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Exchange Rate Regimes and the Nominal Convergence

Keywords: **EMU, CEECs, exchange rate regimes, currency crises, Maastricht criteria, ERM-2.**

Contents

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Abstract

The paper examines theoretical literature, recent EMU accession examples, and current CEECs performance in search of the optimal currency regime for meeting the Maastricht criteria. Currency board arrangements seems to provide the fastest convergence. For other regimes, the markets may have theoretical and historical reasons to believe in the government's temptation to devalue on the ERM-2 entry. The government should announce the final date, and, possibly indicate the final exchange rate for the regime switch to avoid excessive currency and yield volatility. It should also underscore the central bank's and EU authorities importance (even if non-existent) in the parity setting process to avoid excessive domestic debt inflation premium ahead of the accession. Recent experience shows that it will be easy to get rid of the remaining influence of cross rates on CEECs exchange rates.

Introduction

Central European countries joining the EU will have to decide at some stage when, and how to join the EMU. The desirability of the early EMU entry is exposed in Rostowski (2003). The question "how" includes, the wanted path to the fulfilment of the Maastricht criteria, the strategy towards fixing the exchange rate, and the actual final €/local currency exchange rate.

This paper considers the second of the above three issues. Apart from the assessment of various exchange rate regimes in the lead-in to the ERM-2, it also presents theoretical considerations on the regime switch from the original, pre-EU accession to the currency band of ERM-2, and to the king of all pegs, the currency union.

The article starts with showing stylised facts on CEEC performance in nominal convergence, and indicates some patterns in how exchange rate regimes may influence it. Third chapter describes current EMU member states' experience with accession to common currency. Chapter four shows theoretical arguments behind the choice of different variants of the ERM-2 on the ease of meeting the Maastricht criteria. Finally, the fifth part illustrates how the choice of pre-ERM-2 regime can influence both the nominal convergence, and the process of adopting the ERM-2.

CEECs stylised facts

Figures 1-4 show where individual countries stand in terms of Maastricht criteria. Also included are the averages for the three main currency regime groups: float/managed float, currency bands, and pegs/currency boards. The charts show the snapshot as of December 2002. CPI, and interest rate criteria are relatively straightforward to calculate[1]. CPI is the average annual inflation for 2002. Interest rates are 10-year local currency yields as of December 2002. If such instruments were not available, the closest alternative was used. Budget deficit and public debt was much more tricky. Here, official statistics often differ from the ESA95 accounting. Also, sometimes, ESA95 interpretation of certain kinds of spending is not available. For example, as of December 2003 it was not clear if explicit subsidies to the reformed private part of the obligatory pension system should be deemed as a public spending or not (Poland and Hungary would lower their budget deficits by over 1% of GDP if they were not). Still, we used official data on both budget deficit and public debt. Finally, one could argue that the exchange rate stability criterion was not fulfilled by any of the accession countries, as neither was in the ERM-2 two years before the end of 2002. However, to allow for some comparison of exchange rate stability, we measured it as a maximum deviation from "parity" in the two years between January 2001 and December 2002. It is easy to calculate for

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[1] Yet the CPI benchmark value is not. It appears that two or three new EU entrants could have the lowest inflation of all EU countries by 2003. We only included current EU members in the calculations.

countries like Hungary or Estonia, which had explicit parity in the period. For others, we used average local currency/€ exchange rate as the parity proxy[2].

Figure 1. Floating regime Maastricht performance as of December 2002

Czech Republic	Poland
Slovakia	
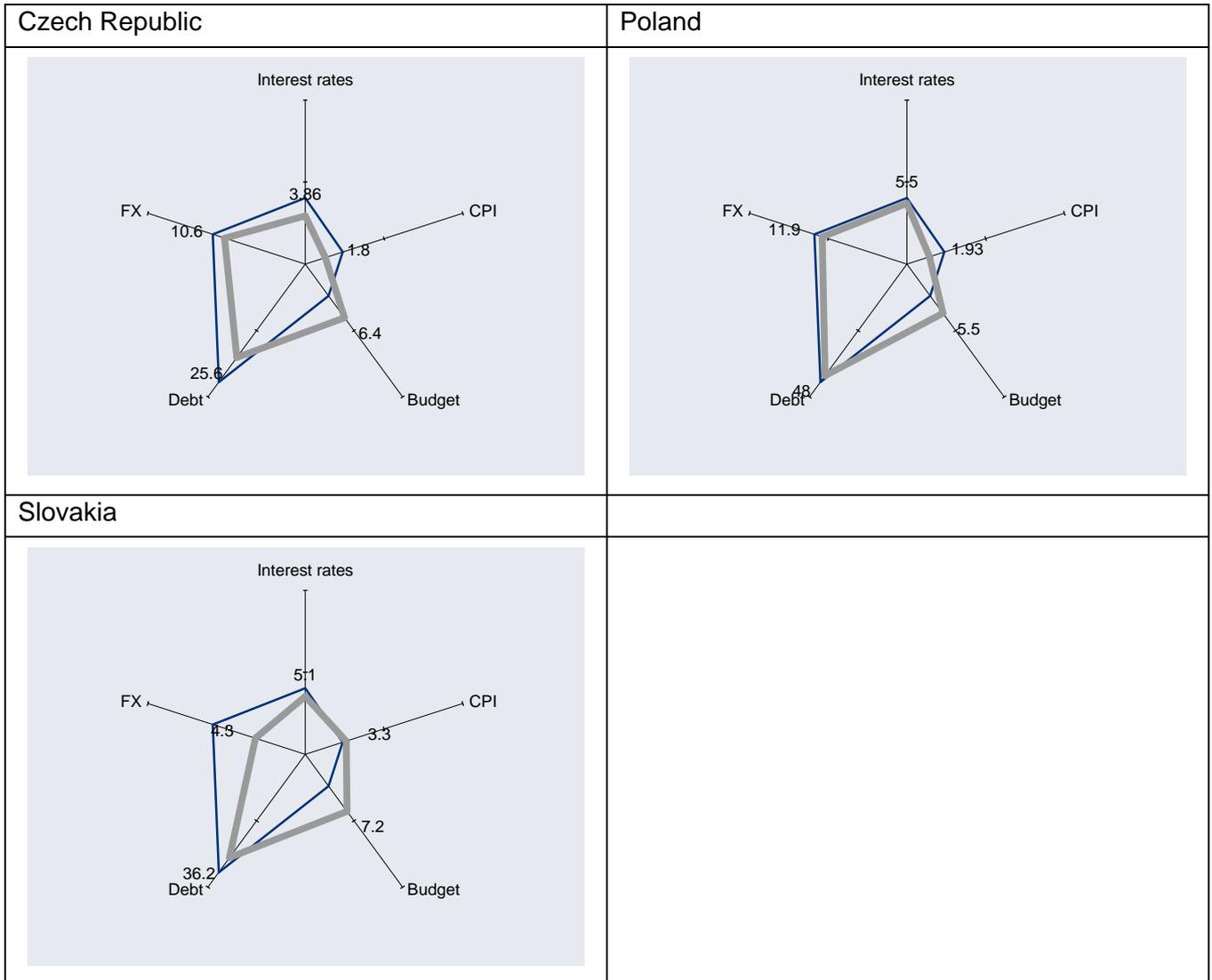
Note : Log scale, thin line is EMU benchmark

Figure 2. Fixed exchange rate and currency board regime Maastricht performance as of December 2002
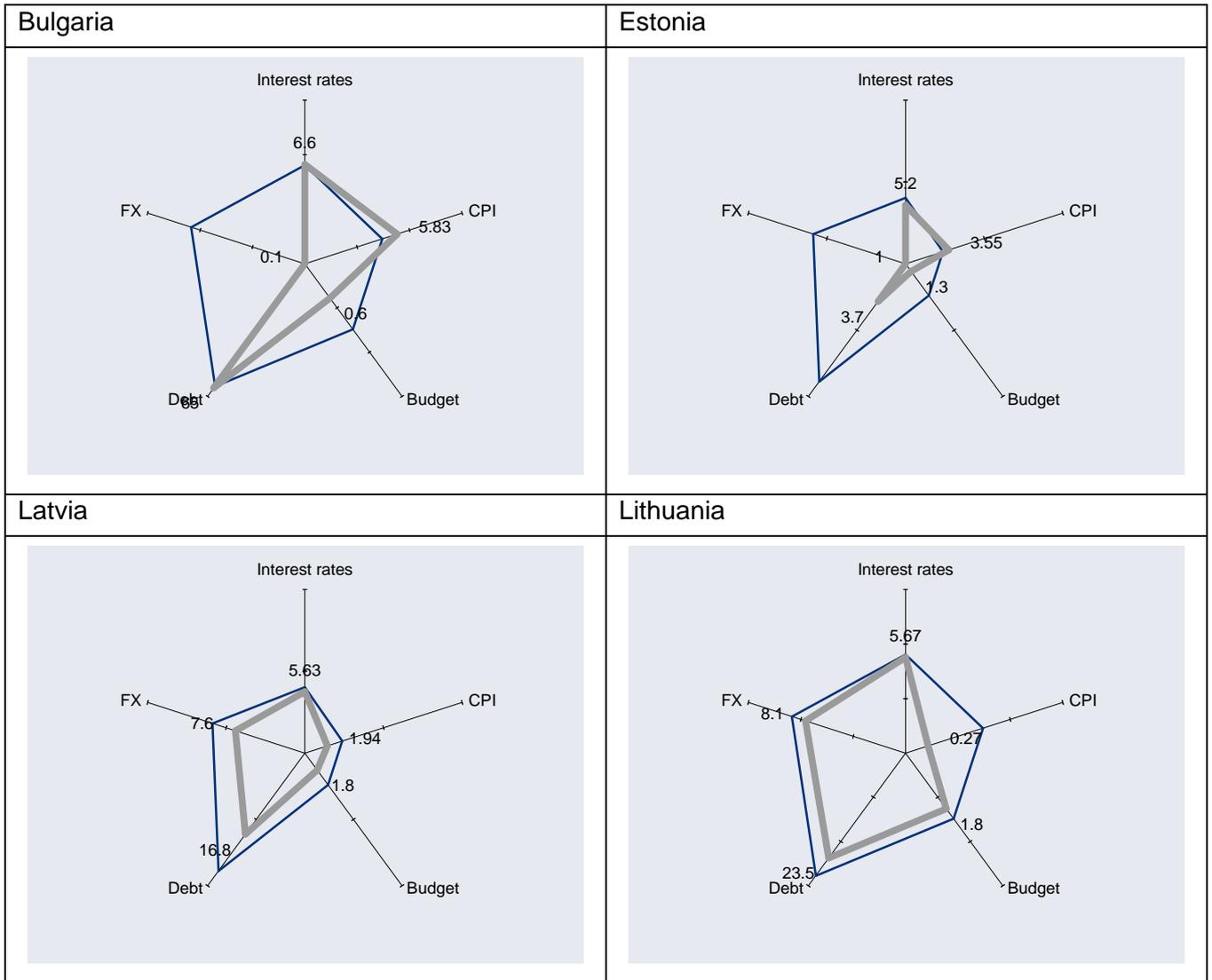
Source: ING, EcoWin, IFS

Figure 3. Exchange rate bands and heavily managed floats: Maastricht performance as of December 2002

Hungary	Romania
Slovenia	
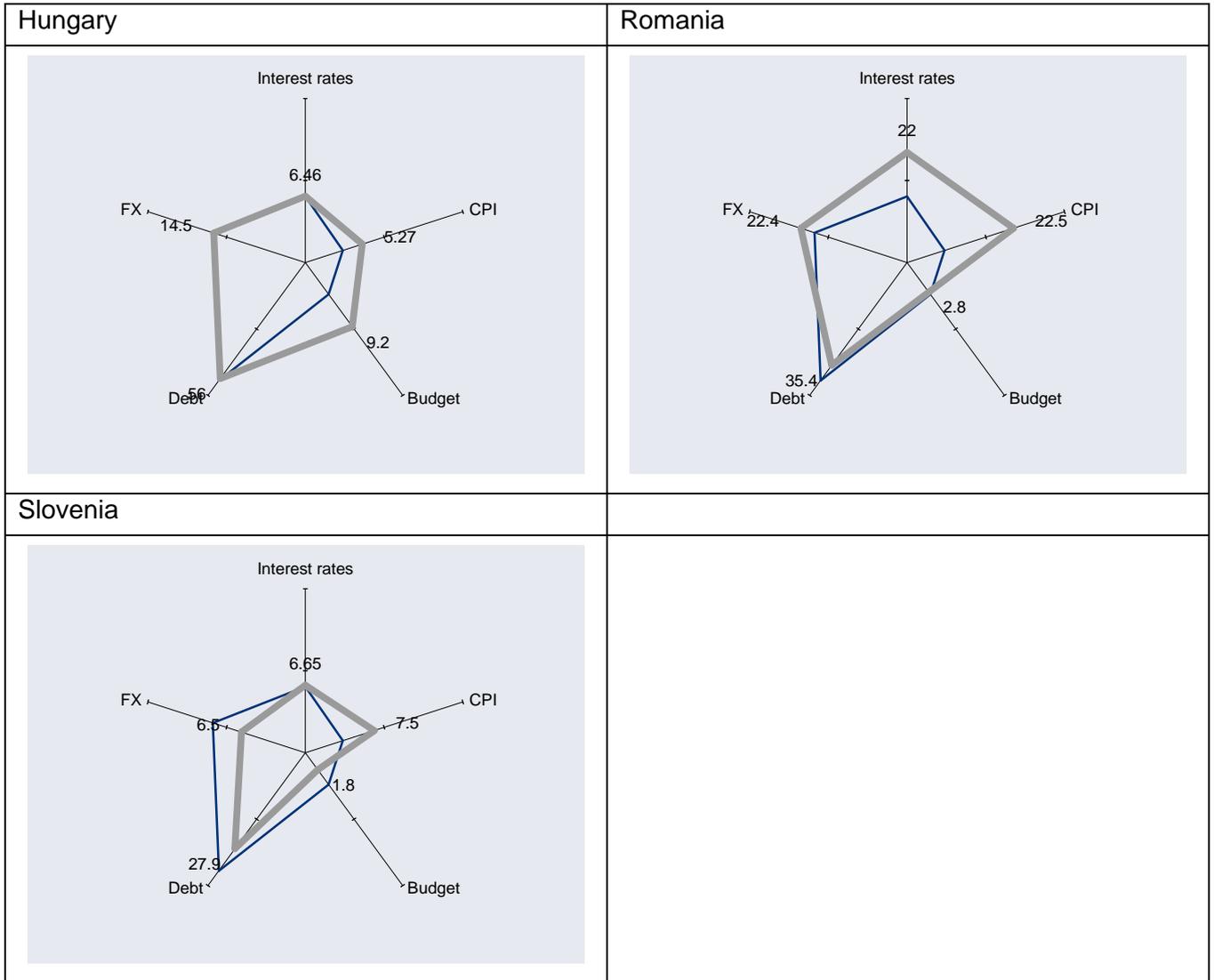
Figure 4. Average Maastricht performance for counties grouped by exchange rate regime

Excluding Romania and Bulgaria	Including Romania and Bulgaria
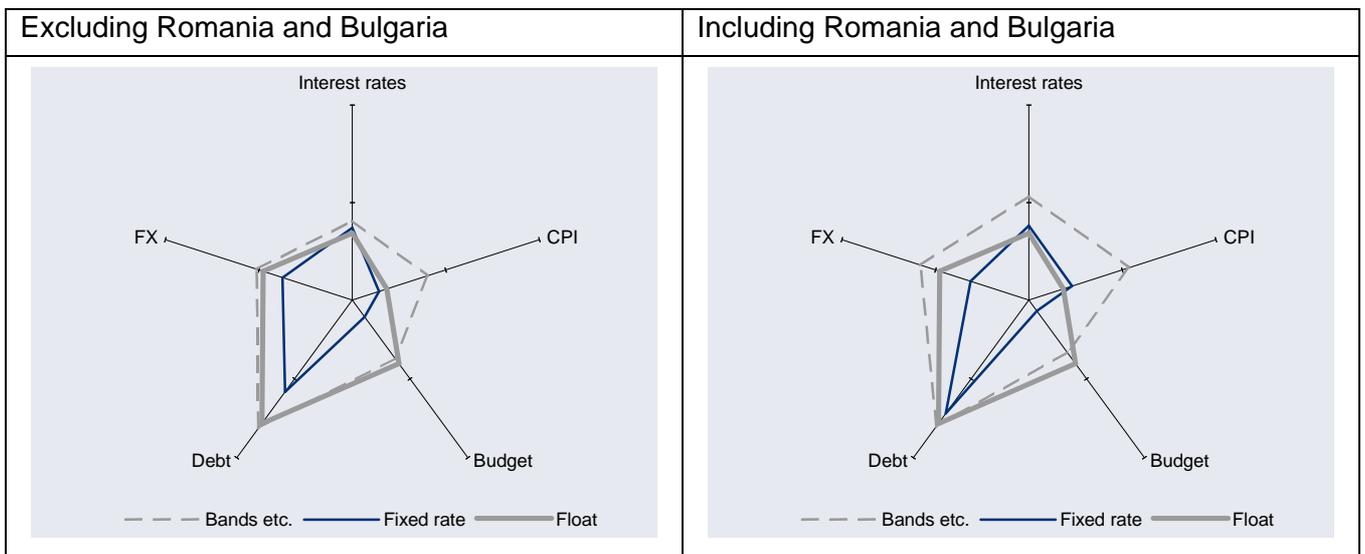
While each country is different, striking similarities can still be observed. All floating exchange rate countries suffer from budget problems. In fact, it is almost the only criterion not fulfilled for the floaters (Slovakia's CPI was just marginally above the benchmark in December 2002). Peggers were the best overall, by far, with Estonia and Bulgaria slightly above the mark with inflation, but overall well within the benchmark on all five criteria. Finally, Hungary, Slovenia and Romania, all with heavily managed, but not pegged exchange rates fared worst, having problems with both CPI and the budget.

Romania's performance, in terms of inflation, foreign exchange stability and interest rates remain the worst of all, Hungary had the biggest budget deficit, and Bulgaria highest public debt.

EMU members

In 1998 European Commission recommended adoption of the single currency by Belgium, Germany, Spain, France, Ireland, Italy, Luxembourg, the Netherlands, Austria, Portugal and Finland on 1 January 1999. Named countries according to the Convergence Report 1998, achieved a high degree of sustainable convergence. Greece joined the EMU two years later.

Can the short history of the EMU help us to understand the process of the new enlargement, which will include the Central and Eastern European economies? Bearing in mind fundamental differences in development, integration, and access to capital between the CEECs and the core EU Members of the 1990s, we will continue with comparisons mainly with so called Club Med countries Greece, Spain, Portugal and Italy, the first three joining the EU only in the 80's and the last one facing nominal convergence problems. These countries are also much more comparable with some of current candidates with respect to the level of real convergence with EU member states.

Prior to looking at the similarities first the differences must be stressed. One is the period between the EU accession, ERM-2, and EMU entry. This is an important factor for two reasons. First, nominal and real convergence had more time to work, than for the fast-track EMU applicants among the CEECs. This concerned not only overall economic integration, and adjustment of relative and absolute prices to the EU levels (which did start prior to the EU accession for the CEECs), but also adjustment of interest rates, and establishment of the (almost final) exchange rate parity. Club Med countries (except for Greece) spend considerable time in the ERM/EMS system which could have increased their currencies stability by the end of the ERM-2 period, despite initial speculative attacks and pegs realignments in mid 90's.

Inflation

Convergence Report 1998 envisages the reference value for the inflation criterion at 2.7 for the YoY HICP index in January 1998. The reference value was established on the basis of the average of the three best performing countries (Austria, France and Ireland) plus 1.5pp. All EU member states but Greece met the criterion. As shown in Figure 5 below, in case of Club Med countries, inflation in fact reached its bottom at the time of the convergence assessment, to reverse to higher

levels afterwards. The explanations of the latter inflation pickup are being ascribed to Harrod-Balassa- Samuelson (HBS) effect as well as price level adjustments. The latter implies higher inflation in the countries with relatively lower price levels as a catching up effect. Named here should also be consumption growth in the aftermath of rapid interest rates falls, especially the long term ones.

By 2002-2003, the situation of majority of the ten candidate countries looks to be better than of the Club Med countries three years ahead of the EMU entry. Most of the CEECs already dealt with high inflation problems either through inflation targeting, or using rigid currency pegs.

Figure 5. Inflation in the Club Med countries and the EU
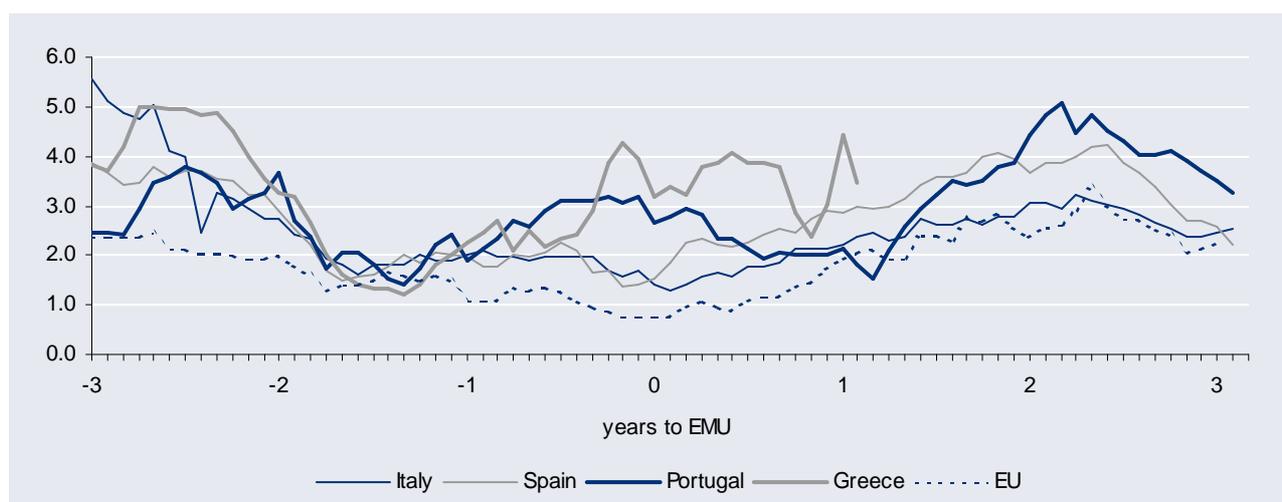
Source: Datastream

Exchange rates stability

Fixed exchange rate regimes under the EMS (European Monetary System) were a part of stabilization policy and succeeded in bringing down the inflation rate, notwithstanding the EMS collapse in 1992. Importantly all participating countries had long experience with rigid exchange rate regimes. Following various exchange rate targeting regimes of the last 15 years of 20th century, the parity setting might have been seen as less problematic than it may be for the new entrants.

The post EMS ERM-2 system was not really tested for the Club-Med countries, and the exchange rates slowly converged to the final parity. The process was much faster for Portugal, than it was for Spain, even though the path of the final bond spread compression proceeded almost exactly together. In both cases, the currency was trading stronger than the final parity.

One exception has been Greece, the experience of which may remind the situation of the floating CEECs the most. Before entering ERM-2 Greece's authorities decided to devalue its currency by some 13%, which, as one could expect, was followed by appreciating pressure. The act of parity devaluation serves as a proof of the appropriateness of Froot and Rogoff's (1991) idea of strong government's temptation to inflate away its fiscal problems at the entry to the ERM-2. As during the next two years the drachma was at the strong part of 30% band, the parity was renegotiated (see Figure 6).

Speculative attacks, troubling the EMS system in early 1990s, do not seem be very dangerous for the new ERM-2 members. The size and limited deepness of the candidate countries' financial markets put them in a favourable position. The threat of speculative attacks can be efficiently eliminated if ECB will be prepared to intensively facilitate the adherence to the assumed target band for given currency. It can prove to be the case especially for small open economies of Estonia and Lithuania with currency board agreements in operation for sufficiently long time to prove the appropriateness of the parity.

Figure 6. Exchange rate for Greece
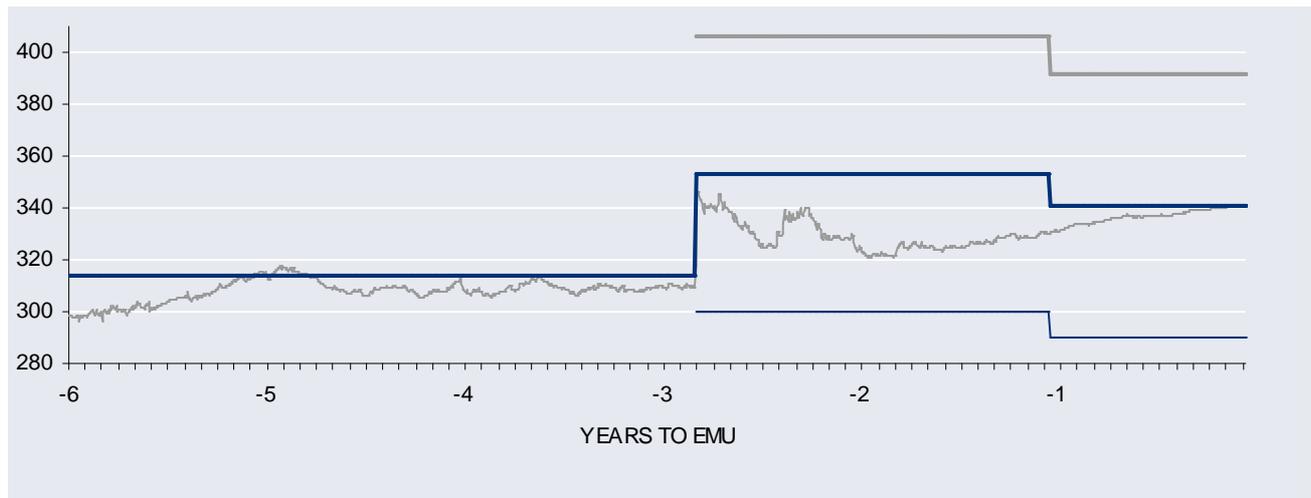
Source: DataStream

It is worth reminding that Finland and Italy spent less time in ERM-2 (16-19 months) when the qualifying decision was made.

Interest rates

The experience of the current EMU members shows that the long term interest criterion is met as soon as market starts believing in accession. Robertson (2003) writes:

> It was felt that the markets would never trade long-bonds of Italy, Spain or Portugal close to the levels of Germany, so even if they cut their public debt ratios like Belgium did, they could still be excluded. But the markets decided otherwise. They recognised that the technocrats had had to fudge one criterion [public debt], so the EU may fudge them all. In which case, it made sense to bet that all countries with high debt ratios would join the Euro. The markets were right.

The responsiveness of the bond yields to the EMU entry expectations may cause problems too. Long term yields may as well quickly rise if only expected EMU entry date is put at doubt. Recent experience with Polish and Hungarian spreads widening by 200bp in June-November 2003 in face of unfavourable fiscal data, and effective abandoning of the 2007 EMU entry plans serve as a painful warning.

Figure 7. Ten-year bonds spreads over Bunds (in percentage points)
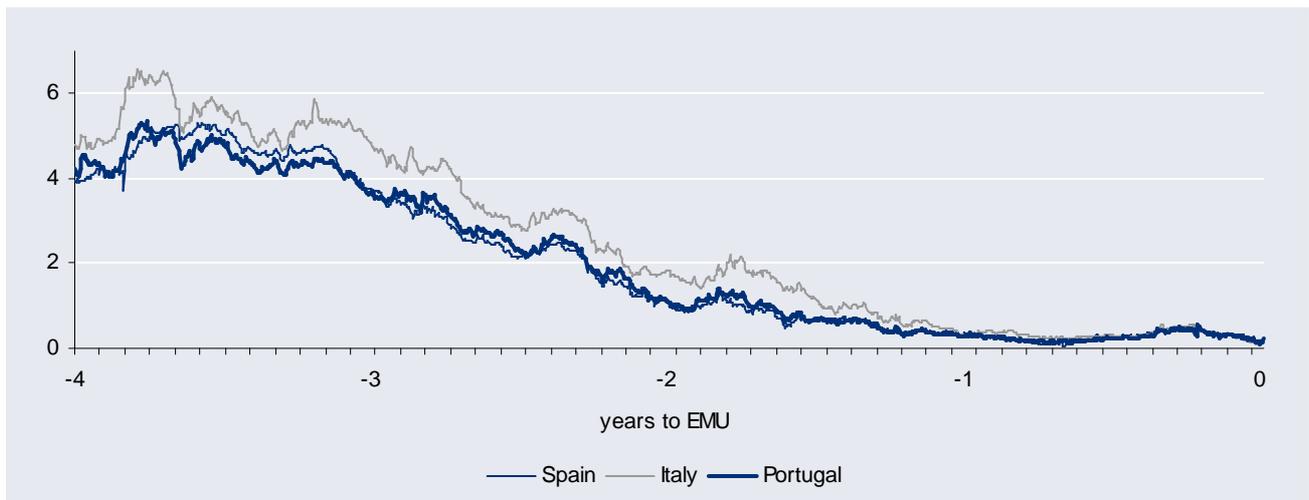
Source: DataStream

Public debt and budget deficit

The application of the criteria to the current EMU states introduces much uncertainty for the newcomers. It showed that as much as it is up to the political will of the government to meet the fiscal criterion on budget deficit it is also, to a big extent, a political will of the European authorities to assess the country as adhering to fiscal scrutiny. As shown in the graphs below in case of many current EMU countries explicate quantitative criteria were violated at the time of convergence assessment. However, except for Greece all of them were considered as not running excessive deficits.

Figure 8. Budget balance and public debt in EU 15

Government debt % of GDP
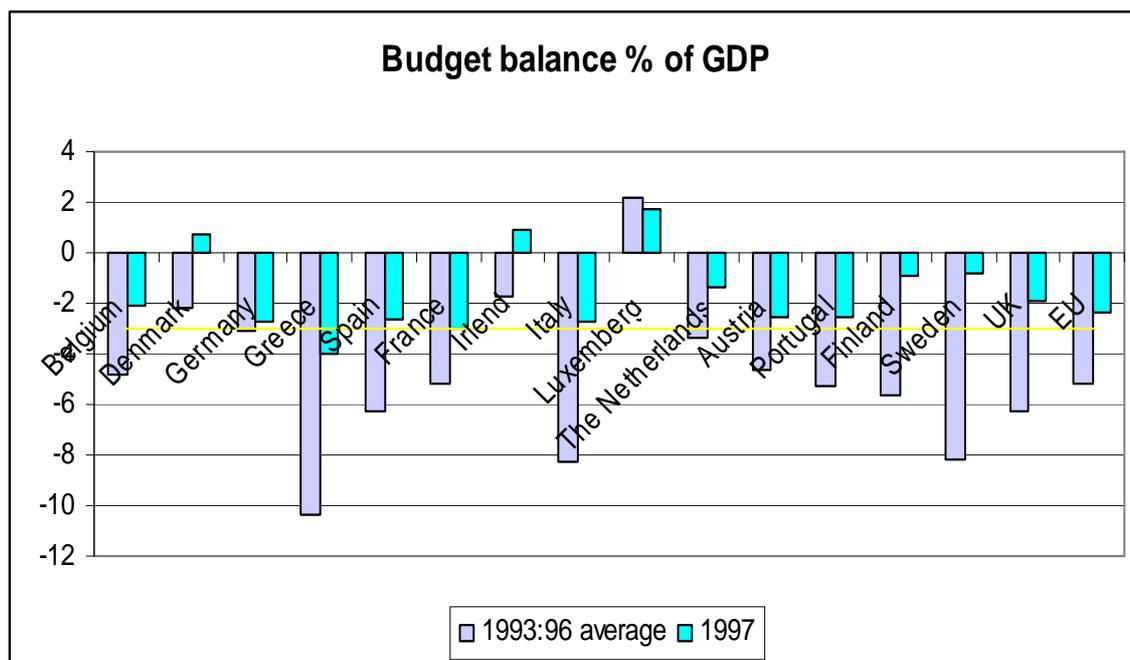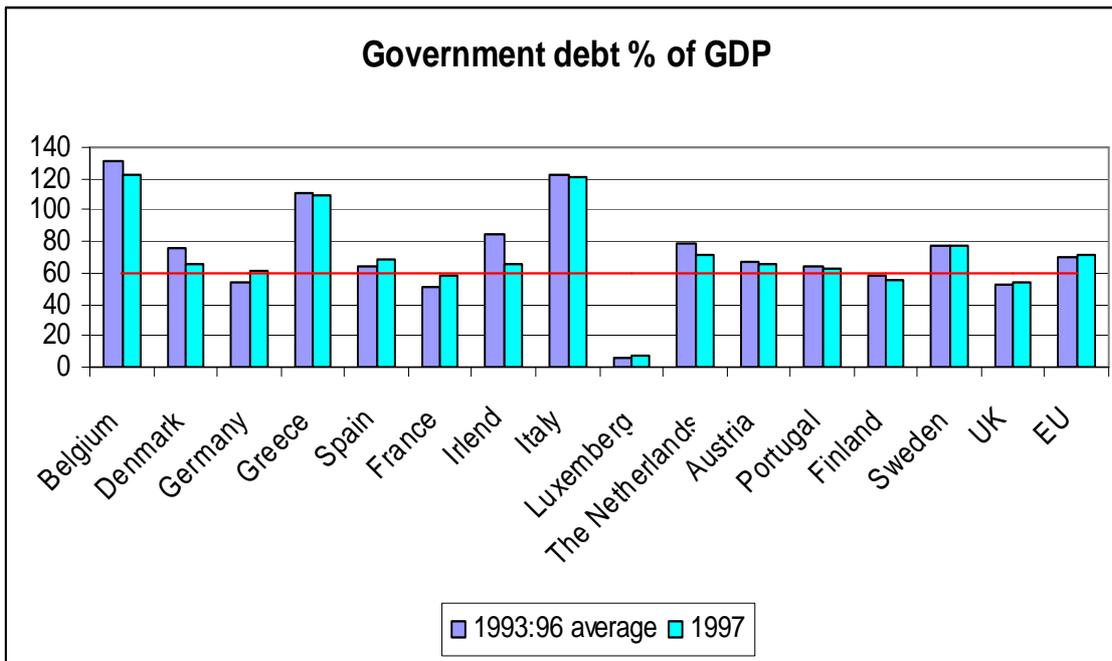
Source: EU Commission, Convergence report 1998

The formulation of the criteria on fiscal policy leaves much room for discretionary judgments about such issues as whether the deficit has declined "substantially and continuously," what level is "close" to three per cent, and what constitutes an "exceptional and temporary" excess.[3]

1998 Convergence Report provides some general conclusions on the adherence to such ambiguous criteria. First it defines successful budgetary retrenchments as those that reduce the deficit mainly by cutting current primary expenditure, while non-lasting adjustments tend to rely more on tax increases or cuts in capital spending. The composition of the adjustments that took place in most EMU member states involved important reductions in primary current government expenditure. This indicated that they were generally soundly based and therefore likely to be maintained in the future. Second, the excessive deficit procedure examines actual and planned deficits. Third, the procedure accounts whether the government deficit exceeds government investment expenditure.

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3 Compliance with budgetary discipline is examined by the Commission on the basis of the following two criteria:
(a) whether the ratio of the planned or actual government deficit to gross domestic product exceeds a reference value [specified in the protocol as 3 %], unless:
— either the ratio has declined substantially and continuously and reached a level that comes close to the reference value;
— or, alternatively, the excess of the reference value is only exceptional and temporary and the ratio remains close to the reference value;
(b) whether the ratio of government debt to gross domestic product exceeds a reference value [specified in the protocol as 60 %], unless the ratio is sufficiently diminishing and approaching the reference value at a satisfactory pace'

Options for the ERM-2 and Maastricht criteria

Inflation

In theory, in the latter stage of transition, floating exchange rate makes fulfilling the inflation criterion easier. Fast growing CEECs are prone to the HBS effect. Higher productivity growth in tradables puts wage and relative price pressure on non-tradables where productivity does not grow as fast. Assuming price elasticity of demand for tradables and non-tradables to be the same, higher productivity growth in tradables could strengthen the local currency, stimulating tradables' price falls, which could offset the non-tradable price hikes.

Second channel, working in a similar fashion is the decreasing cost of capital, likely to be observed in the intermediate and latter stages of transition. Assuming the tradable sector is more capital intensive, falls in capital costs will increase the marginal return on labour more in that sector. This, in turn implies growth of wages and prices in the non-tradable sector, and consequently real exchange rate will also have to appreciate (Buiter and Grafe, 2002).

The third, mentioned in Rostowski (2003), is the demand channel – higher growth of demand for non-tradables in fast growing economies put wage and price pressure on that sector, and on real exchanger rate to appreciate (provided productivity in non-tradables does not grow too fast).

The impact of all the effects equalising relative prices in the CEECs and the old Member States is 3.5-4% per year, according to Pelkmanns et al. (2000), and this, potentially is the CPI gain of having the exchange rate able to appreciate in nominal terms. From this point of view, the classic ERM-2, with ±15% band is the best, provided the initial market rate is close to the parity rate. For a two-year period between setting the parity and evaluating the Maastricht criteria, 15% should be more than enough, while the strict, "Solbes version", with a ±2.25% band may not leave enough room to fulfil the criterion. Keeping in mind the possibility to revalue the parity, without violating the exchange rate stability criterion, any non-currency board version of the ERM-2 is likely to be better in tackling the problem of growth-related real exchange rate appreciation. The cost of altering the currency board rate makes such changes less likely.

An issue related to timing of the CPI benefits is worth mentioning. Because the benchmark of expected EMU parity remains in the centre of the ERM-2 bands (Ireland and Greece did have their exchange rate revalue, but other catching-up countries did not), rational economic agents should set their prices and wage demands to take into account at least the final year depreciation of the local currency (if it does stay below the ERM-2 parity). This could limit, or completely eliminate the beneficial effect of semi-floating exchange rate on inflation. Drachma and escudo started to depreciate back towards the parity some one year and 8 months ahead of the EMU entry, while in Spain, the process started three years ahead of EMU. If "convergence check" comes some 8 months ahead of the EMU, and exchange rate pass-through is significant for periods less than 1 year, inflation effect of the ±15% ERM-2 could actually work in the opposite direction than the one described in the previous paragraphs.

Also on the negative side, non-fixed exchange rate regimes may be promoting short-term volatility in case of global (or regional) market disturbances. Habib (2002), and Csermely and Vonnak (2002) show that world emerging markets' contagion does significantly influence exchange rates of Poland and Czech Republic (and Hungary, with a currency band regime). This means that major world market shock could prompt depreciation leading to subsequent problems with CPI criterion. In the final stages of the EU accession the argument already becomes less valid for emerging market problems, but more so for *converging markets.* As the date of the likely EMU entry approaches, Hungarian forint will be less prone to Latin American or Russian crises, but more susceptible to, say, fiscal disturbances in Czech Republic. This is exactly what happened by the end of 2003, when concerns over Polish fiscal policy prompted another wave of Hungarian forint selling, and another bout of bond spread disconvergence. Such events thus could, theoretically cause some inflation-related problems, unjustified by local policies or fundamentals.

Major capital outflow, however, is unlikely to cause CPI problems for either exchange rate regime, **provided it fails to topple the exchange rate arrangement**. First, for fixed exchange rate regimes and narrow band, the effect of capital outflow can be contractionary. The negative CPI impact for wide bands will only appear under extremely precise timing. It would have to happen about one year ahead of the Maastricht check, and even then, the inflationary impact could quickly be reversed if the belief in the parity returns (as it should).

Another exchange rate regime-related inflation issue comes to play if exchange rate band becomes binding. Capital inflow (appearing e.g. as a result of insufficient savings in economies expecting faster growth in the post EMU years) being absorbed by the central bank with higher base money can become a problem either for inflation, or for the budget, through costs of sterilisation. Provided the parity is not set much weaker than the market rate, the problem is going to be much more pronounced for the ±2.25% ERM variant, or for the currency boards. The ±15% band is able to emulate the float much easier in that respect[4].

Disentangling the impact of the ERM-2 arrangement on inflation is thus quite difficult. The standard, relative price adjustment argument for the floating exchange rates cannot be easily translated into the superiority of ±15% ERM-2 band over the narrower arrangements, currency boards, and unilateral euroisation. This it due to the fact that nominal appreciation can be expected to be reversed in the final stages of EMU accession. One problem which wide band is likely to have on a smaller scale, is the monetary expansion appearing when the exchange rate hits the bottom of the band. Here, pegs, currency boards, and narrow bands are inferior, provided the initial parity of the ±15% band is not set too weak relative to the market rate.

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[4] Delgado and Dumas (1992) show that for trended fundamentals (like trend money demand increase related to relative price adjustments) widening the currency band widens the bounds on fundamentals (the intervention limits) by three orders of magnitude. For mean reverting fundamentals the result holds only if the band is centered on the mean reversion point.

Interest rates

The success in fulfilling the interest rate criterion depends largely on the credibility of the EMU accession, i.e., on the ability (or willingness) to fulfil all other criteria. If the markets believe the country will be considered fit to join the EMU, they will make sure the bond yields adjust roughly to the EMU levels. Public debt levels, bond supply, fiscal stance; the effect of all these on the bunds – other EMU member bonds' spreads is very limited (within 30bp, judging by current EMU members' bond spreads vs bunds). What is more, while inflation inertia is a significant factor to bear in mind while preparing to join the EMU, bond yields can be extremely quick to adjust – almost jumping into the new, low yield equilibrium at the moment of the ERM-2 entry. This makes the choice of both the pre-ERM-2 exchange rate regime and of the actual variant of the ERM-2 regime somewhat irrelevant for the ability to fulfil the interest rate criterion at the time of the EMU entry decision.

The theory suggests that the floating exchange rate allows nominal appreciation (through HBS effect, savings-investment imbalance created by expectations of higher growth, and stimulated by opening and deepening of the CEECs financial markets). This would suggest, through uncovered interest parity (UIP), lower bond yields than in the more rigid exchange rate set-up, where real appreciation translates into higher inflation pressures. But as shown above, inflation and bond yields in the ±15% ERM-2 band may not benefit from the nominal appreciation pressures. That is because these are likely to be reversed back towards parity in the final 1-2 years of ERM-2 anyway. A 5% nominal depreciation expected in one year would then translate into 120bp higher spread on 5-year bonds. Because there is a non-zero probability that parity would be revalued, the negative impact of the final year depreciation expectations could be somewhat limited.

What is more, the wide-band ERM-2, different from the float from the mean expected value point of view, can be almost equivalent to the float on the risk front. This could be additionally boosting the bond spreads. Short-term currency premium, bound to be higher than in the case of a credible peg or currency board, may have an important effect on especially the short-end of the yield curve.

Should thus the currency board ERM-2 result in unconditionally lower yields than a narrow-band ERM-2, which, in turn, has lower yields than the ±15% arrangement? Not necessarily – capital inflow-related inflation problems in the more rigid versions of ERM-2 could make the whole process of accession doubtful, putting additional spread burden on such countries. The overall impact of the exchange rate regime on bond yields is therefore unclear, and depends on where the market exchange rate is, relative to the likely parity (for both versions of the band-ERM-2, especially the +/- 15% variant), and on the CPI performance in the year prior to the Maastricht criterion check.

Exchange rate stability and the EMU parity

There are three issues related to exchange rate in the run-up to the EMU. First, is the exchange rate stability criterion itself, and the impact of the choice of exchange rate regime on the ability to fulfil it. Second is the desired exchange rate. The third is the switch from the ERM-2 regime towards the final fixing.

Several points need stressing before we engage in comparison of exchange rate regime. First, the ERM-2 is not symmetrical. Revaluations of the band are permissible, meaning, that successful speculative attack *against* the € does not have to breach the criterion. Such attacks could succeed if the defence of the stronger edge of the band were to significantly threaten the CPI criterion.

Secondly, ERM-2 is not an exchange rate regime of a single country. It is a matter of common concern – the CEECs will not be alone in both setting of the parity, and in the defence of the bands.

It is easier to start with the evaluation of the exchange rate stability criterion for the pegged regimes. The literature on the subject is vast, starting with Krugman (1979) classic, later simplified and extended by Flood and Garber (1984) and surveyed in Agenor et al. (1992). So called *first generation* crisis models base on exhaustible resource literature originating in Hotelling (1931). The first generation crisis occurs as a result of an unreformable macroeconomic policy incompatible with fixed exchange rate. In Krugman's example the policy is the one of excessive fiscal deficits, monetised away. Incompatible macroeconomic policy causes gradual depletion of reserves. Fixed exchange regime can last only until foreign exchange reserves reach certain critical level. The model predicts, however, that the end comes earlier than that. Rationally thinking speculators attack and buy all remaining stock of reserves as soon as the *shadow price* – the price which would prevail without central bank fixing the exchange rate reaches the official rate. The regime turns smoothly to a float (exchange rate does not jump, only the level of reserves).

Krugman and Rotemberg (1992) provide a model of imperfectly credible exchange rate bands. It joins two strands of the exchange rate literature – target zones models and currency crisis models[5]. The model goes as follows (where s is log exchange rate, m is log money supply, d is domestic credit and r is foreign exchange reserves):

$s = m + v + \gamma E\left(\dfrac{\partial s}{\partial t}\right)$, where a change in *v* is a shock to the money demand following random walk with a drift:

$\partial v = \mu \partial t + \sigma \partial z$

Log money supply $m = \ln(d + r)$

Under the free floating regime, expected depreciation is equal to the drift in the money demand. Holding money supply constant, the general solution of the model, is[6]:

$s = m + v + \gamma \mu + A e^{\alpha_1 v} + B e^{\alpha_2 v}$, where A and B are free parameters, and

$$\alpha_1 = \frac{-\gamma\mu + \sqrt{\gamma^2 \mu^2 + 2\gamma\sigma^2}}{\gamma\sigma^2} > 0$$

$$\alpha_2 = \frac{-\gamma\mu - \sqrt{\gamma^2 \mu^2 + 2\gamma\sigma^2}}{\gamma\sigma^2} < 0$$

With the exchange rate fully floating, money supply is truly constant and cannot be expected to change, thus the expectations component is simply equal to the expected change in *v* – the drift. In

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[5] Other models of this kind can be found in, e.g. Bertola and Svensson (1993). Flood and Garber (1992) extend the model to allow for discrete interventions.

[6] See e.g. Garber and Svensson (1994) for the derivation of the solution, which uses Ito's lemma

such case both A and B are equal to zero (if we exclude the possibility of speculative bubbles). If, however, the central bank is expected to spend the reserves, defending some target exchange rate, then rational speculators expect money supply to fall as soon as exchange rate reaches the edge of the band. The size of A and B depends on the amount that the government is willing to spend defending the edges, the size of the reserves in the case of A, and the amount of reserves the central bank will buy in case of an "attack" on the stronger side of the band (which determines B). It is relatively straightforward to determine the value of A, knowing the level of the foreign exchange reserves, and that no predictable discreet jumps in exchange rate can happen.

After the speculative attack, when reserves r are exhausted, money supply m falls to d, and the regime is floating, thus the shadow exchange rate is:

$\check{s} = d + v + \gamma\mu$

For small level of reserves (reserve/domestic credit ratio $\dfrac{R}{D} < e^{\frac{1}{\alpha_1}} - 1$), the attack occurs, as before, when shadow exchange rate is equal to the regime exchange rate. This is the only rate that eliminates the possibility of capital gains for the speculators. The attack happens when v reaches the critical level v' (for which $\check{s}$ is equal to the targeted level of the exchange rate s_{max}):

$d + v' + \gamma\mu = m + v' + \gamma\mu + Ae^{\alpha_1 v}$

A, which ensures the no-exchange rate jump is equal to: $-e^{(s_{max} - d - \gamma\mu)\alpha_2} r$.

**Figure 9. Target exchange rate with limited reserves**
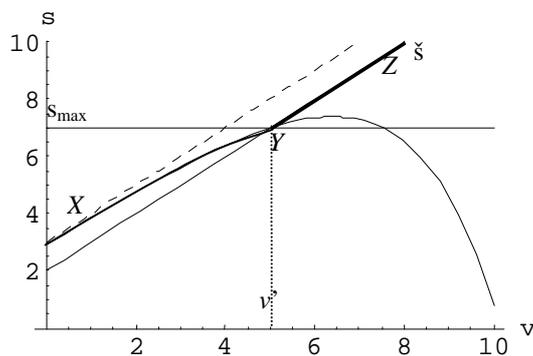
Figure 9 shows exchange-rate-money demand shock loci for the free-float (dashed line) and zero-reserves (post attack) float (solid straight line, parallel to the free float). The latter can be considered a shadow exchange rate. It becomes the actual exchange rate at a point where it crosses the curved line (target regime). While it is obvious that the zero-reserves curve shows stronger exchange rate than the (no-attack) free-float (total money supply is lower by the amount of reserves, so the exchange rate must be relatively stronger after the attack), the fact that the target regime curve is below the free float is more exciting. It shows that despite inability of the government to defend the target rate (as soon as v reaches v' the regime collapses and the exchange rate starts to follow the zero-reserves curve), the exchange rate is supported by the sheer willingness of the authorities to spend reserves defending the target (Krugman's honeymoon effect). The kinked thick curve (X-Y-Z) is the actual exchange rate-money demand schedule.

The situation looks different when reserves to domestic credit ratio is bigger. For large reserves, the regime curve reaches its maximum to the left of the post-attack locus. The speculative attack does not then take place at all, and the target can be kept with very small interventions. Situation like that is shown in Figure 10. *A* is set to make the regime locus tangent to the exchange rate target (*s* cannot be expected to grow above the s_{max} without the attack). Each intervention, however shifts the regime locus to the right, as the reserves get smaller and smaller. When the reserves reach "small" limit ($\frac{R}{D} = e^{\frac{1}{\alpha_1}} - 1$), i.e. when the maximum of the regime locus is at the (s_{max}, v) point, speculative attack occurs consuming all remaining reserves, and the regime turns into free float.

Figure 10. Target exchange rate with large reserves
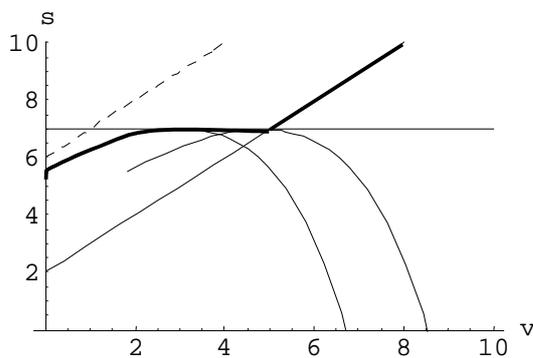
The important point from this analysis is that the attack cannot occur for sufficiently large reserves. If the initial reserves are much larger then domestic credit, reserve loss is zero when fundamentals are good enough (*v* is low). As *v* gets worse, the reserves start to dribble out (along the horizontal part of the bold curve in Figure 10 As they keep worsening, the attack occurs at some stage (the drift in the money demand shock term ensures that in the original model), which eliminates all the remaining reserves.

When the reserves are initially small, they do not contribute much to the defence of the exchange rate target. All the reserves are suddenly wiped out when the fundamentals *v* worsen beyond some threshold. The only benefit from the reserves is the some support to the currency for moderate levels of fundamentals, before the attack.

We would argue that the first-generation model with monetised budget deficits is most unlikely to have any use for the CEECs. Because deficit monetisation is not allowed in the EU, such risk for any ERM-2 members is non-existent (currency-boards are protected from such behaviour by definition). Also, as shown above, it is the fundamental real strengthening trend with which the countries will have to cope. Thus, for fixed exchange rates the reserves will not dribble out, but dribble (or rush) in. Still, the framework used for currency band models can be used to accommodate almost any drivers of exchange rate.

Second generation models (a good example is shown in Obstfeld 1994) addressed serious drawbacks of the first generation models[7]. First, the governments and central banks in the models built on Krugman (1979) were like lemmings: once engaged in a policy incompatible with fixed exchange rates, they were heading for the disaster of reserve depletion. In reality, the governments have more options: for example, they can change their policy when balance of payments gets worse, or devalue without depleting the reserves first. The second-generation models allow the governments to optimise. The loss function usually includes the exchange rate and some variable dependent on both actual depreciation and the prior public expectations of depreciation. In two models presented in Obstfeld (1994), the variable is a level of taxation (dependent on nominal interest rates, and thus on public expectations of nominal depreciation), or unemployment (dependent on agents' wage setting decisions, and thus nominal depreciation).

The circular causality indicated above gives rise to fascinating properties of second-generation models. Exchange rate regimes that at first glance may seem to be perfectly viable may suddenly collapse simply because they are expected to. The possibility of multiple equilibria and self-fulfilling attacks fits very well with crises like 1992 EMS collapse. Important feature of most of the second-generation models is that self-fulfilling attacks cannot occur for any value of fundamentals. Usually, there is a range of fundamentals for which an attack is impossible, a range for which the attack is certain, and a range in which both "attack" and "calm" equilibria are possible.

This class of models appears much more likely to trouble the ERM-2 members, not least because it seems to describe well what has happened in the 1992. What would cause such a forced departure from the peg? Very high unemployment could cause the markets believe it would be cheaper politically to give up exchange rate stability (and prompt EMU entry) for a depreciation. For a politically feeble government, substituting difficult structural reforms for a quick fix of major depreciation could appear tempting, especially if they were not expected to be in the office to reap the political glory of EMU entry. Even though the political cost of abandoning the peg (especially for the currency board) may be much higher than for (fresh) ERM-2 system, the flexibility of the latter (its wide-band variant at least) provides for some scope for foreign exchange stimulation without breaching the system[8].

New models also appeared, exploring asymmetric information issues (when implied government's bail-out promise distorts investment decisions leading to contingent government liabilities either becoming actual fiscal spending or killing the banking sector through a wave of insolvencies, see e.g. Corsetti et al., 1999), or liquidity crises (building on bank run literature, and maturity mismatch in capital account-surplus countries, see e.g. Rodrik and Velasco, 1999). Such problems could trouble the CEECs regardless of the exchange rate regime, especially if the process of excessive private foreign borrowing (on the investors' insurance presumption), and failed

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[7] For other models of this kind see e.g. Obstfeld (1996), Velasco (1996) Ozkan, Gulcin, and Sutherland (1998), Drazen (1999). A survey is provided in Eichengreen, Rose and Wyplosz (1996)

[8] But then, a currency board failed by 15% depreciation could still be accepted.

investments start significantly before the ERM-2 entry. Then, the cumulated crisis hang-up could be large enough to topple not only the currency peg, but also any kind of ERM-2 band.

Similar logic can be applied to the liquidity issues – once the foreign debt builds up, the sudden financing stop could cause severe crisis, due to costly liquidation of investments.

The models described above can usually be applied to both fixed and band exchange rate arrangements. The CEECs are unlikely to engage in reckless money printing, which could lead to the first-generation type crisis, and fundamentals are likely to put pressure on the stronger edge of the band (and currency board is protected, additionally, by high reserves, and automatic monetary tightening in case of a speculative pressure). More problematic is the case of policymakers willing to devalue (and abandon ERM-2) to jumpstart ailing economy at the expense of early EMU adoption. Incentives created by the EC/ECB/incumbent EMU members may influence the loss function of the CEECs policymakers. Outright opposition to their EMU entry will increase the temptation to sacrifice EMU entry in favour of stimulating the economies. The hint of such a thing happening could increase market pressure and prompt the failure of the ERM-2. Even though the costs of confidence loss could be higher for the currency board than for the band (it translates more quickly into monetary tightening than in the case of a currency band), the risk of the failure to meet ERM-2 criteria does not need to be higher. Credibility would suffer more, and the economy would gain less (if at all) from the collapse of the currency board (especially a long-lasting one). Rational speculators recognising that would be less willing to pay hefty interest rate spread to speculate against such currency.

The switch from the ERM-2 to the currency union is likely to be close to the non-stochastic process switching environment. Thus a model describing the behaviour of the financial markets faced with a pre-announced currency peg in a clearly defined future should be of some use.

Obstfeld and Stockman (1985) find out that announcement of a known peg on known date leads to immediate jump towards the new parity (relative to the original free-floating exchange rate path), and a smooth adjustment towards the pre-announced peg.

Ichikawa et al. (1990) apply such a regime change arrangement to the well-known Krugman's (1988) credible exchange rate band foreign exchange rate model. Their findings are also consistent with the Obsfeld and Stockman (1985): the announcement of the fully credible peg (exchange rate band of zero width) results in an immediate jump of the exchange rate towards the future peg (the jump is small if the regime change is distant enough). The exchange rate then depends less and less on the fundamentals (money supply and money's velocity), and more on the exchange rate level set by the authorities. At time *0* (EMU entry) the exchange rate becomes totally insensitive to the underlying fundamentals.

Djajić (1989) provides another model, based on the standard monetary model, in which the exchange rate path ahead of the fixing at the known date depends on the public expectations concerning the length of the fixing period (it is expected to last forever in case of the EMU entry), and the desired level of foreign exchange reserves/domestic money after the fixing.

The models are applicable to the situation of a fully credible announcement of both the level and the time of the regime switch, and this should indeed well describe the environment of the final 6

months of ERM-2 membership. While the timing of entry should be known relatively well in advance, the exchange rate would come slightly later.

The inherent asymmetry of the final peg expectations may have some impact on the market exchange rate while in the ERM-2. The Krugman's S-curve cannot stay symmetrical if fixing the exchange rate weaker then the parity cannot be expected. Thus, as the date of the EMU approaches, the S-curve should be becoming much flatter on the weak side of the parity (exchange rate would be more and more insensitive to fundamentals because of appreciation expectations in the credible ERM-EMU switch). The change of the shape of the S-curve on the stronger side of the parity would depend on the political bargaining process, but given the experience of previous EMU entry cases, the benchmark case of ERM-2 parity becoming the final rate would suggest the curve gets flatter on that side as well.

Figure 11. Exchange rate and fundamentals on the way from ERM-2 to EMU
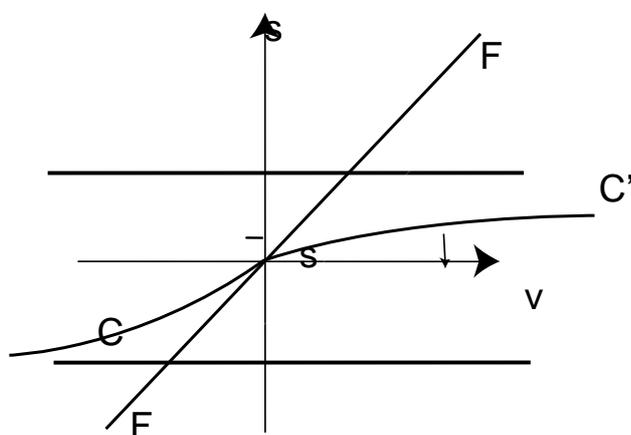
Budget deficit and public debt

There are several channels through which the choice of the exchange rate regime influences the fiscal position of the government.

First, the non-rigid exchange rate, in the CEEC reality, can stimulate nominal appreciation. This, in turn, hits profits (and tax intake from) the non-tradable sector. The effect of lost taxes depends on the productivity growth in the sector. Similarly, the non-tradable sector inflation (and thus nominal PIT and CIT in the sector) can be contained by nominal appreciation (relative prices in tradable-non-tradable sector can change without wage and price increases). In the short-run this damages also VAT income.

Generally, for counties which managed to deal with most forms of automatic inflation indexation (read countries that have recently been through a period of sub 5% CPI), a period of higher inflation does facilitate fiscal consolidation. Nominal downward rigidities are prevalent in labour market regulations in most CEECs. Almost all taxes depend on nominal wages and prices, while some kinds of spending are not indexed to the actual inflation rate. The biggest gains, both in terms of

output and fiscal balance can be achieved by surprise depreciation and inflation. This is out of the question within the ERM-2, but the accession country can set the more rigid exchange rate in order to get some inflation. Getting the balance right (improving the fiscal balance, but without overdoing it on the CPI side, which could breach another Maastricht criterion) is tricky. The exchange rate inflation and exchange rate-output pass-through factors differ among the countries, so the size of the effects would vary.

Even though the inflation effect of the currency board or a peg need not to be much larger than for a currency band (because of relatively small likelihood of nominal appreciation becoming permanent through parity revaluation), the average exchange rate during the ERM-2 period is likely to be stronger for the band than for the peg[9].

Second channel through which exchange rate regime influences the budget deficit is debt servicing. As argued above, floating exchange rate can have a two-fold effect. Expectations of nominal appreciation (as well as lower inflation) should keep the yields and debt servicing costs down. Despite non-zero probability of a revaluation, such expectations would be severely limited by the benchmark expectations of the return to the parity, as was the case for most of the current EMU members. On the other hand, short-term exchange rate risk can still influence a big part of the yield curve.

Another, fourth, indirect influence of the exchange rate regime on budget deficit is related to the straightjacket of the fixed exchange rates. Advanced CEECs cannot resort to deficit monetisations. However, the perils of slack fiscal policy under fixed exchange rate or under the currency board are well known, and it appears are also well understood by the policymakers in the CEECs. Not a single fixed exchange rate accession country (including Bulgaria) had budget deficit above 3% of GDP in 2002, while all others (apart from Slovenia and Romania) had. Even if hard economic arguments do not fully support the case for higher budget deficit under the floating exchange rate regime (a possibility of nominal appreciation for +/-15% band and related lower debt financing costs, but higher short-term currency risk widening the spreads, and making currency board look more attractive), lack of the straightjacket of the fixed exchange rate already does seem to make the non-pegging CEECs less strict about their budgets.

Public debt impact of the ERM-2 regime choice can be due to three channels. First is the budget deficit, likely to be smaller under more rigid exchange rate regimes, and especially under the currency board.

Second is inflation, and its influence on nominal GDP, the denominator of the public debt ratio. Again, lower CPI which should be associated with the (properly aligned) wide ERM-2 band puts such countries in a disadvantaged position.

The third is the exchange rate itself. Nominal appreciation has an immediate public debt reducing impact, as the local currency value of the € debt falls. Such process, in turn, favours wide-band ERM-2 members the most. The overall influence of the exchange rate regime depends on the currency composition of the public debt. For example, nominal appreciation would certainly be

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[9] Much depends on the parity set, but there is no reason to believe the parity would be weaker for the band

negative for Czech debt figures because Czech Republic does not have any foreign public debt. For Poland, with its 33% of foreign currency debt, the short-term impact of appreciation would be positive. For countries with significant share of foreign currency debt, and ERM-2 membership short enough, the band is likely to be positive for meeting the public debt Maastricht criteria. Longer ERM-2 membership favours pegging as a way to keep public debt levels in check. Indeed, the data seems to support it – floating exchange rate countries (as almost all of the CEECs) have low 36% of GDP public debt on average, but that is still 10 percentage points more than in the case of the pegging countries, including Bulgaria with its 65% of GDP (average public debt of the other three was a mere 14.7% of GDP).

How to get there: from here to ERM-2

This section describes three issues relating to the choice of the exchange rate regime choice ahead of the ERM-2 entry. Can a specific regime make it easier to meet Maastricht criteria later, within the ERM-2? Does the exchange rate regime matter for the dynamics of setting the exchange rate parity in the various versions of the ERM-2? Finally, we touch on the idea that the EMU entry could actually increase exchange rate volatility faced by some economic agents in a country; that could happen if the €/US$ exchange rate is more volatile than US$/local currency exchange rate prior to the EMU entry.

Getting ready for the Maastricht

The choice of the pre-ERM-2 exchange rate regime matter for just three Maatricht criteria. They are inflation, budget deficit, and public debt. Interest rates and exchange rate stability do not exhibit sufficient inertia to influence the ability to fulfil the criteria one year-ahead of the EMU.

Inflation

For advanced CEECs floating exchange rate should help make meeting the inflation close to the CPI target easier in the long run, which, given the CPI inertia should help in meeting the Maastricht criterion.

Many countries seem to be unable to use other means of fighting very high inflation than a currency peg. The cases of Romania and Bulgaria are good examples. Romania remains with a (dirty) floating exchange rate and had 2002 CPI at 22.5%, the highest of all accession CEECs. Bulgaria, on the other hand, had the highest inflation of all pegging CEECs, but at 5.8% it looks decent enough, compared with 2019.5% in March 1997[10]. Still, performance of the countries actually joining the EU in May 2004 suggests it is unlikely that peg will be the only inflation-credible exchange rate regime by the time of the EU entry for Romania and Bulgaria. Relative price adjustment will thus be more of a problem than post-transformation price stabilisation.

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[10] To be fair, Romania had 164% YoY CPI in that period.

The ability of the policy-makers to use adjustable, but managed exchange rate as an inflation-fighting tool was not used because of the competing goal to support external competitiveness. Lower inflation-fighting credibility caused, on average over four percentage points higher inflation in managed, but not fixed exchange rate regimes. In the later stages, it is likely that the devaluation temptation, presumably higher in non-fixed managed regime countries than in currency boards, may boost inflationary expectations even more in such countries prior to the adoption of the ERM-2.

What is the actual performance of the CEECs so far? It matches the indicated CPI performance relatively well. If we exclude Bulgaria and Romania from the calculations, the average floating CEECs CPI in 2002 was 2.34, while for the pegging/currency board countries it was 1.92% YoY. Hungary and Slovenia with their intermediate regimes fared the worst of the advanced accession states with 6.4% inflation. Including the late-comers made the currency board and pegged exchange rate counties loose their lead to the floaters by 0.5 percentage points. Managed, but not pegged exchange rate countries fared worse yet with 11.8% average CPI in 2002.

Budget deficit and public debt

Due to nominal rigidities, it may be easier to reform public finances with higher inflation. This effect, however, is likely to be limited for post-transformation economies, with indexation mechanisms still not completely removed.

Speed of debt accumulation depends also on bond yields. Nominal appreciation expectations favour the floaters again. However, they suffer from higher short-term foreign exchange volatility. This factor may be even more important than the underlying long-term strengthening trend, which *should* be seen in low-inflation floating exchange rate CEECs.

For longer bonds, the ones actually being instrumental for the *convergence play* (investments based on the presumption the interest rates converge into the core-EMU levels), another type of exchange risk is also crucial. It is the risk of up-front depreciation at the gate to ERM-2 – which is almost the last chance of an officially sanctioned devaluation ever. While countries with all exchange rate regimes face the temptation to devalue, the differences still exist. It is hard to imagine current parities of the €-linked currency boards would be altered, which puts Estonia, Lithuania and Bulgaria in slightly more comfortable positions. Policymakers of other exchange rate regime economies could attempt to use temporary weakness of the currency to establish the ERM-2 parity.

One could argue that, in the early stages of transition, pegging is a faster way of fighting inflation. This could give floating exchanges and crawling pegs some fiscal advantage – higher initial inflation could wipe out the debt early on. The "clean start" argument is not really valid in case of most of the CEECs, as the amount of the local currency debt was usually very low to start with. The transition would have to last long enough for the local currency bond market to develop. But in such case, the inflation surprise would not be a surprise anymore; indeed Romanian 22.5% inflation is brings little comfort for the public debt, as 2-year yield is at 22%.

The facts on bond yields are mixed. It appears that long bond yields have not converged more in floating exchange rate countries, than in the currency board ones. Even though the lowest spread

country is Czech Republic (where yields were, at some stage, trading through the German equivalents), others' yields, and inflation performance are not any better than that of the peggers.

Probably the most important fiscal difference between currency regimes in the run-up to the ERM-2 is the recognised value of tight fiscal policy in very rigid exchange rate arrangements. Slack fiscal policy in such countries increases the problems with inflation and external competitiveness. It can also put doubt on the regime altogether. This forces the currency board and rigid peg countries to reform their finances, which subsequently makes it easier to meet the Maastricht criteria on debt and deficit.

The regime switch

From the float and managed float

As already shown above, models describing the transition from a float into the credible, predefined currency peg in known time (in case of fixed-exchange rate version of the ERM-2) point to the jump in exchange rate towards the peg, and slow loss of relationship between monetary fundamentals and the exchange rate. This is because the expectations component of the exchange rate determination becomes more important as the time of the switch approaches (which, in turn, arises from the monetary credibility of the peg).

Ichikawa et al. (1992) show the dynamics of the conversion from a float to a perfectly credible currency band (similar to a change from, say, floating Czech crown exchange rate to the ERM-2). The analytical solution quickly becomes intractable, but the basic idea is similar to the one proved for the float to a fix. The currency moves from a linear relationship between fundamentals and exchange rate, to a familiar S-shaped curve, at first only slightly bent, and in time *0* becoming fully contained within the exchange rate bands.

The size of the jump depends on how far in advance the change is announced. If the policymakers fail to inform the markets well in advance about the exchange rate, they can be faced with significant jump in exchange rate (but not the interest rate).

The announced peg, or band may not be credible for two reasons. Either the parity points to an overly strong local currency, or the parity is set too weak with relation to fundamentals or market conditions. Too strong exchange rate (relative to the floating rate), to be credible, requires major monetary tightening, leading to growth problems. Overall fiscal consequences would depend on the debt levels – primary deficit would be expected to rise (due to growth-related erosion of the tax base), while debt service costs would fall thanks to yields dropping on expectations of nominal appreciation. Too weak parity may prove to be unsustainable either because of the threat to the CPI targets or because of the quasi-fiscal costs related to the necessary money market sterilisation operations[11].

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[11] The old argument about sterilised interventions being not effective in countries with fully opened capital account is important here. Taking this argument seriously, the sterilisation costs would be infinitely high, assuming local currency

In order to avoid monetary policy shocks, while targeting specific exchange rate, the policymakers of the floating CEECs could resort to state contingency of the regime switch. According to Smith and Smith (1990), after the World War I, British policymakers wanted to (and were letting everyone know about it):

- Fix the pound to gold.
- Have the parity stronger than after-war exchange rate, preferably at the pre-war level.
- Leave some time until the exchange rate adjusts itself to the desired level, at which point the fixing occurs.

The floating CEECs situation is not much different. In particular, the markets:

- Expect the government/central bank will fix the national currency to the euro
- Often believe that the government would like to see the local currency weaker than the average market rate
- See that the floating exchange rate regime creates a possibility to do it, provided the exchange rate swings towards a more desirable level (it can be fixed at that time, with no objectives from any other body)

What are the implications of such regime-switching environment? Smith and Smith (1990) claim that in case of Britain it resulted in longer return in the gold standard and a weaker pound during the adjustment. They got this surprising result by assuming that the pound had an *exogenous* tendency to strengthen, which was expected to be counteracted on as soon as the pound reached the desired parity level.

To illustrate, imagine, a set-up similar to Figure 9. F'F' line is a free floating relationship between fundamentals and exchange rate, assuming expectations of a long-run nominal appreciation (e.g. due to relative price adjustments). FF is the free float relationship without such expectations – it points to a weaker exchange rate than F'F' (the difference depends on expectations parameter, and the drift in fundamentals). If the authorities promise to fix the exchange rate as soon as it reaches the level s*, rational speculators must expect an end to the fundamental appreciation trend at that point. So, the fixing point must lie on FF line (from that point onwards no appreciation is expected. Thus, the intermediate regime must be between the two curves, as the appreciation expectations slowly give way to the fixing reality.

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short-term interest rates are higher than their foreign equivalent (portfolio balance arguments would ensure the capital inflow is not infinite)

Figure 12. Probability density function impact of regime switching
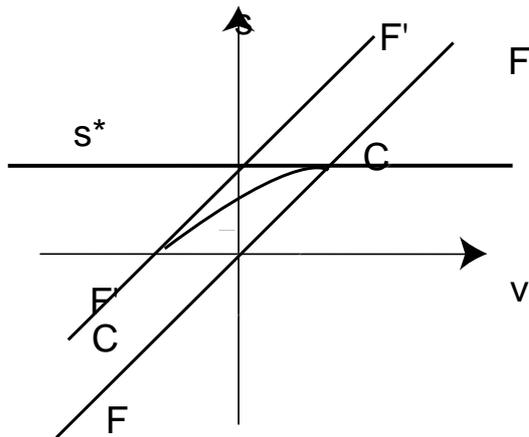
The conclusion of the argument is that the known government's wish to make use of the appreciation trend to fix the parity at a stronger level leads to weaker than otherwise exchange rate in the run-up to the fixing.

As Miller and Sutherland (1992) point out, there are two problems with application of such a paradox to Britain's return to gold in 1925. First, the claim that the switch was not at all time-contingent is unjustified. Similarly, it can be claimed, that the CEECs would not be willing to wait forever for the exchange rate to reach the proper level. The timing of the switch could occur earlier if condition prove right, but still not later than a specific date (for example determined by the political cycle formula: election date – 2 years to allow for EMU entry before elections). Assuming money velocity does not follow any trend, and using the Krugman's nomenclature (see Figure 9) the switch would look like in Figure 13.

Figure 13. Time and state dependent regime switch
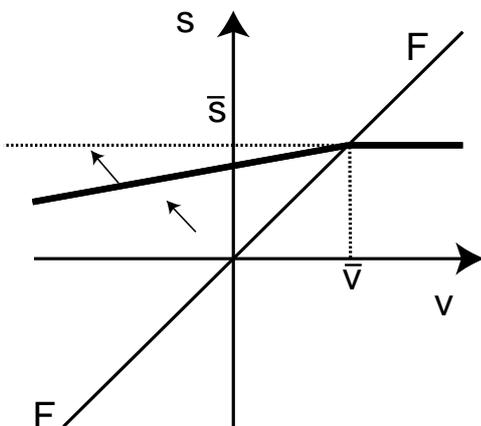
The free float exchange rate (s) monetary shock (v) locus is shown as the 45 degree line FF. The desired exchange rate is s-bar. The credible announcement of the fixing *within* some time frame (but not necessarily at a certain date) shifts the exchange rate-monetary shock locus up for

v<v-bar (thick line). However, if v exceeds v-bar, the fixing occurs. This is where state-dependency kicks in. As time to the fixing date passes the expectations component starts to matter more, and the bold curve becomes more and more horizontal.

Second problem is the fact that Smith and Smith interpreted the monetary aggregates drift towards stronger pound as exogenous. The expectations of the ending of the trend once the exchange rate reaches the desired level could have weakened the spot rate. If the trend was in fact **caused** by British policymakers, the result would be completely opposite (as long as the pound is trading weaker than the desired level, the authorities will continue to tighten). Because of the fundamental nominal strengthening trend in CEECs case, the Smith and Smith model could only be applied for strong target exchange rates, where fixing prospects mean expectations of the end of the underlying, exogenous trend. More likely is the opposite case, where the desired weaker exchange rate requires changes in policy. Then, the exchange rate would approach the desired (weaker) level earlier than in the free-floating case (which could never happen, given the fundamentals).

Froot and Rogoff (1991) argues that the known date of giving up the monetary authority creates expectations of currency weakness and widening of the interest rate spreads just ahead of the EMU accession date. Their idea is that after the transition the policymakers' credibility is useless (national central banks have no monetary policy powers in the EMU anyway). Therefore the policymakers face a great temptation to (almost costlessly) wipe out their domestic-currency denominated debt, or (assuming Keynesian price rigidities) stimulate the economy through real exchange rate depreciation, which may then ease the burden of necessary fiscal reform. The policymaker optimises using the following loss function:

$$\sum_{t=0}^{T} \beta^t L_t\left(d_t, d_t^{\ e}, C\right) = \sum_{t=0}^{T} \beta^t \left[-\omega_t\left(d_t - d_t^{\ e}\right) + \frac{1}{2} d_t^{\ 2} + \frac{1}{2} R\left(C, d_t, d_{t-1}, ...\right) \right],$$

where d_t and $d_t^{\ e}$ are actual and expected devaluations in period t, C is the fixed cost of devaluing the exchange rate (eg. connected with negotiation costs with the EU Commission, hurt ego of the central bank governor, etc). The first of the three terms of the loss function represents the short-term gain from unexpected devaluation: higher ω (0<ω<1) means higher gain from devaluation. The second (squared depreciation) is loss associated with depreciating currency in each period. Finally R is the fixed cost of reneging on the fixing. *R* becomes *C* if d_t is greater than zero for any *t*. Cost C is assumed to be uniformly distributed between [0, μ], and is known by the policymaker only, but not the public (which knows only the upper limit μ).

It is then rational for the public to attach ever-increasing probability of devaluation as the date of giving up monetary policy approaches (the costs of doing so go down over time, as the number of periods in which d^2 is paid falls). This makes the government pay higher inflation premium on the local-currency denominated debt. This may mean that the government is ultimately *forced* to devalue (as they actually were, one year after publication of the paper). Obstfeld's (1996) second-generation crisis model immediately comes to mind.

The set-up, and the idea that the EMU entry poses a strong temptation to inflate are far from purely theoretical. This is probably the idea behind the ERM-2 requirement of not devaluing. In the model it means that C becomes extremely high – the cost of devaluing prior to the EMU prevents from the EMU entry altogether.

The cost of the ERM-2 entry depreciation, however, is likely to be less forbidding. This means that the final period of the process of ERM-2 accession may be characterised by *rising interest rate spreads* and that shortening of the period of accession will not eliminate the effect. What the government can do about it? The key is to show the investors that C is very high; that devaluation is neither feasible nor desirable. The means to achieve it are:

- Convincing the public that EU member states will not tolerate competitive devaluation. While in case of the unilateral euroisation, EU institutions have very limited influence on the parity rate; both normal EMU and ERM-2 accession requires parity agreement of all the EMU member states, according to the Treaty of Maastricht, art. 123, para 5. Does this mean that up-front competitive devaluation is impossible? Not entirely, the politics rule all such decisions, and there is a possibility of the key EMU member states agreement in exchange for e.g. fishing rights, or CAP reform.
- Convincing the public that devaluation/depreciation is not desired, for whatever reason. While it is not easy, given the model, the authorities can at least stop talking about the need for a weaker currency. It is simply costly.
- Fixing the currency for good.
- Indexing the debt to foreign currency. This way, devaluation would be counterproductive for reducing the public debt. Also, useful are binding debt level limits expressed as a percentage of GDP. Maastricht 60% limit, as well as Polish constitutional limit may make devaluation impossible, as it would influence not only numerator, but also denominator (nominal GDP level expressed in euro). Thus with only 10% foreign debt, but overall debt level at 60% of GDP, any depreciation would require costly fiscal adjustment programme, even if inflation was to make up for the lost nominal GDP.

Theoretical models of perfectly credible regime change announcement point to a gradual shift of the currency towards the new parity, with fundamentals loosing its importance as the critical day approaches. The situation with endogenous parity level, or endogenous switch time is more complicated, but it gives rise to interesting conclusions. First, the markets have reasons to expect the government to use the end-of-game argument to devalue and wipe out its domestic currency-denominated debt. This could lead to an increase in bond yields and weakening of the market exchange rate prior to the parity rate announcement. Second, in the unlikely case of CEEC policymakers known to set the parity stronger than market rate, and exogenous trend in exchange rate (caused e.g. by relative price adjustments), the convergence of the nominal rate to the desired level would be slowed down.

From fixed exchange rate

In the CEEC environment facing fundamental real appreciation trend, pegged exchange rates and currency boards can normally last forever. The typical first-generation crisis model dynamics shows growth in domestic money offset by falls in reserves (money supply must be held constant in Flood and Garber 1984, as PPP and uncovered interest parity ensures prices and interest rates do not change, and neither does money demand while the exchange rate stays fixed). One way to describe the CEECs situation is to lift the PPP condition, adding non-tradables' prices, which exogenously drift upwards. This ensures that nominal money demand grows together with overall price level, which, if domestic credit remains constant, boosts reserves in each period of the peg[12].

With the announcement of the float, money supply becomes constant, and changes in non-tradable price level should translate into expected nominal appreciation and lower interest rates. The change depends on the non-tradables' inflation, their weight in consumer price index, and interest rate elasticity of money demand. Sudden switch into float would then appreciate the currency immediately.

Announcement of the end of the peg some time ahead of the event would ensure no exchange rate jump. It would boost the money supply (through higher growth of foreign exchange reserves) to the point that the peg exchange rate is also a free float solution. This growth in money supply would ensure interest rates temporarily drop ahead of the end of the peg to maintain money market equilibrium amid prices responding to (still pegged) exchange rate and constant trend in non-tradable prices.

The transition to the currency band would depend on the parity chosen, and the results are shown in Figure 14 and Figure 15. Surprise switch into the currency band is equivalent to vertical jump from a point on the FF curve (where money demand increases are offset by reserve growth), to the S-shaped curve CC, based on free float F'F' (where money demand increases are not offset by money supply changes), and expectations of monetary expansion/contraction at the edges of the band. For the currency band parity set at peg level, the step appreciation for immediate regime change would be smaller than for the switch to the float. The currency could appreciate even if the parity is set weaker than the peg. It would appreciate more than in the floating case if the parity is set much stronger than the peg (unlikely in the CEEC case).

[12] Another option is to include GDP growth differential which increases *real* money demand

Figure 14. Surprise switch from fixed exchange rate into currency band
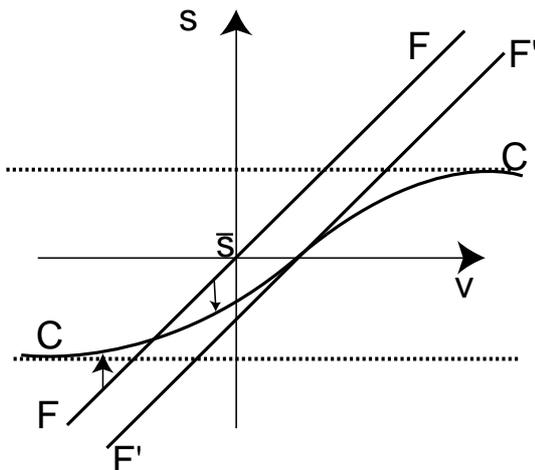
As in the floating case, prior announcement of the currency band (likely to happen in the ERM-2 case), would imply reserves inflow, and temporary interest rate fall for a wide range of parity options, and capital outflow for an extremely weak parity.

Figure 15. Pre-announced switch into currency band
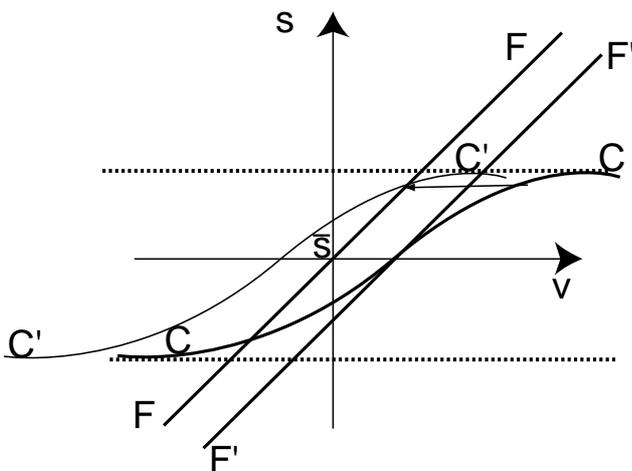
A special case would occur if the peg were to be *outside* of the currency band. Setting the stronger edge of the band weaker than the peg would imply the commitment to print as much local currency as needed to get the currency within the band. Such possibility along with the peg still in place until the moment of the band introduction would require anticipated jump in exchange rate, providing infinite profits for speculators. Such thing should never happen in competitive and open financial markets. The mechanism of a too strong peg collapse is well known. If the peg remains too weak, the result could be infinite inflow of capital.

The pre-announced entering into ERM-2 currency band from a pegged exchange rate can thus **cause capital inflow and interest rate falls even if the parity is set weaker than the previously prevailing exchange rate.** This effect would be stronger the stronger the interest semi-elasticity of money demand, and the stronger the fundamental (perceived) appreciation trend.

Forgetting the dollars

Large foreign exchange volatility on G3 markets underscores a problem for some of the CEECs. EMU entry could actually increase exchange rate volatility faced by some economic agents in a country. That could happen if the €/US$ exchange rate is more volatile than US$/local currency exchange rate prior to the EMU entry. Below, we propose a method of measuring attachment of local exchange rate to key world currencies. As a result, we calculate *an optimal basket*, which minimises currency risk (while financing, or investing abroad).

To derive the results, we analysed the daily profit and loss from long CEEC currency positions from 1999 through June 2003. Optimal basket 0<*B*<1 minimises the variance of 21 daily returns from buying 1m of local currency, paying US$ for b*1m and € for (1-B)*1m. The result shows the proportion of US$ and € the investor (or local firm financing itself abroad), should choose to minimise its risk to €/US$ rates.

In a country which has the exchange rate pegged to the US$, €/US$ volatility translates one-to-one to €/local currency changes. Lithuania used to be such a country, and not surprisingly, stopped being one as soon as the reference currency for the currency board was switched into €. In the case of managed and floating exchange rates, the exposure of the local currency to cross-exchange rate movements is much less obvious. Figure 16 shows such optimal currency baskets for the CEECs.

Figure 16. Optimal currency baskets in CEEC countries

Czech Republic
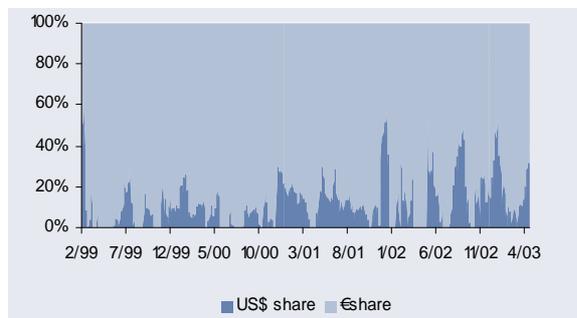
Slovakia
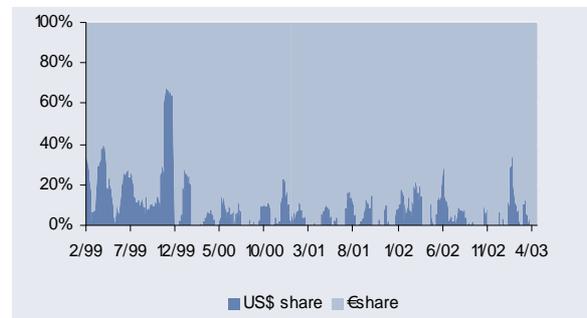
Poland
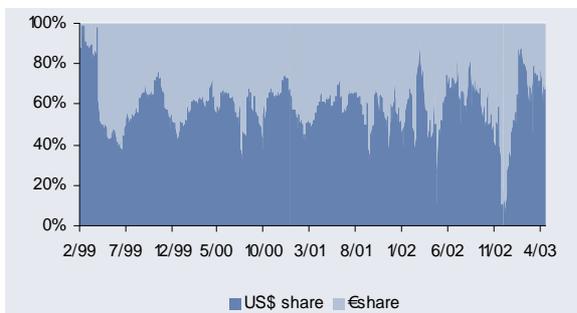
Lithuania
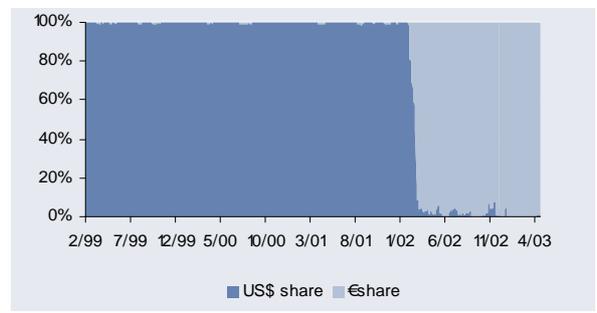
Bulgaria
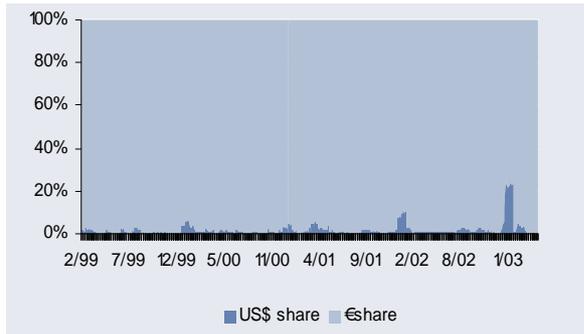
Estonia
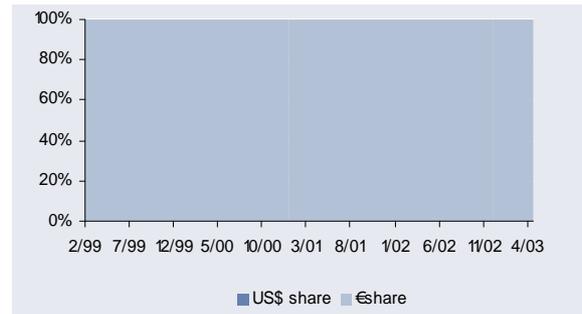
Latvia
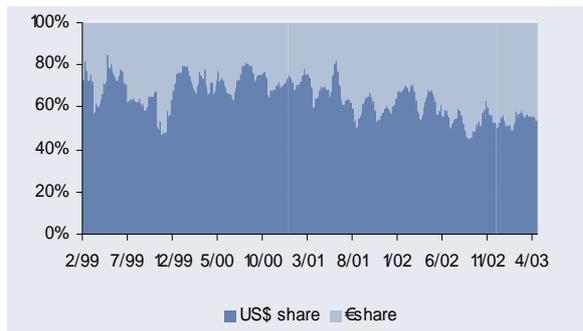
Romania
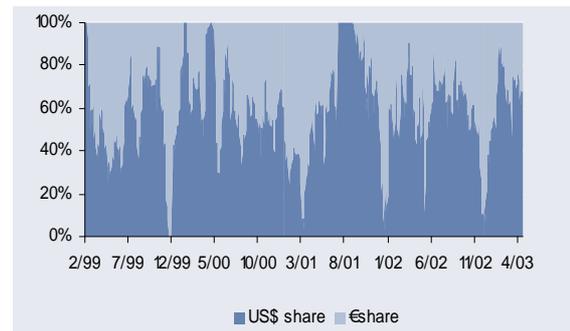
Slovenia
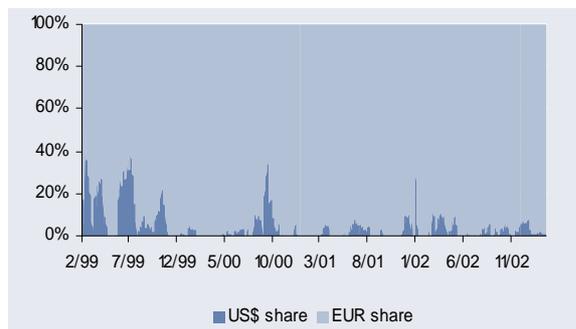
Hungary
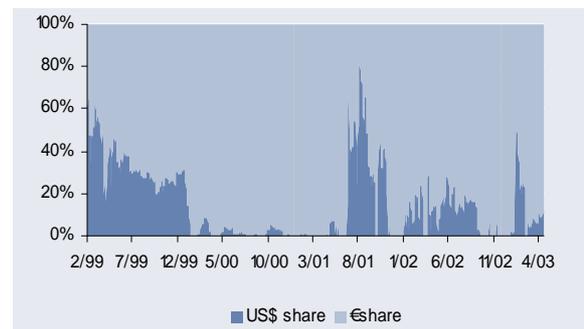
Of all the CEECs analysed above, Romania, Poland and Latvia still exhibit significant attachment to the US dollar. The dollar's weakness against the € in 2003 translated into larger PLN/€, LTV/€ and ROL/€ depreciation.

The sources of large share of US$ in the optimal basket could include dependence on raw materials trade, large US$ debt, historical and cultural reasons, and exchange rate regime causes. The first two causes are fundamentally justified and could call for some caution in establishing very rigid exchange rate regime with respect to the euro. The other two can be quite safely ignored, being endogenous and dependent either on present, or on past currency regime[13].

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[13] Yet, abrupt change in volatility patterns created for whatever reasons could cause some problems for the real economy, creating unexpected currency risk. For example, if a dollarised property market suddenly becomes euroised, initially viable past investment decisions like US$ financing, become suboptimal. US$ debt, at first naturally hedged by the

Lithuania's and Hungary managed to reduce significant shares of US$ in their currency trading baskets to (close to) zero in less than a month. Lithuania did that by switching the currency board reference currency from US$ to €, while in Hungary, it was enough to change the composition of the currency basket from 30% US$ and 70% € (quite well reflected in actual trading, see figure above), to 100% €. This experience suggests that introduction of any form of ERM-2 could suffice to change the trading habits.

Conclusions

Assuming similar CPI levels at the beginning of the ERM-2 period, wide band should make it the easiest to meet the price stability criterion, followed by narrow-band arrangement, and pegs.

Narrow-band ERM-2 seems to be the most problematic in terms of exchange rate stability, followed wide-band ERM-2, and currency boards. This classification, however, is not as clear-cut as the price-stability one. Much depends on the ERM-2 parity level.

Fixed exchange rate arrangements should be better for budget deficit criterion, followed by narrow and wide bands. Public debt statistics, however, could be aided by the nominal appreciation possibility, provided foreign debt is significant, and exchange rate-inflation pass through is not too fast.

Current standing of the CEECs suggests that rigid exchange rate regimes, including pegs and currency boards, allow, by far, the fastest nominal convergence. Straightjacket over fiscal policy, and resulting smaller accumulation of public debt, and the obvious currency stability are undisputed. Bond yields are not systematically higher in such countries, as lack of nominal appreciation is compensated by lower short-term exchange rate risk. Finally, inflation, while theoretically suffering from the lack of nominal appreciation buffer, compensating the relative price adjustments, does not seem to be as big a problem so far: on average CPI has been very close to that of the floating exchange rate countries.

Fixed exchange rate does not fully solve the problem of final parity speculations. However, especially the countries with €-linked currency boards are likely to avoid bond yields pick-up, and higher fiscal costs, related to the risk of the final parity being set at a weaker level than that prevailing during the pre-ERM-2 peg period. What is more, the unlikely switch from fix exchange rates into the target zone with weaker parity may still lead to *nominal appreciation*.

The temptation to devalue for countries with other exchange rate regimes, will be mitigated by political pressures (the needed agreement of all member states for the final parity), fiscal costs of sterilised intervention defending the stronger edge of the band, potential CPI outcome of such a move, and short-term effect of foreign-currency denominated debt inflation, which could offset the reduction of the real value of local currency debt.

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fact that the value of the real estate is also quoted in US$ (sudden US$ strength increases also the local currency value of the property), becomes unhedged when house pricing switches to local currency or €.

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