IMPLICIT EXCHANGE REGIMES IN CENTRAL AND EASTERN EUROPE [*]

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Abstract

This paper attempts to identify implicit exchange rate regimes for currencies of the Central and Eastern European Countries *vis-à-vis* the euro. To that end, we apply a sequential procedure that considers the dynamics of exchange rates to data covering the period from 1977:01 to 2006:02. Our results would suggest that implicit bands have existed in many subperiods for almost all currencies under study. Once we detect *de facto* discrepancies between *de facto* and *de iure* exchange rate regimes, we propose a model in order to explain these decisions. Our results suggest a positive association between the previous inflation rate and the probability of a peg with the euro, and a negative association with past unemployment rate.

JEL classification: F31; F33

Keywords: Exchange rate regimes, implicit fluctuation bands, exchange rates.

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1. Introduction

In 2004, ten new Central and Eastern European Countries (CEECs) became European Union (EU) member states. Although this did not imply immediate membership in European and Monetary Union (EMU), after a two-year derogation period, their convergence has been evaluated on the basis of the Maastricht Treaty. But, in contrast to the past experiences of United Kingdom and Denmark, the CEECs are not granted with opt-out clauses in joining the EMU. In other words, the way toward the adoption of the euro is a non-return one for these new members.

Among the four convergence criteria (i.e., price stability, sustainable fiscal position, exchange rate stability and low interest rates) has been used in evaluating the catching-up process of these economies, the exchange rate stability is perhaps the most striking one, given the crucial role that exchange regime plays in determining macroeconomic stability and investment climate.

When joining the EU, the currencies of the CEECs exhibited a rather heterogeneous pattern in their exchange rate movements against the euro. This was due not only to the fact that the macroeconomic developments and degree of success in maintaining stability are very different from one country to the next but also, in particular, to the broad range of exchange rate regimes currently being applied in the new member states.

Since the assessment of exchange rate stability includes as a mandatory the participation for at least two years in the new European Monetary System (EMS) linking the currencies of non-euro area, most of the CEECs were expected to join it. In fact, over the past years the euro has increasingly gained importance as the main reference currency in both the pegged and managed regimes prevailing in the CEECs.

Nevertheless, the *de facto* exchange rate policy adopted by monetary authorities has tended to differ from the announced *de jure* exchange rate regime, which is why IMF classifications are not always a good guide to the true exchange rate intentions of said authorities.

The new literature in this area seeks to achieve two linked objectives, namely, to detect divergences between *de jure* and *de facto* regimes and to assess the consequences of these differences on the relevance of exchange rates for macroeconomic performance[1]. Recognition of the divergences opens up a number of key questions regarding the analysis and recommendations of international economic organizations as well as for academic work: which is the correct classification and which variables and methods should be considered for this purpose?

Recently, Reinhart and Rogoff (2004) have presented a comprehensive classification of the exchange rate regimes of 153 countries over the last half-century. Their research suggests the importance of *de facto* bands in the international economy. Other approaches focus on the variation of central bank reserves and acknowledge the

[1] See Coudert and Dubert (2004) for a survey of studies on implicit exchange rate regimes. Reinhart and Rogoff (2004) examine the relevance of the exchange rate regime classifications for empirical macroeconomics.

relevance of intervention in detecting implicit pegs and bands (see, for instance, Poirson, 2001).

This paper has two main objectives. The first purpose of the paper is to use a sequential procedure that considers the dynamics of exchange rates to detect implicit bands for the exchange rate between the CEECs' currencies and the euro. The second aim is to study the reasons behind the implicit bands detected in the CEECs.

The paper is organized as follows. To place the study in its proper context, Section 2 presents a brief background of the CEEC's exchange rate regimes before and after EU accession, with special emphasis in the requirement of ERM-II participation before adopting the euro. In Section 3, we apply a statistical procedure to detect implicit bands to data for the CEECs covering the 1977-2006 period. In section 4 we address the economic factors explaining the implicit bands detected by estimating a logit model based on the Barro-Gordon model. Finally, Section 5 provides some concluding remarks.

2. The CEEC's and the euro

As previously mentioned, on 1 May 2004 ten new member states (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia) joined the EU. Two years and eight months later, on 1 January 2007, the EU welcomed Bulgaria and Romania.

It was expected that the new countries would adopt the euro only when they fulfil the same economic criteria demanded for the current euro area members. To that end, the European Central Bank (ECB) has been preparing convergence reports in which it analyses whether the countries have achieved a high degree of sustainable economic convergence for adoption of the euro. This is assessed on the basis of the fulfilment of the Maastricht convergence criteria. One of such criteria is the observance of the normal fluctuation margins provided for by the new, modified Exchange Rate Mechanism (the so-called ERM-II) of the EMS, linking the currencies of non-euro area.

The ERM-II is a pegged but adjustable system in which central parities are defined against the euro and not between all other participating currencies. Hence, this bilateral nature, in contrast to the multilateral one of its predecessor the ERM, is expected to reduce the frequency and the scope of interventions. Central rates and fluctuation bands are set by common agreement involving the ministers of the euro area, the ECB and National Central Bank (NCB) governors of the non-euro area member state.

The standard fluctuation band is ±15%, while not excluding the possibility of setting a narrower band. Intervention support of the ECB to the NCB is automatic at the margins of the band (marginal interventions), but any interventions within the band (intra-marginal interventions) need not be (but may be) supported by the ECB. Finally, realignments of central parity are made by the common procedure, which both the ECB and the member states have the right to initiate.

As any other fixed regime the ERM-II was expected to play a stabilizing role in CEEC's economies, since the maintenance of the pre-committed rate should be taken into account in the design of economic policies. First of all, ERM-II would contribute to get exchange rate steadiness. "Its stabilizing role should derive from the announcement of the central parity, which should provide the markets with a lead and thereby reduce exchange rate fluctuations" (Czech National Bank, 2003, p. 5). This role must be enhanced by the ECB's intervention assistance, though in principle such support is only planned at the margins. Moreover, arguments in favour of the ERM-II highlight its function in disciplining national authorities to pursue consistent macroeconomic policies. In particular, past experiences show the importance of price stability and sustainable public finances for maintaining a credible fixed regime.

However a carefully revision of recent episodes should warn us about some potential problems associated with the participation in a system like the ERM-II. With limited exchange rate flexibility and an environment of increasing capital mobility, the large capital inflows that will be directed towards these economies (mainly in the form of foreign direct investment) are expected to exert appreciating pressures on domestic currencies. Alarmingly, large capital inflows figured in virtually every financial crisis of the 1990s. Other features that characterized recent crises, and that are still present in accession economies, are the basic development of their financial systems, limiting to a great extent the managing of interest rates as a defensive device, and the higher levels of inflation, pushing up real exchange rates and increasing the probability of future realignments be needed. Finally some credibility problems may arise from the fact that central parities are subject to realignment: in the case of such transition economies involved in a catching-up process the credibility of the central rate may be eroded over time.

These and other potential gains and shortcomings could have not gone unnoticed for some of the CEECs and could have significantly affected their decision to follow or not *de facto* or *de iure* implicit bands, maintaining the exchange rate around a central parity.

When joining the EU, the currencies of the CEECs exhibited a rather heterogeneous pattern in their exchange rate movements against the euro: Estonia and Lithuania had a currency board pegged to the euro, Cyprus and Hungary unilaterally shadow ERM-II, Slovenia pegged its currency to the euro within a crawling band; Maltese lira was pegged to a currency basket dominated by the euro; Latvia pegged its currency to the International Monetary Fund's special drawing right; and Poland, the Czech Republic and Slovakia pursued a floating exchange rate regime.

On 27 June 2004, Estonia, Lithuania and Slovenia joined the ERM-II. The central rates were set, respectively at EKK 15.6466, SIT 239.640 and LTL 3.45280 per euro. On 29 April 2005, the currencies of Cyprus, Latvia and Malta joined the ERM II, being set the central rates at CYP 0.585274, LVL 0.702804 and MTL 0.429300 per euro. On 25 November 2005, the Slovak koruna joined the ERM-II, with a central rate of SKK 38.4550 koruna per euro. In all cases, the standard fluctuation band of ±15% around the central rate was set.

Slovenia introduced the European single currency on 1 January 2007, being the13th member of the euro area. Cyprus and Malta both plan to introduce the euro on 1

January 2008, while the Slovak Republic intends to do so one year later, on 1 January 2009.

3. Implicit bands

In this section we implement two methods leading to the detection of implicit bands for the CEEC's exchange rates. On the one hand, the descriptive procedure used by Reinhart and Rogoff (2004), and on the other hand a variant in which we incorporate statistical significance to find *de facto* bands.

Firstly, the procedure by Reinhart and Rogoff accepts the existence of a *de facto* pegged system if, during at least four consecutive months, no variation is seen in the exchange rate. They then calculate the probability that the monthly variation remained within ±1% or ±2% over a rolling 2-year period. If the probability is at least 80%, the regime is labelled a *de facto* peg (band) or crawling peg (band) in the case of a ±1% (±2%) margin, during said years. If a positive drift is observed, it is identified as a crawling peg or band while if the rate undergoes periods of both appreciation and depreciation it is deemed to be a moving peg or band.

We have applied this procedure to the CEECs' exchange rate *vis-à-vis* the euro for Cyprus (1977:04-2006:02), the Czech Republic (1994:12-2004:02), Estonia (1994:05-2006:02), Hungary (1977:04-2006:02), Latvia (1994:01-2006:02), Lithuania (1993:12-2006:02), Malta (1977:04-2006:02), Poland (1980:11-2006:02), Slovakia (1994:12-2006:02) and Slovenia (1993:11-2006:02). The source of data used is the IMF International Financial Statistics of the International Monetary Fund and data availability determines the sample period examined for each country.

Figures 1 to 10 give the results obtained by calculating the monthly proportion of the 24 previous months during which the percentage monthly variation in the exchange rate is less than ±1%. When the blue series (proportion within band) is above the red one (threshold) the null hypothesis cannot be rejected, which would suggest the presence of fluctuation bands. This occurs for the 1995:02-1996:09 subperiod for the 1977:07-1978:05 and 1994:05-2006:02 subperiods for the Cyprus pound (representing the 44 per cent of the sample); for the Czech koruna (20 per cent of the sample); for the 1994:12-2006:02 subperiod for the Estonian kroon (95 per cent of the sample); for the 2000:12-2001:06 subperiod for the Hungarian forint (2 per cent of the sample); for the 2005:10-2006:02 subperiod for the Lithuanian lita (3 per cent of the sample); and for the 1978:06-1979:08, 1994:08-1995:03, 2000:03 and 2004:06-2006:02 subperiods for the Maltese lira (13 per cent of the sample). Note that we do not find evidence of implicit bands in any subperiod for the Latvian lat, the Polish zloty, the Slovenian tolar and the Slovak koruna.

[Figures 1 to 10, here]

The same procedure is followed in Figures 11 to 20, although here a fluctuation band of ±2% is considered. Once again, if the blue series (proportion within band) is above the red one (threshold) there is evidence of monthly limits of ±2% during a given subperiod. This occurs for the 1994:12-1996:12, 2000:12-2002:06, 2005:06-2005:10 and 2005:12-2006:02 subperiods for the 1977:04-1979:11, 1982:03-1986:08 and 1988:02-2006:02 subperiods for the Cyprus pound (representing the 87 per cent of the sample); for the Czech koruna (52 per cent of the sample); for the 1994:05-2006:02 subperiod for the Estonian kroon (100 per cent of the sample); for the 1997:10-1978:01, 1978:03, 1997:01-1998:12, 1999:09-2002:12 and 2003:04-2004:01 subperiods for the Hungarian forint (23 per cent of the sample); for the 1995:06-1997:05, 1997:08-2000:04 and 2005:08-2006:02 subperiods for the Latvian lat (44 per cent of the sample); for the 2002:11-2006:02 subperiod for the Lithuanian lita (27 per cent of the sample); for the 1977:04-1980:03, 1980:09-1980:12, 1983:01-1984:03, 1984:05-1985:01, 1985:06 and 1987:02-2006:02 subperiods for the Maltese lira (85 per cent of the sample); for the 1997:01-1997:09 subperiod the Polish zloty (3 per cent of the sample); for the 1995:05-1998:06 subperiod for the Slovenian tolar (26 per cent of the sample); and for the 1995:05-1998:09, 2000:09-2002:08, 2002:11-2003:12 and 2004:04-2006:02 for the Slovak koruna (78 per cent of the sample).

[Figure 11 to 20, here]

Secondly, we recognize one of the weaknesses of the approach taken by Reinhart and Rogoff (2004): the results are not filtered by their statistical significance. So we test whether the average of the proportional absolute monthly variations for each rolling 24-month period is significantly less than ±1% or ±2%. To test if the population mean (of the monthly variations during 24-month periods) is less than or equal to a given mean μ_0 (±1% or ±2%) the following expression may be used:

$$\begin{matrix} H_0 : \mu \leq \mu_0 \\ H_1 : \mu > \mu_0 \end{matrix}$$, where μ_0 is the given mean.

The acceptance region of the null hypothesis is $\bar{x} \leq \varepsilon$, where $\bar{x}$ is the sample mean of a the exchange rate of a given currency *vis-à-vis* the euro and $\varepsilon = \mu + t_{1-\alpha,n-1} \frac{\sigma}{\sqrt{n}}$, where $t_{1-\alpha,n-1}$ is the critical value of the t-Student distribution at a confidence level of $1-\alpha$, σ is the serial population deviation and n is the sample size. At a 5% confidence level we choose a critical value of 1.71.

The results of the application of this statistical procedure, which avoids the need to count the periods previously, as Reinhart and Rogoff do, are given in Figures 21 to 30 when ±1% fluctuation bands are considered. The average value (24 months rolling) of absolute proportional variations of the exchange rate of each month with respect to the previous month is given in blue, while the critical region appears in red. Thus, when the red series is above the blue one the null hypothesis cannot be rejected, which would suggest the existence of implicit fluctuation bands. This occurs for the 1977:04-1980:12, 1981:11-1986:10, 1987:09 and 1988:02-2006:02 subperiods for the Cyprus pound (representing the 93 per cent of the sample); for the 1994:12-1996:12, 2000:08-2002:06, 2002:09-2002:11, 2003:02-2003:03 and 2005:04-2006:02 subperiods for the Czech koruna (65 per cent of the sample); for the 1994:05-2006:02 subperiod for the Estonian kroon (100 per cent of the sample); for the 1977:08-1978:03, 1994:05, 1994:07, 1994:09, 1997:01-2004:02 and 2006:01-2006:02 subperiods for the Hungarian forint (29 per cent of the sample); for the 1995:02-1997:03, 1997:05-1997:06, 1999:05-1999:09, 2002:10-2003:08, 2005:04-2006:02 subperiods for the Latvian lat (38 per cent of the sample); for the 2002:10-2006:02 subperiod for the Lithuanian lita (28 per cent of the sample); for the 1977:04-1981:03, 1982:10, 1982:12-1990:01, 1990:06--2006:02 subperiods for the Maltese lira (93 per cent of the sample); for the 1983:11, 1996:12-

1998:07 subperiods for the Polish zloty (7 per cent of the sample), for the 1995:02-1998:04 and 1999:03-1999:07 subperiods for the Slovenian tolar (30 per cent of the sample); and for the 1994:12-1999:01, 2000:11-2001:12, 2002:03-2002:08 and 2003:05-2006:02 subperiods for the Slovak koruna (77 per cent of the sample).

[Figures 21 to 30, here]

Figures 31 to 40 offer the results when a ±2% fluctuation band is used. As can be seen, the average of the monthly variations generally lies below the critical region in the following cases: during the 197704-2006:02 subperiod for the Cyprus pound (representing the 100 per cent of the sample); during the 1994:12-1996:12 and 1999:12-2006:02 subperiods for the Czech koruna (100 per cent of the sample); during the 1994:05-2006:02 subperiod for the Estonian kroon (100 per cent of the sample); during the 1997:01-1980:02, 1980:10-1981:03, 1982:02-1982:04 and 1983:03-2006:02 subperiods for the Hungarian forint (92 per cent of the sample); during the 1995:06-1997:05, 1997:08-2000:04 and 2005:08-2006:02 subperiods for the Latvian lat (44 per cent of the sample); during the 1995:05-2000:11, 2001:01-2001:07, 2001:09-2006:02 subperiods for the Lithuanian lita (87 per cent of the sample); during the 1977:04-2006:02 subperiod for the Maltese lira (100 per cent of the sample); during the 1982:12-1985:02, 1991:10-1992:10 and 1993:02-2006:02 subperiods the Polish zloty (64 per cent of the sample); during the 1993:11-2002:02 and 2001:09-2006:02 subperiods for the Slovenian tolar (96 per cent of the sample); and during the 1994:12-2006:02 period for the Slovak koruna (100 per cent of the sample).

[Figures 31 to 40, here]

Combining the results obtained from Figures 31 to 40 with that observed with the ±1% bands (Figures 21 to 30), we can be confident that fluctuation bands between ±1% and ±2% existed throughout many subperiods, except during those subperiods detected with the ±1% test, when the bands were narrower.

4. Explaining implicit bands

In this section we explore the main determinants of the election of an exchange-rate regime, making use of the well-known Barro-Gordon model. According to Barro and Gordon (1983), a monetary authority determines the inflation rate which maximises a social objective function in inflation and unemployment. The economy is represented by a simple Phillips curve:

$$u = u^n - a(\pi - \pi^e) + \varepsilon$$

where u denotes observed unemployment rate, u^n the natural rate of unemployment, π observed inflation, π^e expected inflation and ε is a stochastic disturbance in output. As can be seen, only inflation surprises can affect unemployment, being a the elasticity of unemployment to inflation surprises. The loss function of the central bank is as follows:

$$L = (\pi - \pi^*)^2 + b(u - u^*)^2$$

where π^* denotes targeted inflation, u^* is targeted unemployment rate and b is the weight attached by central bank to stabilising the unemployment rate around the target.

Assuming that target inflation is zero $(\pi^* = 0)$ and that the central bank targets an unemployment rate below the natural rate $(u^* = \lambda u^n, 0 < \lambda < 1)$, combining these two equations we obtain:

$$L = \pi^2 + b[a(\pi^e - \pi) + (1-\lambda)u^n + \varepsilon]^2$$

Minimizing L with respect to π, assuming rational expectations and solving for π^e, we obtain

$$\pi^e = ab(1-\lambda)u^n$$

which states that, in equilibrium, the average inflation is positive, thus reflecting an inflation bias.

Since economic agents will realize that governments have an incentive to cheat, they will take this into account. A policy such as the zero inflation policy in this model is said to be time inconsistent (i. e., the nature of the system is such that governments have an incentive to do something other than what they promised). Nevertheless, in a dynamic model in which the game between government and economic agents is played over and over again, governments can improve the situation by building up a reputation for keeping the inflation rate low. In this sense, Giavazzi and Pagano (1988) have shown that, by tying their hands of central banks of the countries participating in the ERM-II could have reached a certain degree of credibility for their monetary policies due to the discipline effect.

From this perspective, we could interpret the detected implicit bands as a form of pre-commitment about macroeconomic policy made by the CEEC's Central Banks to borrow the ECB's anti-inflation reputation. To test this hypothesis, we estimate a logit model, assuming that *peg* is a binary dependent variable, taking on values of one when we obtain peg in the variant of the Reinhart and Rogoff method.

We model the probability of observing a value of one as: $P_t = P(peg_t = 1/x_t, \beta) = F(x_t'\beta)$, being x_t' a row vector of explanatory variables, $t = 1,..,T$ where T is the sample period and where F is a continuous, strictly increasing function that takes a real value and returns a value ranging from zero to one. We assume that F is logistic, then probability is written as $P_t = \frac{e^{x_t'\beta}}{1+e^{x_t'\beta}}$; $x_t'\beta = \beta_1 + \beta_2 x_{1t} + \beta_3 x_{2t}$, where $x_{jt}, j = 1,2$ are past national inflation and unemployment rates, both computed as the rolling average rate for the previous twenty-four months in accordance with our methods of computing the implicit bands. The parameters in the logit equation are estimated by maximising the logarithm of the likelihood function:

$$LogL(\beta) = \sum_{t=1}^{T} peg_t \log F(x_t'\beta) + \sum_{t=1}^{T} (1-peg_t)\log[1-F(x_t'\beta)]$$.[2]

[2] We use quasi-maximum likelihood (Huber/White) to estimate the standard errors. Although these standard errors are not robust to heteroskedasticity in binary dependent variable models, they are robust to certain misspecifications of the underlying distribution of the peg. In addition, we use quadratic hill-climbing to obtain parameter estimates. This algorithm uses the matrix of analytic second derivatives of

[Tables 1 to 7, here]

In Tables 1 to 7, we report the estimation results for those CEECs for which data are available, including the LR statistic to test the joint null hypothesis that all slope coefficients except the constant are zero and the McFadden R-squared that is calculated by using the likelihood ratio index. As can be seen, the fundamental variables are statistically significant at the usual levels. On the one hand, the results suggest that an increase in the average inflation rate during the previous two years will increase the probability of a peg with the ECB. This in turn is consistent with the hypothesis that the NCBs has been trying to profit from the ECB's reputation in order to achieve a lower inflation rate during the subperiods of the detected implicit bands. On the other hand, an increase in the average unemployment rate during the same period seems to significantly reduce the probability of a peg.

5. Concluding remarks

This study has explored the possible existence of implicit bands in the exchange rates of the currencies of the Central and Eastern European Countries vis-à-vis the euro. To this end, we have used both the classification procedure suggested by Reinhart and Rogoff (2004) and a modification proposed in this paper to account for the statistical significance of the outcome of their classifying algorithm.

The results obtained using both procedures indicate that the presence of bands in most of the currencies for several subperiods, including even before some of these countries joined the new ERM-II.

Since the detected implicit bands could be interpreted as an attempt by the National Central Banks to borrow ECB's anti-inflation reputation, we estimate a logit model, based in the Barro-Gordon model. The results suggest a positive association between the previous inflation rate and the probability of a peg with the euro, and a negative association with past unemployment rate.

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the log likelihood in forming iteration updates and in computing the estimated covariance matrix of the coefficients.

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Figure 1: Proportion of monthly variations in the Cyprus pound. Bands of ±1%

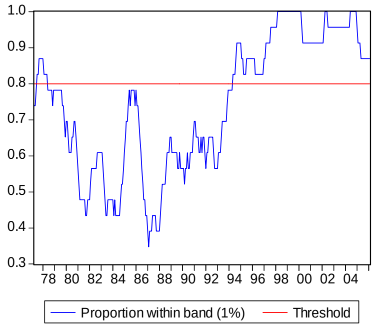

Figure 2: Proportion of monthly variations in the Czech koruna. Bands of ±1%

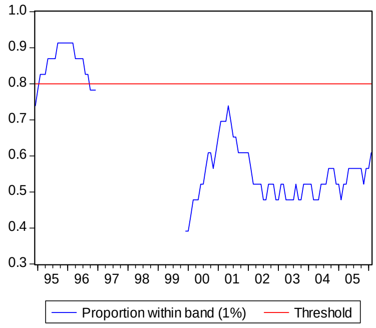

Figure 3: Proportion of monthly variations in the Estonian kroon. Bands of ±1%

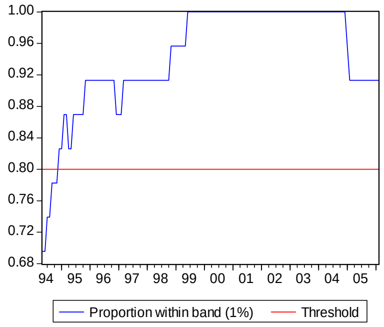

Figure 4: Proportion of monthly variations in the Hungarian forint. Bands of ±1%

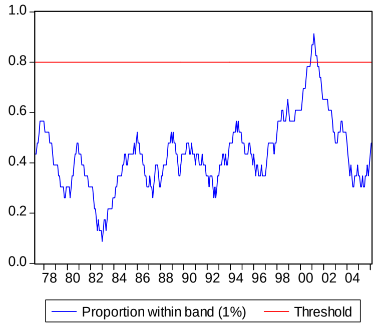

Figure 5: Proportion of monthly variations in the Latvian lat. Bands of ±1%

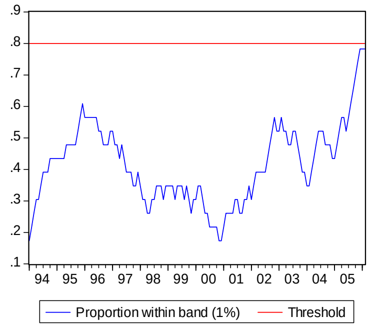

Figure 6: Proportion of monthly variations in the Lithuanian lita. Bands of ±1%

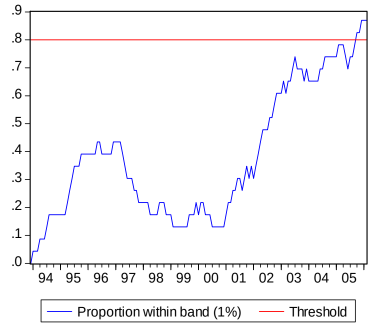

Figure 7: Proportion of monthly variations in the Maltese lira. Bands of ±1%

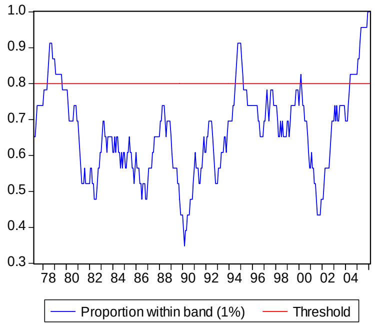

Figure 8: Proportion of monthly variations in the Polish zloty. Bands of ±1%

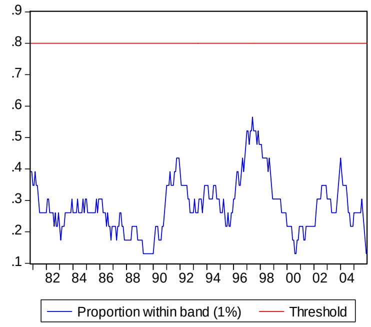

Figure 9: Proportion of monthly variations in the Slovak koruna. Bands of ±1%

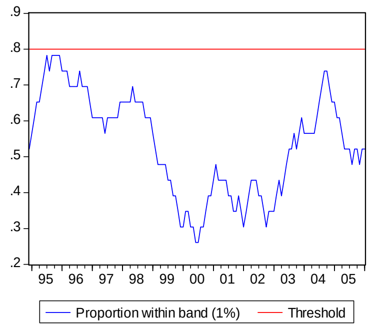

Figure 10: Proportion of monthly variations in the Slovenian tolar. Bands of ±1%

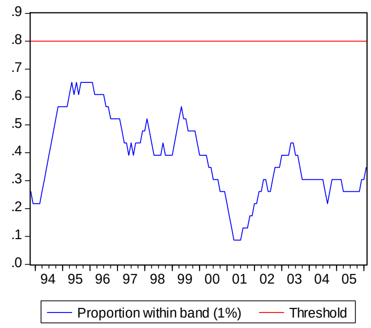

Figure 11: Proportion of monthly variations in the Cyprus pound. Bands of ±2%

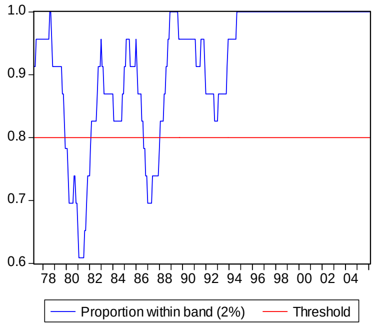

Figure 12: Proportion of monthly variations in the Czech koruna. Bands of ±2%

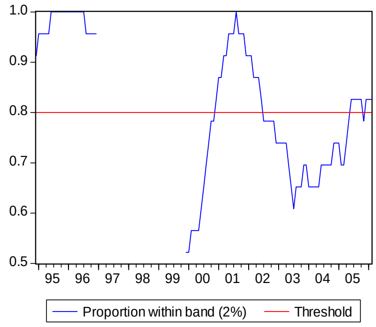

Figure 13: Proportion of monthly variations in the Estonian kroon. Bands of ±2%

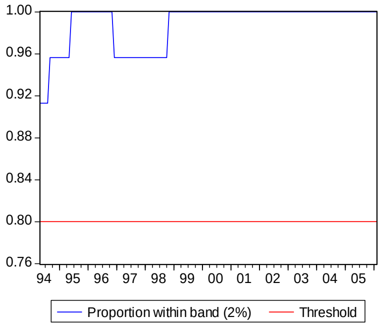

Figure 14: Proportion of monthly variations in the Hungarian forint. Bands of ±2%

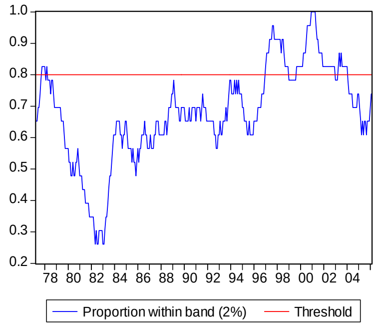

Figure 15: Proportion of monthly variations in the Latvian lat. Bands of ±2%

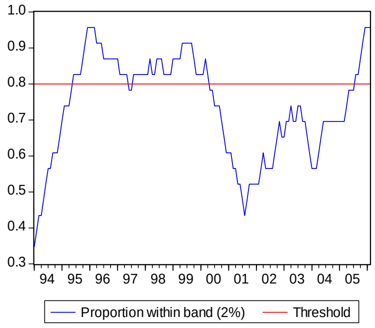

Figure 16: Proportion of monthly variations in the Lithuanian lita. Bands of ±2%

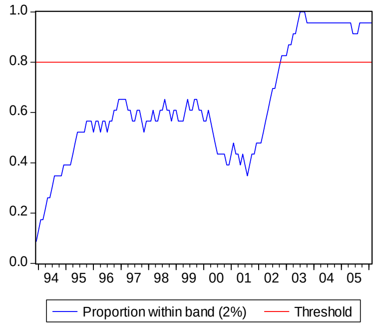

Figure 17: Proportion of monthly variations in the Maltese lira. Bands of ±2%

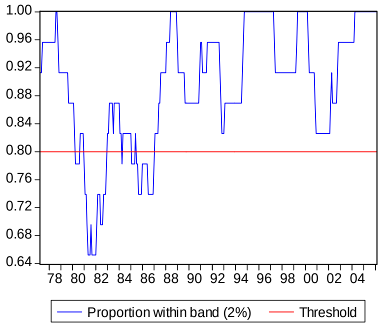

Figure 18: Proportion of monthly variations in the Polish zloty. Bands of ±2%

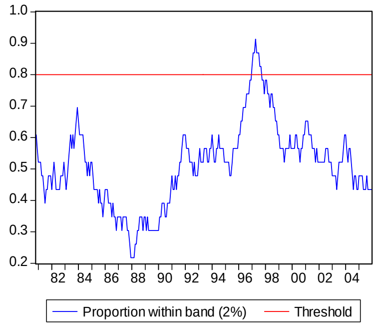

Figure 19: Proportion of monthly variations in the Slovak koruna. Bands of ±2%

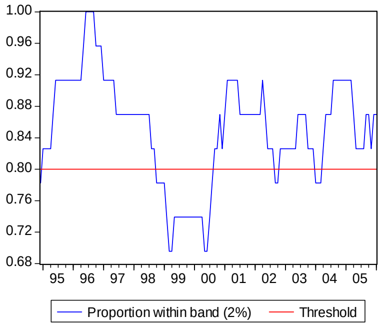

Figure 20: Proportion of monthly variations in the Slovenian tolar. Bands of ±2%

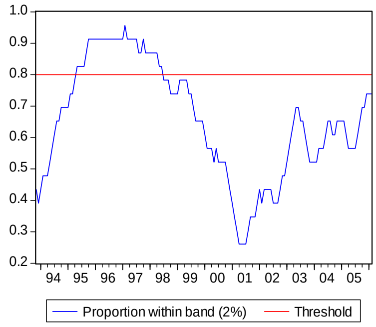

Figure 21: Test of the average monthly variations for the Cyprus pound. Bands of ±1%

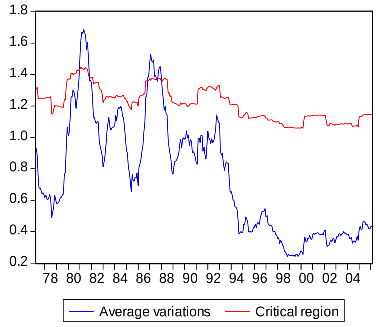

Figure 21: Test of the average monthly variations for the Czech koruna. Bands of ±1%

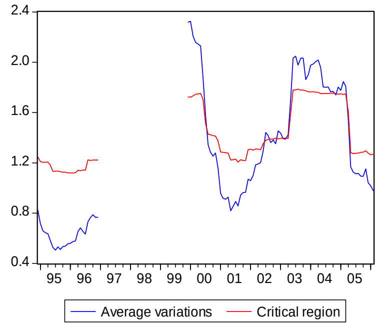

Figure 23: Test of the average monthly variations for the Estonian kroon. Bands of ±1%

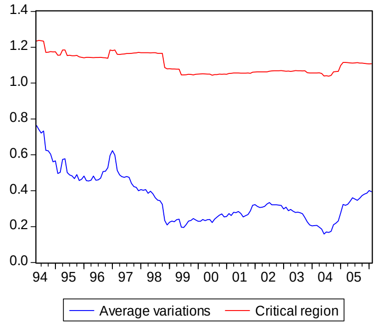

Figure 24: Test of the average monthly variations for the Hungarian forint. Bands of ±1%

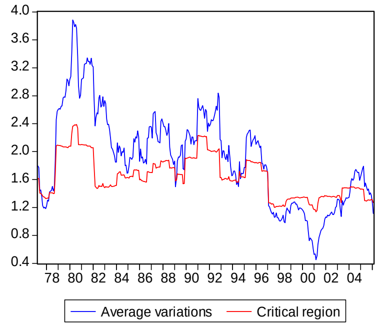

Figure 25: Test of the average monthly variations for the Latvian lat. Bands of ±1%

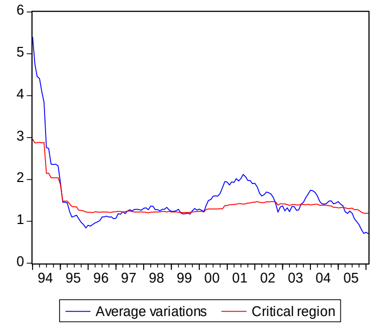

Figure 26: Test of the average monthly variations for the Lithuanian lita. Bands of ±1%

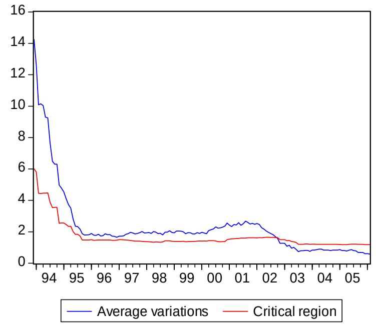

Figure 27: Test of the average monthly variations for the Maltese lira. Bands of ±1%

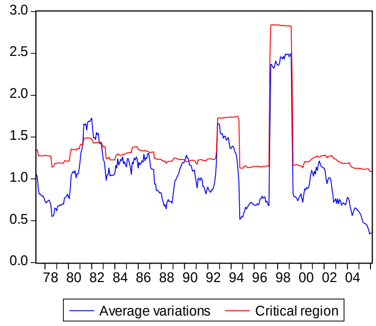

Figure 28: Test of the average monthly variations for the Polish zloty. Bands of ±1%

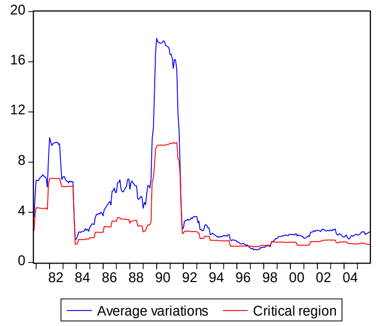

Figure 29: Test of the average monthly variations for the Slovak koruna. Bands of ±1%

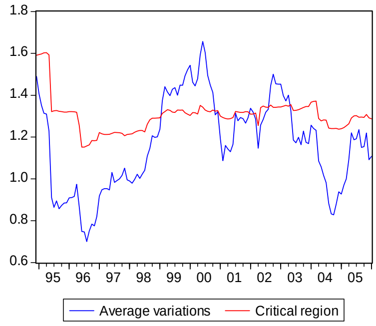

Figure 30: Test of the average monthly variations for the Slovenian tolar. Bands of ±1%

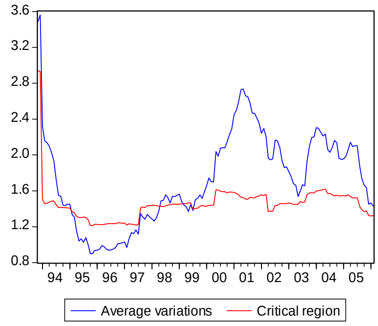

Figure 31: Test of the average monthly variations for the Cyprus pound. Bands of ±2%

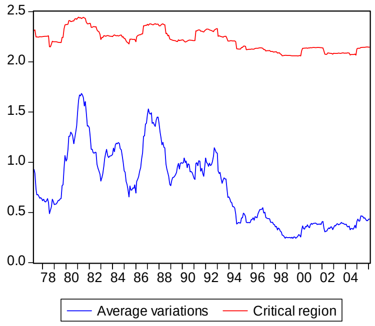

Figure 32: Test of the average monthly variations for the Czech koruna. Bands of ±2%

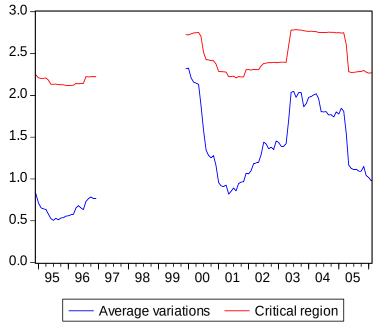

Figure 33: Test of the average monthly variations for the Estonian kroon. Bands of ±2%

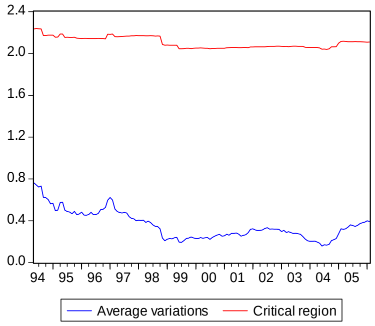

Figure 34: Test of the average monthly variations for the Hungarian forint. Bands of ±2%

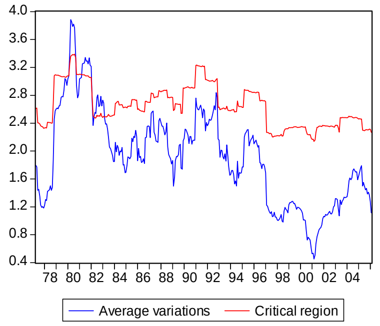

Figure 35: Test of the average monthly variations for the Latvian lat. Bands of ±2%

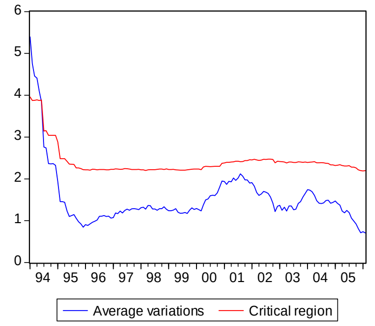

Figure 36: Test of the average monthly variations for the Lithuanian lita. Bands of ±2%

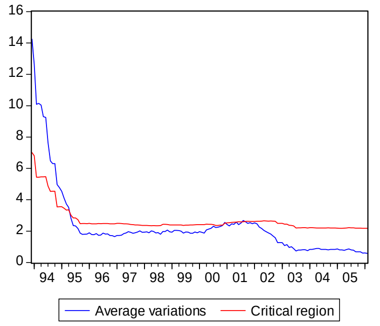

Figure 37: Test of the average monthly variations for the Maltese lira. Bands of ±2%

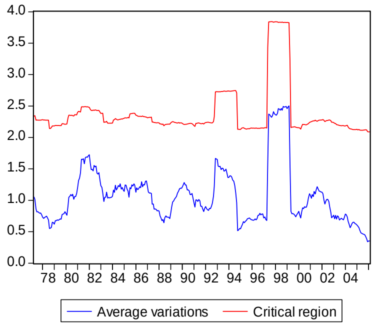

Figure 38: Test of the average monthly variations for the Polish zloty. Bands of ±2%

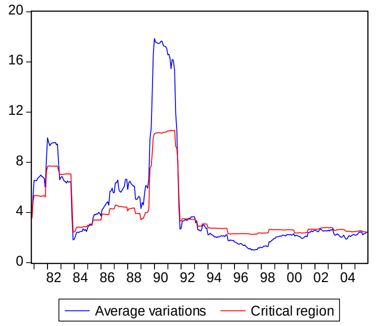

Figure 39: Test of the average monthly variations for the Slovak koruna. Bands of ±2%

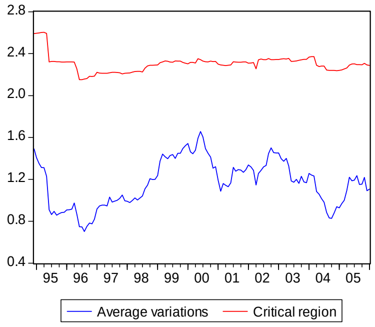

Figure 40: Test of the average monthly variations for the Slovenian tolar Bands of ±2%

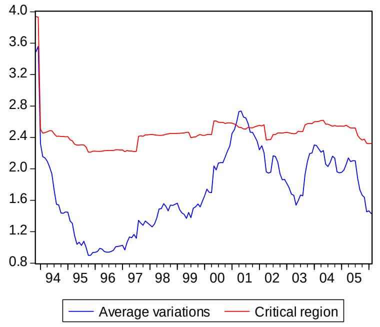

Table 1

Probability of a peg in Cyprus

	Coefficient	**t-Student**
Constant	-3.7476	-4.7879
Past inflation rate	14.2883	3.5784
Past unemployment rate	-1.0186	-4.5007
LR statistic (2 df)	28.7991	
McFadden R-squared	0.3855	

Notes:

a. The LR statistic tests the joint null hypothesis that all slope coefficients except the constant are zero. McFadden R-squared is the likelihood ratio index.
b. In accordance with our methods of computing the implicit bands, both past inflation and unemployment rates are computed as the rolling average rate for the previous twenty-four months.

Table 2

Probability of a peg in the Czech Republic

	Coefficient	**t-Student**
Constant	44.4550	3.7525
Past inflation rate	59.0078	3.7421
Past unemployment rate	-4.8109	-3.7690
LR statistic (2 df)	41.4184	
McFadden R-squared	0.4795	

Notes:

c. The LR statistic tests the joint null hypothesis that all slope coefficients except the constant are zero. McFadden R-squared is the likelihood ratio index.
d. In accordance with our methods of computing the implicit bands, both past inflation and unemployment rates are computed as the rolling average rate for the previous twenty-four months.

Table 3

Probability of a peg in Hungary

	Coefficient	**t-Student**
Constant	3.2639	3.9334
Past inflation rate	5.5808	3.1155
Past unemployment rate	-3.1994	-3.8011
LR statistic (2 df)	9.5990	
McFadden R-squared	0.6834	

Notes:

e. The LR statistic tests the joint null hypothesis that all slope coefficients except the constant are zero. McFadden R-squared is the likelihood ratio index.
f. In accordance with our methods of computing the implicit bands, both past inflation and unemployment rates are computed as the rolling average rate for the previous twenty-four months.

Table 4

Probability of a peg in Latvia

	Coefficient	**t-Student**
Constant	4.6481	3.6253
Past inflation rate	7.8529	3.7353
Past unemployment rate	-4.0812	-3.7025
LR statistic (2 df)	13.2982	
McFadden R-squared	0.3423	

Notes:

g. The LR statistic tests the joint null hypothesis that all slope coefficients except the constant are zero. McFadden R-squared is the likelihood ratio index.
h. In accordance with our methods of computing the implicit bands, both past inflation and unemployment rates are computed as the rolling average rate for the previous twenty-four months.

Table 5
Probability of a peg in Lithuania

	Coefficient	t-Student
Constant	0.6008	3.4822
Past inflation rate	8.3234	3.8816
Past unemployment rate	-2.4414	-3.1040
LR statistic (2 df)	46.3815	
McFadden R-squared	0.4562	

Notes:

i. The LR statistic tests the joint null hypothesis that all slope coefficients except the constant are zero. McFadden R-squared is the likelihood ratio index.
j. In accordance with our methods of computing the implicit bands, both past inflation and unemployment rates are computed as the rolling average rate for the previous twenty-four months.

Table 6
Probability of a peg in Malta

	Coefficient	t-Student
Constant	-7.0312	4.5162
Past inflation rate	7.7689	3.1706
Past unemployment rate	-3.1359	-3.6338
LR statistic (2 df)	45.4401	
McFadden R-squared	0.4712	

Notes:

k. The LR statistic tests the joint null hypothesis that all slope coefficients except the constant are zero. McFadden R-squared is the likelihood ratio index.
l. In accordance with our methods of computing the implicit bands, both past inflation and unemployment rates are computed as the rolling average rate for the previous twenty-four months.

Table 7
Probability of a peg in Poland

	Coefficient	t-Student
Constant	9.1895	4.3979
Past inflation rate	5.4419	3.6794
Past unemployment rate	-3.8557	-4.7510
LR statistic (2 df)	50.7758	
McFadden R-squared	0.4279	

Notes:

m. The LR statistic tests the joint null hypothesis that all slope coefficients except the constant are zero. McFadden R-squared is the likelihood ratio index.
n. In accordance with our methods of computing the implicit bands, both past inflation and unemployment rates are computed as the rolling average rate for the previous twenty-four months.