	<b>11.9</b>	<b>12.5</b>	<b>10.0</b>	----	<b>11.3</b>	<b>11.7</b>	<b>10.3</b>	<b>10.7</b>
Italy	1.8	1.9	<b>2.5</b>	0.4	-2.3	----	1.7	0.7	0.9
Netherlands	0.8	0.5	<b>2.8</b>	-0.2	<b>4.6</b>	1.3	----	1.8	-0.2
Portugal	<b>2.9</b>	<b>2.8</b>	1.7	1.2	<b>3.5</b>	3.0	<b>2.5</b>	----	<b>2.9</b>
Spain	2.0	<b>2.4</b>	<b>3.3</b>	0.2	<b>5.1</b>	1.4	1.7	2.4	----

Source: EMI (1998), pp. 53, 119, 134, 149, 167, 195, 211, 227, 242.

Note: Lines indicate the maximum appreciation of the currency of the given country against the other countries. Automatically, columns show maximum depreciation of the currency of the given country against the other countries. The period considered is March 1996 – February 1998. For Finland and Italy, the reference period starts on October 14, 1996 and on November 25, 1996, respectively, which is in accordance with the practice of the EMI. Figures are obtained using 10-day moving averages. In bold are marked values exceeding 2.25%.

Clearly, one important advantage of employing the median currency is not to use the strongest currency as the benchmark, which would have meant very large deviations of all currencies against the Irish pound from September 1996 onwards. But it seems also quite evident that the median currency is rather a nice technical solution than a real tool, which attempts to show ex post the validity of exchange rate stability. The main reason why the European Commission preferred the median currency rather than the German mark is that taking the German mark as the benchmark would explicitly reckon the stability of the latter. By contrast, the use of the median currency would also allow, at least theoretically, for the German mark to be weak. However, the median currency closely mirrors the German mark. The Austrian, Belgium, Danish and Dutch currencies were very closely clustered with the German mark and therefore bearing in mind the strong appreciation of the Irish pound, and at some point of time that of the Finnish markka, the Portuguese escudo and the Spanish peseta, the median currency was always one of the currency of the cluster, i.e. either the German mark or one of its “proxy” (Table 8B).

**Table 8B.** Composition of the median currency

	Number of days of the reference period (March 1996- February 1998)	
<b>TOTAL</b>	<b>503</b>	
of which the median currency was:		in %
DKK	181	35.98
DEM	90	17.89
NLG	77	15.31
ATS	42	8.35
No median currency	30	5.69
FRF	28	5.57
BEF	27	5.37
PTE	10	1.99
ESP	9	1.79
ITL	8	1.59
IEP	1	0.20
<b>DKK+DEM+NLG+ATS+BEF</b>	<b>417</b>	<b>82.90</b>

Source: Authors' own calculation based on data provided by the European Commission

Note: When the Finnish markka joined ERM, the number of participating currencies increased to 12, which made the calculation of the median currency impossible. This period lasted till the Italian lira re-entered ERM. (14 October 1996 to 22 November 1996, i.e. during 30 days)

It is a well-known fact that ERM was built around the German mark. Although the EMI/ECB does not explicitly call it the benchmark currency, the tension indicators are based on either the German mark (exchange rate deviation) or the cluster around it (interest rate differential). Therefore, it seems appropriate to consider deviations from the bilateral central parity against the

German mark, depicted in Table 9. and Figure 7. When the structure of the ECU and especially the British pound is controlled for, the following features emerge:

1. First, depreciation against the central parity beyond the 2.25% limit is observed only for two countries, namely Ireland and France, over the reference period provided the reference period of the EMI is applied for Finland and Italy. By contrast, if the two-year period is considered for Finland and Italy as done by the European Commission, four countries deviated by more than 2.25% on the weaker side. It is important to note that all these deviations higher than 2.25% on the weaker side of the band occurred at the onset of the reference period. And this distinct feature of ERM has two implications. On one hand, the 2.25% limit on the weaker side is a flexible one. On the other hand, the timing of the deviation is crucial, i.e. it is probable that deviations of the same size that would have taken place at the end of the reference period would have led the European Commission and the EMI/ECB to conclude on the non-fulfilment of the criterion on exchange rate stability.
2. Furthermore, the depreciation of the French franc shrinks below 2.25% when applying the 10-day moving average to the nominal exchange rate series. However, these cases occurred in early 1996 and no excessive depreciation against the central parity happened after November 25, 1996, date of Italy's re-entry.
3. Second, whilst the 2.25% limit on the weaker side is reasonably well respected in every participating country, the exchange rate appreciated up to 10% against the central parity in Finland, Ireland, Italy, Portugal, Spain and Denmark. However, very clear evidence in favour of an asymmetry mainly emerging when the first couple of months of the reference period are ignored.
4. Especially in the case of countries where exchange rate fluctuations around the central parity were extremely low, such as in Austria, Belgium, the Netherlands and recently in Denmark, the question to be raised is how so narrow fluctuation band could be achieved in the context of fully liberalised capital movements. Besides high credibility, in some cases, central bank interventions might have constituted another ingredient of the delicious main course.

**Table 9.** maximum deviations from the official bilateral central parity against the German mark in ERM, 1996-1999

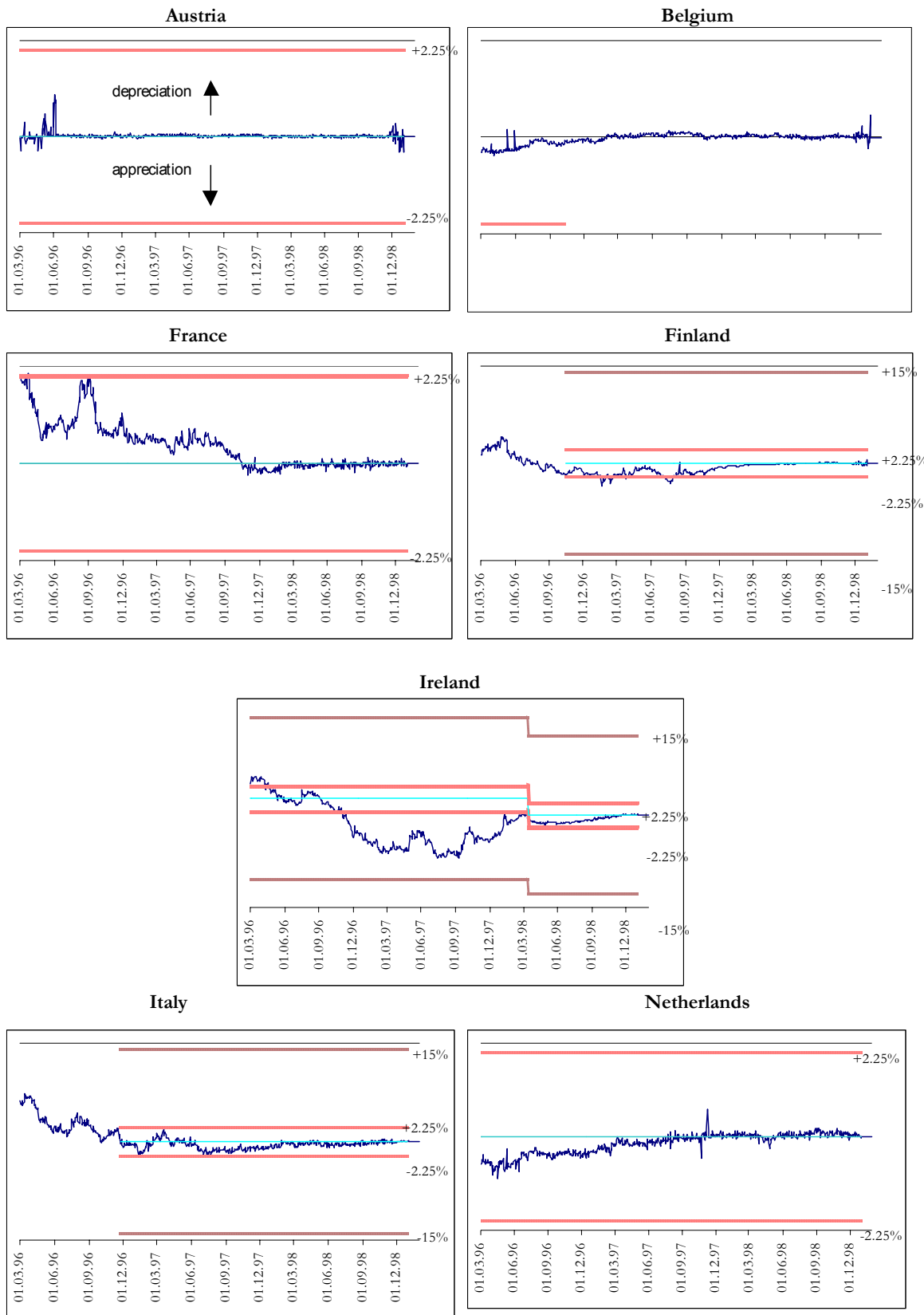
	APPR	DEPR	APPR	DEPR	APPR	DEPR	APPR	DEPR
	01/03/1996 – 28/02/1998				25/11/1996 - 28/02/1998 <sup>1</sup>			
	DAILY OBS.		10-DAY MA		DAILY OBS.		10-DAY MA	
Austria	0.382%	1.079%	0.081%	0.432%	0.054%	0.091%	0.022%	0.049%
Belgium	0.473%	0.192%	0.387%	0.116%	0.182%	0.158%	0.120%	0.116%
Denmark	0.044%	1.892%	0.042%	1.234%	0.044%	1.892%	0.042%	1.234%
France	0.294%	<b>2.321%</b>	0.224%	2.131%	0.294%	1.298%	0.224%	1.040%
Finland	<b>3.668%*</b>	<b>4.421%*</b>	<b>2.978%*</b>	<b>4.033%*</b>	<b>3.668%</b>	0.164%	<b>2.978%</b>	-0.189%
Ireland	<b>10.943%</b>	<b>4.073%</b>	<b>10.581%</b>	<b>3.869%</b>	<b>10.943%</b>	-2.726%	<b>10.581%</b>	-2.986%
Italy	<b>2.274%*</b>	<b>7.756%*</b>	1.846%*	<b>7.250%*</b>	<b>2.274%</b>	2.005%	1.846%	1.258%
Netherlands	<b>1.121%</b>	<b>0.743%</b>	<b>0.864%</b>	<b>0.131%</b>	<b>0.562%</b>	<b>0.743%</b>	<b>0.474%</b>	<b>0.131%</b>
Portugal	<b>3.024%</b>	1.640%	<b>2.744%</b>	1.045%	<b>3.024%</b>	0.684%	<b>2.744%</b>	0.060%
Spain	<b>2.734%</b>	0.415%	<b>2.330%</b>	0.079%	<b>2.370%</b>	0.122%	1.849%	-0.225%

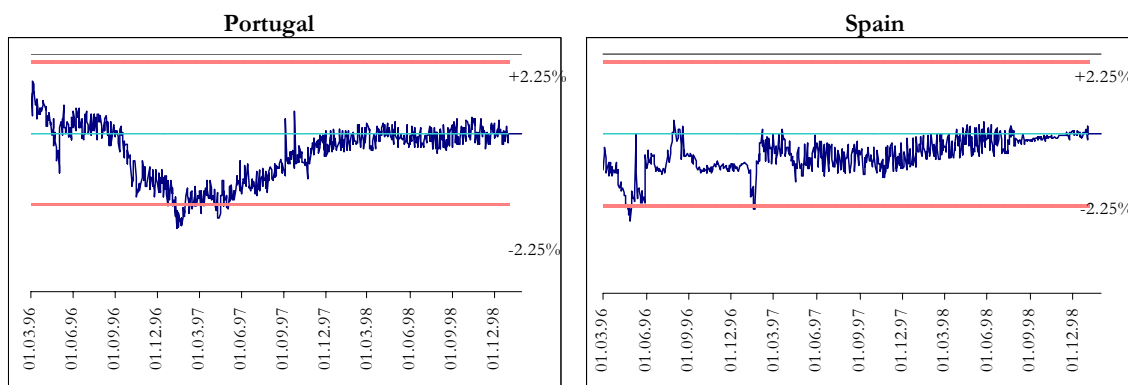
Source: Authors' own calculation

Note: APPR and DEPR refer to the maximum appreciation and depreciation. Negative values mean that the market exchange rate remained in the other side of the band. With bold are marked values higher than 2.25% and blue indicates very low fluctuation in either side around the central parity.

\*In accordance with the methodology applied by the European Commission.

**Figure 7.** The Exchange Rate Mechanism from March 1996 to February 1998, against the German mark bilateral central parity





*ERM-II and the case of Greece and Denmark*

Greece became a member of ERM on March 16, 1998, just shortly after the end of the reference period used in the European Commission’s and the EMI’s convergence reports in 1998. Continuity was secured within ERM-II until Greece adopted the euro on January 1, 2001. As mentioned earlier, the criterion on exchange rate stability was assessed for two distinct periods, that is for March 16, 1998 to December 31, 1998 and January 1, 1999 to March 31, 1999. Greece is a strong case for the asymmetry of the criterion given that, as shown in Tables 10 and 11 and Figure 8, both in ERM and ERM-II, the market rate remained constantly on the stronger side of the fluctuation band with the exchange rate coming as close as 5% to the stronger edge. The reason why only the deviation against the ECU is shown, and not that against the median currency and the German mark is that all three deviations appear strikingly similar. However, one major reason why the Greek currency remained constantly on the stronger side is arguably the fact that Greece entered ERM with an upfront devaluation of 12.3% of the central parity. This huge devaluation, promptly followed by the market rate opened the avenue for future appreciation and re-valuation of the central parity.

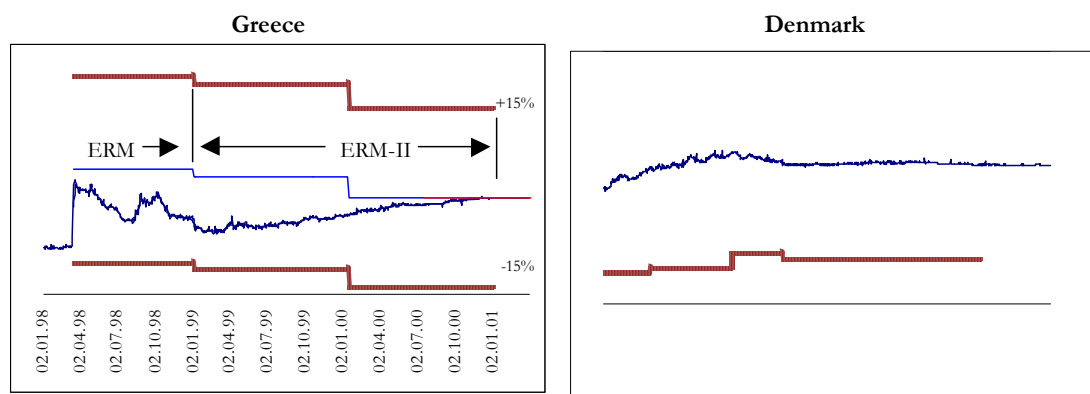
**Table 10.** Maximum deviation from the ECU central parity, Greece, March, 1998-December 1998

	APPR	DEPR	APPR	DEPR
	17/03/1998 – 31/12/1998			
	DAILY OBS.		10-DAY MA	
Greece <sup>2</sup>	8.557%	-1.681%	8.428%	-2.479%

Source: Authors’ own calculations.

Note: APPR and DEPR refer to the maximum appreciation and depreciation. Negative values mean that the market exchange rate remained in the other side of the band. DAILY OBS.= daily observations, 10-DAY MA = 10-day moving average. Negative values mean for appreciation (depreciation) that the exchange rate stayed in the other part (weaker/stronger) part of the fluctuation band.

Denmark’s experience in ERM-II is somewhat different from that of Greece. First, Denmark is still in ERM-II. Second, the Danish currency has been extremely close to the central parity of the EURO since the very beginning with a de facto fluctuation band of smaller than  $\pm 1\%$ . Indeed, such a narrow fluctuation band is only possible to maintain with the help of foreign exchange interventions of the central bank.

**Figure 8.** Greece and Denmark in ERM and ERM-II, 1996-2000/2003.**Table 11.** Greece and Denmark in ERM-II: Minimum and maximum deviations against the EURO central parity, 1999-2000/2003

	APPR	DEPR	APPR	DEPR
	DAILY OBS.		10-DAY MA	
<b>Denmark</b>	0.799%	0.593%	0.474%	0.119%
<b>Greece</b>	10.378%	-4.440%	10.011%	-4.546%

Note: Greece: 01/01/1999-31/12/2000, Denmark: 10/01/1999-14/04/2003

#### Nominal exchange rate stability in selected CEE acceding countries

In the case of the acceding countries, the issue to be addressed is to what extent nominal exchange rate stability is to be achieved during the run-up to euro adoption. While only participating in ERM-II, countries make use of the entirety of the fluctuation band, i.e.  $\pm 15\%$ . However, as exposed earlier, and according to the equal treatment principle, these countries will presumably have to respect, the asymmetric fluctuation band of  $+2.25\%$  and up to  $-15\%$  when it comes to assessing the criterion on exchange rate stability.

We think that it is possible to extract some meaningful information from past data as the Czech Republic, Poland, Slovakia have been having a managed or free float over the last couple of years and the Hungarian forint has been also allowed to fluctuate in a large band of  $\pm 15\%$ . It might be reasonable to assume that nominal fluctuations in a free float and in a unilaterally announced pegged regime with large fluctuation margins such as in Hungary have been larger than it would have been in a more credible ERM-II-type regime. Therefore, past nominal exchange rate volatility is likely to give us an upper bound estimate regarding future volatility provided no major negative shocks occur.

Turning to Hungary, it is very clear that the pegged regime against the euro with  $\pm 15\%$  fluctuation bands has been explicitly designed to respect the Maastricht criterion on exchange rate stability. And over the past two years, the forint did not actually adventure into the weaker part of the fluctuation band. However, when constructing a hypothetical ERM-II, we should address the issue of the central parity in line with the equilibrium real exchange rate.

The equilibrium nominal exchange rate in 2002 could be used as the central parity with which to enter the  $\pm 15\%$  fluctuation band. As shown in Table 4., the consensus, even though fragile, emerging from the literature suggests that the Hungarian currency was fairly valued until mid-2001. Because of the nominal appreciation of 10% coupled with substantial inflation differentials, the real exchange rate appreciated by more than 20% over the last two years that by no means

could be considered as an equilibrium appreciation. Given the lack of estimates, 4 scenarios are considered in which the currency is overvalued in real terms by 5%, 10%, 15% and 20%, respectively. The average nominal exchange rates for the periods July 2001 to April 16 2003 (245.35 HUF/EUR) and January 1, 2002 to April 16, 2002 (243.02 HUF/EUR) are taken as the “baseline parity” and are employed and adjusted correspondingly to the benchmark misalignments.

In a next step, these different estimates serve as the central parity of a hypothetical ERM-II with a fluctuation band of  $\pm 15\%$ . The aim of this exercise is to examine to what extent and with which parities could the asymmetric criterion on exchange rate stability (+2.25%, -15%) be fulfilled. What we can see from Figure 9. is that a parity close to or weaker compared with the currently prevailing central parity, i.e. considering an overvaluation 10-15% of the market rate, would have ensured the fulfilment of the criterion on nominal exchange rate stability. This is also shown in Table 12.

Figure 9. Hungary

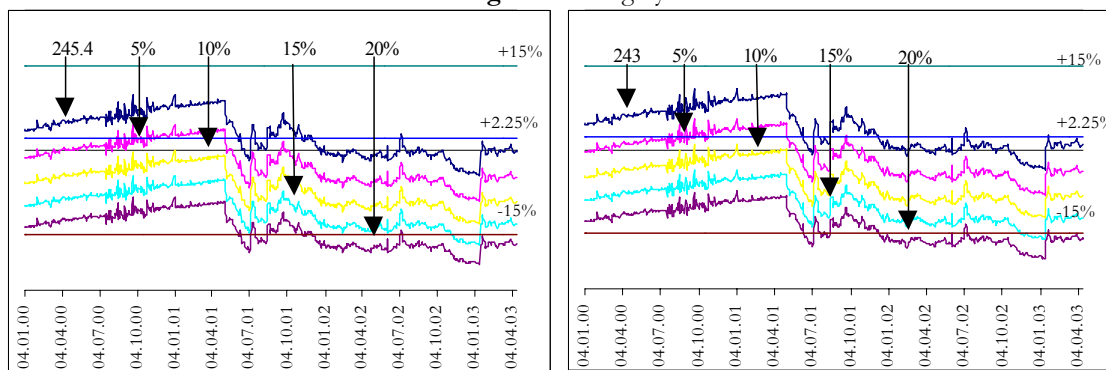


Table 12. Central parities for a hypothetical ERM-II

Czech Republic				
Market forex (CZK/EUR)	Hypothetical central parities over average market rates by			
	5%	10%	15%	20%
34.04*	35.74	37.45	39.15	40.85
Hungary				
Market forex (HUF/EUR)	Hypothetical central parities over average market rates by			
	5%	10%	15%	20%
245.35*	257.62	269.89	282.15	294.42
243.02*	255.17	267.32	279.47	291.624
Hypothetical central parities re-valued (-)/devalued (+) to the official central parity (275.65 HUF/EUR)				
	-7.0%	-2.1%	2.3%	6.4%
	-8.0%	-3.1%	1.4%	5.5%
Poland				
Market forex (PLZ/EUR)	Hypothetical central parities over average market rates by			
	5%	10%	15%	20%
3.67*	3.85	4.03	4.21	4.40
Slovakia				
Market forex (SKK/EUR)	Hypothetical central parities over average market rates by			
	5%	10%	15%	20%
43.27*	45.43	47.59	49.76	51.92

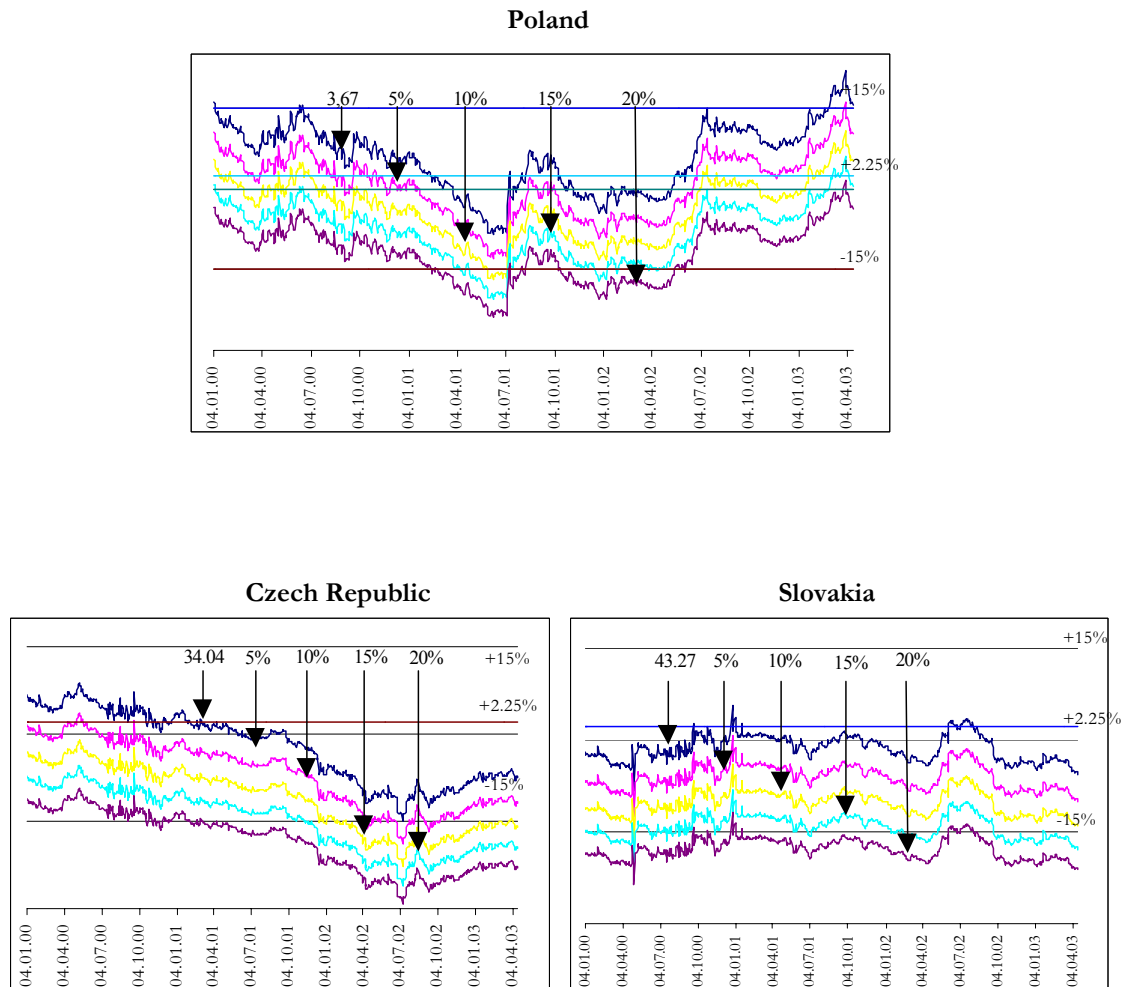
Note: 245.35 is the average nominal exchange rate for the period July 2001 – April 2003. 243,02 refers to the period of January 2002 – April 2003.

\* baseline parity that is defined as a recent period average. For more detail, see the text.

As regards Poland, the existing equilibrium exchange rate estimates against the effective basket and the euro suggest the Polish zloty was fairly valued in 2000 and 2002 whereas it appears overvalued by 2-15% in 2001. These results are corroborated in Figure 10. as the nominal

exchange rate reached its strong peak against the euro in 2001. With this as a background, the average nominal exchange rate (3.67 PLN/EUR) is calculated for 2001 and is considered as the baseline parity. Similarly to Hungary, 4 scenarios are considered in regard to the extent of the overvaluation (5,10,15 and 20%). In any case the zloty's fluctuation exceeded the implicit 17,5% band required by the exchange rate stability criterion. Nevertheless, bearing in mind that defending the currency against an appreciation is easier compared with that when it is about to leave the band on the weaker edge, with a central parity devalued by 10-20% to the average 2001-rate keeping the Polish currency within the targeted band might have been achieved. However, this hinges on the effectiveness of the interventions that should have been taken place both on the stronger limit of the band and therefore this finding is rather suggestive than conclusive.

**Figure 10.** The hypothetical ERM-II



As far as the Czech Republic and Slovakia go, the baseline parity is the market average for 2001. Similarly to Hungary and Poland, 4 overvaluation cases are taken into account – given that some estimation suggest overvaluation of these countries' currencies. Figure 9. shows that the Slovak koruna has been moving in a relatively stable corridor over the last 3 years or so. Consequently, based on the scenarios of an overvaluation of 5-10%, the nominal exchange rate remained in the 17,5% band throughout the period under consideration. By contrast, the picture for the Czech Republic reveals a much larger band in which the Czech koruna has been fluctuating over the last couple of years mainly because of the sharp nominal appreciation occurred in 2002. And this is

the reason why, whatever the central parity might be, the nominal exchange rate was not compatible with the bandwidth given by the Maastricht criterion on exchange rate stability.

## Conclusion

With the CEE countries under study heading towards EU accession, new problems emerge as regards their future entry to ERM-II and, finally, the adoption of the euro. One of the most important issues is related to how to manage smooth transition from their actual exchange rate regimes towards the adoption of the euro. In this context, several questions arise. One of them is related to the determination of the optimal central parity with which acceding countries could join ERM-II and the euro zone afterwards. It is all the more crucial as the chosen parity could impact on the behaviour of the nominal exchange rate within the fluctuation bands, let alone other economically devastating effects of a seriously misaligned exchange rate. Combining past exchange rate fluctuations with different scenarios for the optimal central parity, we have shown possible difficulties in terms of the criterion on exchange rate stability, especially in the case of the Czech Republic and Poland. However, it should be stressed that these findings are rather suggestive than conclusive.

The evaluation of exchange rate movements within ERM and ERM-II combined with what can be learnt from the convergence reports has shown the asymmetric nature of the exchange rate criterion. Albeit official fluctuation bands were as large as  $\pm 15\%$  around the central parity during the reference period, exchange rate stability was considered de facto in a  $+2.25\%$  (depreciation) and a  $-15\%$  (appreciation) band against the German mark and subsequently the euro. And in accordance with the *equal treatment principle* also confirmed by the informal ECOFIN meeting in April 2003 in Athens, this is likely to be applied to the acceding countries as well when assessing the criterion on exchange rate stability. Nevertheless, prior to the examination/reference period, participating countries are free to exploit the entirety of the fluctuation bands, i.e.  $\pm 15\%$ .

In the context of fully mobile capital flows, the defensible nature of the asymmetric band, especially on the weaker side seems to raise some doubts in times of financial turmoil.

Nevertheless, it appears that the breach of the asymmetric band was not taken automatically as the violation of the criterion by the European Commission. But the timing of the deviation on the weaker side of the band seems important, i.e. the excess deviation should occur at the very beginning of the reference period. As to the EMI and the ECB, they did not acknowledge explicitly the asymmetry and only put forth the notion of “close to parity”. They apply a 10-day moving average to the nominal exchange rate series in order to assess exchange rate stability, and this renders the task of keeping the currency within the band easier. In particular, the implicit  $+2.25\%$  limit on the weaker side leaves some room for manoeuvre and some flexibility since the spot exchange rate can leave the  $2.25\%$  limit for some day provided the 10-day average is still below the target  $2.25\%$  mark. And this is exactly what might be conducive in avoiding speculative attacks by offering no hard but only a soft and thus somewhat intangible limit on the weaker side of the fluctuation band. But it is also clear that this might be insufficient to fend off a major speculative attack.



## References:

- Alonso-Gamo, Patricia, Fabrizio, Stefania, Kramarenko, Vitali, Wang, Qing (2002): Lithuania: History and Future of the Currency Board Arrangement, *IMF Working Paper* No. 127, August, Washington D.C.
- Avallone, Nathalie and Lahrèche-Révil, Amina (1999): Le taux de change réel d'équilibre dans les pays en transition: le cas de la Hongrie, *TEAM, University of Paris I - Sorbonne, Cahiers blancs* 1999/91, <http://mse.univ-paris1.fr/MSEPageCahierSBla.htm>
- Begg, David, Halpern, László and Charles Wyplosz (1999): *Monetary and Exchange Rate Policies, EMU and Central and Eastern Europe*, Forum Report on the Economic Policy Initiative No. 5, CEPR: London, EastWest Institute: New York, Prague
- Coudert, Virginie (1999): Comment définir un taux de change d'équilibre pour les pays émergents ?, *Economie Internationale*, No. 77, 1<sup>er</sup> Trimester, pp. 45-65.
- Coudert, Virginie and Couharde, Cécile (2002): Exchange Rate Regimes and Sustainable Parities for CEECs in the Run-up to EMU Membership, *CEPII Working Paper No.15*, [www.cepii.fr](http://www.cepii.fr)
- Csajbók, Attila and Kovács, Mihály András (2002): FEER enough? National Bank of Hungary, *mimeo*
- Égert, Balázs, Drine, Imed, Lommatzsch, Kirsten and Rault, Christophe (2003): The Balassa-Samuelson effect in Central and Eastern Europe: Myth or Reality?, *William Davidson Institute Working Paper* No. 483, July, [www.wdi.bus.umich.edu](http://www.wdi.bus.umich.edu), and forthcoming in *Journal of Comparative Economics*, No. 3.
- Égert, Balázs (2002): Investigating the Balassa-Samuelson Hypothesis in the Transition: Do We Understand What We See? A Panel Study, *Economics of Transition*, 10(2), July, pp. 1-36., and *Bank of Finland BOFIT Discussion Paper* No 6/2002, [www.bofi.fi/bofit](http://www.bofi.fi/bofit)
- Égert, Balázs (2003a): Assessing equilibrium real exchange rates in accession countries: Can we have DEER with BEER without FEER?, forthcoming in *Focus on Transition*, Oesterreichische Nationalbank, No. 2., Autumn.
- Égert, Balázs (2003b): Nominal and real convergence in Estonia: The Balassa-Samuelson (dis)connection. Tradable goods, regulated prices and other culprits, *Bank of Estonia Working Paper No. 4.*, [www.bankofestonia.info](http://www.bankofestonia.info) and *William Davidson Institute Working Paper* No. 556
- Égert, Balázs – Lahrèche-Révil, Amina (2003): Estimating the fundamental equilibrium exchange rate of Central and Eastern European countries: The Challenge of EMU Enlargement, *CEPII Working Paper* No. 5 and forthcoming in *Weltwirtschaftliches Archiv*, No. 4.
- European Central Bank (2000): Convergence Report 2000, Frankfurt
- European Central Bank (2002): Convergence Report 2002, Frankfurt
- European Commission (1998): Convergence Report 1998, Brussels
- European Commission (2000): Convergence Report 2000, Brussels
- European Commission (2002): European Economy, Enlargement Papers No. 14, November
- European Commission (2003): European Economy, Enlargement Papers No. 15, April
- European Monetary Institute (1998): Convergence Report, Frankfurt, March
- Filipozzi, Fabio (2000): Equilibrium exchange rate of the Estonian kroon, its dynamics and its impacts of deviations, *Bank of Estonia Working Paper* No. 3
- Frait, Jan and Komárek, Luboš (1999): Dlouhodobý rovnovážný reálný měnový kurz koruny a jeho determinanty, Czech National Bank, *Monetary Policy Division Working Paper* no. 9.
- Golinelli, Roberto and Orsi, Renzo (2001): Modelling Inflation in EU Accession Countries: The Case of the Czech Republic, Hungary and Poland, paper presented at the conference "East European Transition and EU Enlargement: A Quantitative Approach", 15-21 June 2001, Gdansk, [www.spbo.unibo.it/pais/golinelli](http://www.spbo.unibo.it/pais/golinelli)
- Halpern, László and Wyplosz, Charles (1997): Equilibrium Exchange Rates in Transition Countries, *IMF Staff Papers*, Vol. 44, No. 4, pp. 430-461., Washington D.C.
- IMF (1998): Republic of Slovakia: Recent Economic Developments, *IMF Staff Country Report* No. 98/60, Washington D.C.

- Kim, Byung-Yeon and Korhonen, Iikka (2002): Equilibrium exchange rates in transition countries: Evidence from dynamic heterogeneous panel models, *BOFIT Discussion Papers No. 15*, [www.bof.fi/bofit](http://www.bof.fi/bofit)
- Kovács, Mihály András (2001): Az egyensúlyi reálárfolyam Magyarországon, *MNB Háttér tanulmány* 2001/3, november, Budapest
- Kovács, Mihály András (ed.) (2002): On the estimated size of the Balassa-Samuelson effect in five Central and Eastern European countries, *National Bank of Hungary Working Paper* No. 5, July
- Krajnyák, Kornélia and Zettelmeyer, Jeromin (1998): Competitiveness in Transition Economies: What Scope for Real
- Lommatzsch, Kirsten and Tober, Silke (2002): What is behind the real appreciation of the accession countries' currencies? An investigation of the PPI based real exchange rate, presented at "Exchange rate strategies during the EU Enlargement, Budapest", 27-30 November, [www.icegec.hu](http://www.icegec.hu)
- MacDonald, Ronald and Ricci, Luca (2001) : PPP and the Balassa Samuelson Effect: The Role of the Distribution Sector, *IMF Working Paper* No. 38, March, Washington D.C.
- Mihaljek, Dubravko (2002): The Balassa-Samuelson effect in central Europe: a disaggregated analysis, ICEGEC Working Paper No. 11, [www.icegec.hu](http://www.icegec.hu)
- Randveer, Martti and Rell, Mari (2002): The Relationship between competitiveness and real exchange rate in Estonia, *Bank of Estonia Working Paper*, [www.ee/epbe](http://www.ee/epbe)
- Rawdanowicz, Łukasz W. (2002): Poland's accession to EMU – choosing the exchange rate parity, presented at "Exchange rate strategies during the EU Enlargement, Budapest", 27-30 November, [www.icegec.hu](http://www.icegec.hu)
- Rother, C. Philipp (2000): The Impact of Productivity Differentials on Inflation and the Real Exchange Rate: An Estimation of the Balassa-Samuelson Effect in Slovenia, *IMF Country Report*, Republic of Slovenia: Selected Issues, 00/56, April, pp. 26-39
- Rubaszek, Michal (2003): A model of balance of payments equilibrium exchange rate: Application to the zloty, National Bank of Poland, *mimeo*
- Sinn, Hans-Werner and Reutter, Michael (2001): The Minimum Inflation Rate for Euroland, *NBER Working Paper* No. 8085, January, Cambridge, Massachusetts
- Šmídková, Katerina (1998): Estimating the FEER for the Czech Economy, Czech National Bank, *Institute of Economy Working Paper Series* No. 87, Prague

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