International Center for Economic Growth
European Center

WORKING PAPERS
NR. 6.

MACROECONOMIC STUDIES

ANDREAS FREYTAG:

Accession to EMU and Exchange Rate Policies in Central Europe – Decision Under Institutional Constraints

JANUARY 2002

Andreas Freytag*

Paper prepared for the research project "Alternatives for Exchange Rate Regimes in Advanced Transition Economies" of the ICEG, supported by ACE. I very much benefited from the discussions at two project workshops in Budapest and Portoroz.

* Dr Andreas Freytag, Institute for Economic Policy, University of Cologne, Pohligstr. 1, 50969 Cologne, Germany, Phone: ++49 221 470-5348/47, Fax: ++49 221 470-5350, e-mail: andreas.freytag@uni-koeln.de. I gratefully acknowledge reearch assistance by Jörg Wiegratz.

CONTENTS

I. INTRODUCTION

Currently, five Central and Eastern European countries (CEE) are negotiating about membership in the European Union: the Czech Republic, Estonia, Hungary, Poland and the Slovak Republic. Although it can be assumed that their accession will be a time-consuming process with a long transition period, there is a broad consensus that it will eventually result in membership in the European Monetary Union (EMU). To achieve this goal, the countries have to fulfil several conditions (Maastricht criteria), the most important being that the annual inflation rate prior to the accession does not exceed the annual inflation rate in Euroland by more than 1.5 per cent and that the exchange rate between domestic currency and the Euro remains stable prior to accession.[1]

Given that the economic policy assignment is correct, monetary policy is responsible for both conditions. Therefore, the exchange rate arrangement of the EU applicants plays an important – but not exclusive – role in their policy-mix. The history of transition economies as well as of other emerging markets illustrates that exchange rate policies as such are not a distinctive factor for the success and failure of monetary policy with respect to price stability. They have to be seen in a broader context; this is sometimes overlooked in the debate of appropriate exchange rate systems. Almost every possible exchange rate arrangement in transition countries was associated with both high and low inflation rates. Although in the long run, some of these countries will have to aim at a fixed exchange rate towards to the Euro (via ERM 2 or a similar arrangement) with its eventual adoption, obviously there is no one-size-fits-all exchange rate arrangement to meet the Maastricht criteria.

In this paper, we therefore argue that there is no naturally superior exchange rate regime that can be applied to all advanced countries in transition when trying to meet the inflation criterion of the Maastricht Treaty. By way of contrast, an exchange rate arrangement is part of the monetary regime, which itself is a component of the economic order. The latter consists of both politically chosen and spontaneously evolved institutions. This leads to the hypothesis that the choice of an exchange rate arrangement in CEE is constrained by this institutional setting. This hypotheses will be developed and tested as follows. In section 2, we distinguish possible exchange rate arrangements for transition economies. In the third section, we will theoretically discuss the relation between exchange rate arrangement, monetary commitment and institutional factors. These considerations will be tested empirically for transition countries in Central and Eastern Europe in section IV. Lessons for those countries applying for EU membership will be drawn in section V.

II. POTENTIAL EXCHANGE RATE REGIMES PRIOR TO EMU MEMBERSHIP

In this section, we briefly recapitulate the properties of the most relevant exchange rate arrangements with respect to bringing down inflation on EMU level. One can think of several exchange rate arrangements for countries in transition to EMU. For one, the domestic

---

[1] See Szapáry (2000) for a substantial critique of the Maastricht criteria, especially the inflation criterion, from a CEE perspective.

currency can float freely; it is not fixed to other currencies. The central bank can exclusively concentrate on the objective of price stability; it is not forced to consider the exchange rate. On the other hand, there is no external anchor, which allows to import stability. Second, the central bank intervenes occasionally to prevent excessive exchange rate fluctuations and to keep the exchange rate stable. This system is called managed floating. The problem is that the markets probably do not receive a clear signal about the strategy and intentions of the central bank.

Third, the transition country can fix its currency to the Euro. For this regime to be successful it is not necessary to sign a formal international treaty. The transition country only has to announce that it fixes its exchange rate to the Euro and thereby uses this currency as a nominal anchor. This arrangement allows to import stability.

Similarly, a country aiming at a disinflation process can fix its exchange rate to another currency, but depreciates its currency regularly and by a pre-announced rate (crawling peg), e.g. 1.5 per cent per month. A basic rate towards the reserve currency is set, with an exchange-rate band, e.g. ±10 per cent. There will be no intervention as long as the exchange rate does not fall short of this band on the market for foreign exchange. Every month or quarter, the currency will be depreciated by the fixed percentage. This is done by raising the base rate (in domestic currency per reserve currency). It is aimed at reducing the costs of disinflation by a crawling peg. Poland employed this regime until April 2000.

Fifth, a currency board system (CBS) as an extreme form of an informal fixed-exchange-rate arrangement has increasingly gained importance throughout the 1990s.[2] When introducing a currency board, the government fixes the exchange rate towards a reserve currency and guarantees full convertibility of its own currency. Monetary policy is pursued by a monetary institution, which only has a couple of tasks. Whereas a central bank has a variety of monetary instruments, with which it can influence either quantities or prices on the market for money and credit, a currency board has none. It issues notes and coins exclusively against foreign currency. The board merely reacts to the supply or demand of market participants. The monetary base is fully backed by foreign exchange. Besides issuing money on demand the currency board has another duty. The reserve currency does not have to be held entirely in cash. The board can invest part of the reserves in order to earn interest payments. These can either be added to the reserves in order to protect the board from possible future losses[3] or it can be handed to the government as additional revenues. It is self-evident that the board has to invest the foreign reserves in secure assets, which can be converted into cash very rapidly in case a large number of citizens wishes to cash in domestic notes and obtain foreign currency in cash.

Therefore, the board has no control of the money supply in the country. It cannot act as a lender of last resort in case a commercial bank has liquidity problems or even goes bankrupt. This makes it highly necessary to introduce a prudential banking regulation (Baliño, Enoch et

---

[2] For a comprehensive description see Hanke and Schuler (1994).
[3] The West-African Currency Board (1913-1971) for instance created a backing of 110 per cent of the money base by adding seigniorage to the reserves (Schuler 1992, p. 59). Thereby, it tried to protect itself from losses from its portfolio.

al. 1997, pp. 20-23). The money supply can be made more regular and predictable if foreign banks are allowed or even encouraged to operate branches in the CBS country. A very important aspect of a CBS is the choice of the correct reserve currency. A currency board can import stability by fixing the exchange rate to the reserve currency.[4] If a sound currency such as the US-dollar is chosen, a necessary condition for stability is fulfilled. For example, in 1992, Estonia introduced a CBS (Bennett 1994), which is still in operation.

A final form is eurosation[5], which implies that the country does not issue its own currency. Instead, a foreign currency, the Euro, circulates and is used for all purposes, i.e. cash holdings, banking accounts, credits and so forth. In the context of this paper, eurosation is a deliberately chosen monetary regime, as opposed to cases, where, due to instability, another currency has driven out the official currency (Fontaine 2000). The country, in which only a foreign currency circulates cannot pursue its own monetary policy. It has no source of interest payments, which can be used for the public budget. Moreover, the fact that a country does not have its own currency is sometimes considered a disadvantage, since many people may regard the exclusive circulation of foreign exchange as somewhat humiliating.

The choice of the appropriate exchange rate arrangement to guarantee stability and to enhance the chances of a fast accession to EMU is not easy. In the following section we analyse how the exchange rate arrangement is related to the monetary regime and the economic order and discuss the consequences of the relationship for the choice of the exchange rate system.

III. Exchange Rate Regime, Monetary Commitment and Institutions: Theoretical Considerations

Monetary policy and other policy areas are closely related. On average countries performing badly in one field, seldom function well in others. This shows that monetary performance cannot be judged separately from other policy areas. The monetary regime is a component of the economic order. In economic policymaking, a number of objectives have to be met. Price stability, full employment, growth are the most important ones. Politically, it is very tempting to try to meet several objectives with one policy variable. Policymakers may then hope to obtain a so-called double dividend.

Monetary policy has been one of the most attractive policy instruments in the history of economic policymaking. It has been employed regularly to meet other policy objectives beside price level stability. On the contrary, price stability has often been neglected. Monetary policy has been abused as a means to enhance employment and output, to balance the public budget and to balance the current account. In transition economies, the considerable need for seigniorage has regularly been the most relevant cause for money growth and subsequent inflation (see also section IV). However, theoretical analysis as well as empirical evidence

---

[4]   Due to the Balassa-Samuelson-effect, the inflation rate in the currency board country can be higher than in the reserve country.

[5]   In the literature, this is commonly defined as dollarisation.

show that it is practically impossible to meet this objective with the means monetary policy. The objective of price stability is also missed.

Thus, it follows that economic policy in general is successful if every policy instrument were assigned to one policy target. For each policy objective, there is one agency, which decides on its policy instruments independent of the others (Tinbergen 1952). This has two advantages concerning the objective of combating severe inflation. The most important argument in favour of the Tinbergen rule is that it is a strong signal that the government is serious about separating the economic policy areas; the temptation to aim at a double dividend (e.g. an increase in seigniorage and stable prices) is resisted. Besides, the analytical problem of policymaking is neither under-determined nor over-determined. On the same token, if the components of economic order, e.g. the monetary regime, labour market regulation and the like are compatible with each other, monetary policy can concentrate on price stability.

a) Legal monetary commitment

This has consequences for the design of monetary policy. To begin with, the monetary regime can be assessed with the help of legal measures such as the concept of central bank independence (CBI). The existing indices of CBI however have serious flaws as they do not consider external monetary relations. This is extremely important in the context of the problem at hand. Therefore, we employ a version of an alternative measure, the index of monetary commitment, which is more comprehensive than any measure of CBI (Freytag 2001a). The index is constructed as the average of a number of components, along the lines leading indices have been built. For the problem at hand and due to difficulties to generate data, we have to proceed in two steps. First, select the most important components of the index, which are the following:

Objectives of monetary policy. These may be restricted to price stability, but also my include other macroeconomic goals. In the latter case, commitment is lower (*obj* in *Table 1*).

Conditions of lending to the government. This is a crucial component, as it shows whether or not monetisation of public budget deficits is excluded. If the central bank is not able to lend to the government, commitment is high (*lim*).

Convertibility restrictions. These include convertibility for both current account and capital account transactions (*conv*).

Public pledges of the government with respect to the exchange rate system. It is assumed that fixing the exchange rate to the Euro increases legal commitment. A ranking of the six different exchange rate arrangements discussed in section II is as follows keeping other components constant, the strongest commitment is eurosation, followed by a currency board, fixed exchange rates, a crawling peg, managed floating and, finally, freely floating exchange rates (*extern*).

Number of exchange rates. Multiple exchange rate show that the government intervenes discretionarily and diminishes the degree of commitment (*mult*).

Table 1
Index of commitment: a suggestion for codings

Criterion	Component	Explanation	Numerical codings
Stated objectives of	*obj*	1. Price stability only goal	1.00
monetary policy		2. Other objectives mentioned	0.50
		3. No goals for monetary policy	0.00
Limitations on lending to the Government	*lim*	1. Central Bank (CB) is prohibited to give credit to the public	1.00
		2. CB is allowed to purchase public bonds in hard currency on the secondary market	0.66
		3. CB is allowed to purchase public bonds in any currency on the secondary market and to give limited credit to the government	0.33
		4. No government lending limitations	0.00
Convertibility Restrictions	*conv*	1. Full convertibility	1.00
		2. Partial convertibility	0.75
		3. Convertibility for current account transactions only	0.50
		4. Convertibility for capital account transactions only	0.25
		5. No convertibility	0.00
Public pledges of the	*extern*	1. CBS	1.00
Government		2. Exchange rate fixed	0.75
		3. Crawling peg	0.50
		4. Managed floating	0.25
		5. No external pledge, free floating	0.00
Number of Exchange	*mult*	1. One exchange rate	1.00
		2. Multiple exchange rates	0.00

Source: Freytag (2001a), own changes.

The index of legal monetary commitment can be composed as an (unweighted or weighted) average of these components. In a second step, we distinguish those components directed to

internal commitment (*IC*) from those related to the exchange rate regime (*ER*). In *Table 1*, the latter are separated by the horizontal line after the component lim.[6]

b) Restricting Institutions

Of course, legal commitment is not equal to actual commitment. The case that the government does not abide by its commitment seems to be the rule rather than the exception. Even if the government is determined to stabilise the economy and to stop inflation, it may seem politically useful for it to deviate from the chosen commitment. This is where credibility enters the stage: the higher the credibility of the monetary regime is, the lower the deviation will be. Therefore, it is important to note that the degree of commitment does not necessarily correspond with the credibility of monetary policy. It is not meant to measure actual commitment. Instead, the index focuses on legal determinants of commitment. In other words: the index measures what governments promise instead of to what extent governments keep their promises.

Following this reasoning, a monetary regime is more credible and successful, if it is compatible with the other institutional factors in the country. They are constraints for the design of components of the economic order. These constraints can be the result of a purposeful process of policymaking, just as discussed above. Or they emanate spontaneously without an official mandate. Such institutional constraints are to be considered when the exchange rate regime is decided upon to meet the Maastricht criterion on inflation. We identify five relevant institutional factors determining the comprehensive economic order (Freytag 2001b):

- Political stability gives evidence about the robustness of the political system. High stability implies that a political system is stable rather than long-term survival of a party in government.

- An indicator of Fiscal stability shows whether or not a government can keep the public budget balanced. Ideally, it should not be based exclusively on historical performance.

- Labour market flexibility is ideally measured by an index giving evidence of the duration of unemployment and the speed, with which structural change is managed on the labour market.

- Openness of the country shows whether or not the world market price structures are valid in the country. It is usually restricted to trade (exports plus imports).

- Public attitude to inflation displays the sensibility of the public as regards inflation. It is comprised of past experience and actual regulations. The former inflation record is especially relevant for a country after a hyperinflation. People are very sensitive as regards stability: since they know the cost of inflation on average they strongly oppose another

---

[6] In Table 1 as well as in the empirical section, eurosation is missing, for it is not applied in the sample.

hyperinflation. Elements determining this institution are past inflationary experience, indexation and price freezes. In transition economies, however, the past inflation experience may be too little to form a collective memory.

The first factor (political stability) is a summary of the formal and informal rules that affect the way, in which the political system in general responds to incentives and constraints. The second, third and fourth institutional factors regard other relevant fields of economic policy. Nevertheless, they indirectly influence most governments in their decision on whether or not allowing for inflation. The fifth factor (public attitude to inflation) shows how much the public responds to an inflationary bias of policymakers. It seems necessary to take into account the comprehensive institutional setting. In other words: it would not be satisfactory to concentrate on single aspects, i.e. single institutions.

However, it turns out to be impossible to calculate meaningful institutional indicators for transition countries. Therefore, the institutional setting can be mirrored by several indices of economic freedom existing in the literature. We introduce four of them:

- The study by Johnson, Holmes and Kirkpatrick (1999) applies ten criteria to measure economic freedom of 160 countries. These concern the regulation of the following areas: trade policy, taxation, government intervention in the economy, monetary policy, capital flows and foreign investment, banking, wage and price controls, property rights, (general) regulation, and black market activities (ibid., pp. 51-68). The authors compare the period 1996 through 1998, which does not cover the time span of our analysis.

- The survey of "Freedom in the World" (Freedom House 2001) is restricted to two series of questions: one regarding political rights and one regarding civil liberties. Each country or territory considered is assigned a rating for each category. Both ratings are averaged and used to assign each country and territory to an overall status of "Free," "Partly Free," or "Not Free." This categories are not precise enough. They may serve as an addition to institutional factors.

- The European Bank for Reconstruction and Development (EBRD) has introduced the EBRD Liberalisation index (Fidrmuc 2000). It describes the average progress in liberalisation in transition countries and consists of the following components: privatisation, price liberalisation, enterprise restructuring, trade and foreign exchange liberalisation, competition policy, banking reform, securities market and legal rules on investment. Thus, it can be used as an approximation of the institutional setting.

- The index of economic freedom as constructed by Gwartney, Lawson and Samida (2000). is based on 23 criteria summarised in the seven following groups: size of government, structure of the economy, monetary policy, freedom to use alternative currencies, legal structure and property rights, international exchange, international capital mobility.[7] The authors calculate the economic freedom of 123 countries between 1975 and 1997. Naturally, to be useful for the goal of our analysis, the criteria for monetary policy and

---

[7] For the weighting see Gwartney, Lawson and Samida (2000, p. 7).

freedom to use foreign currencies have to be eliminated from the index since monetary commitment has already been considered. Moreover, it is necessary to avoid statistical interference. This is the most comprehensive and widely used index, acknowledged by the literature (e.g. Henderson 1999). Therefore, we use it for our empirical section. We also test for the EBRD Liberalisation index.

c) The theory

These considerations shall be explored further in the following. We assume that a new exchange rate regime is introduced to (further) reduce Imagine an objective function of the government depending positively on seigniorage S and negatively on costs of inflation ϕ, which in turn depend on both actual and expected inflation (Barro 1983). The policymaker's problem is given by:

(1) $Z = \delta S - \phi(\pi, \pi^e) \rightarrow \max_{\pi}$,

      where: $\dfrac{d\phi}{d\pi} > 0$ and $\dfrac{d\phi}{d\pi^e} > 0$.

The weight the government places on seigniorage in (1) is denoted by δ with $\delta \geq 0$. The smaller the value of δ, the higher the acceptance of the need for price level stability. We set $S \equiv \dfrac{\dot{M}}{M}\dfrac{M}{P} = mL(\pi^e) = m\exp(-\alpha\pi^2)$ (Cagan 1956). Since we are taking a long term perspective and due to the Fisher equation, we can set $m = \pi$. We further define $\phi = \exp(\pi^2 + k(\pi^e))$ where $k(\pi^e)$ describes the costs of expected inflation. Increasing expected inflation raises the political costs associated with inflationary expectations. The government takes the expected inflation rate as given. The fact that actual inflation is introduced into the cost function in a quadratic form takes into account the costs of deflation as well. Thus the objective function becomes:

(2) $Z = \delta\pi\exp(-\alpha\pi^e) - \exp(\pi^2 + k(\pi^e))$.

The costs of commitment $k(\pi^e)$ can be interpreted as a function of the difference between the degree of commitment C (consisting of both internal and external components) and the institutional setting (*IS*) calculated as the average of the institutional factors i. As a convention, they are restricted between 0 and 1 (Cukierman 1992, chapter 19). The costs are the higher, the smaller the difference is between the level of commitment C and the average level of the institutional factors IF_i ($IS = \sum IF_i / n$). Whereas in case of the index of commitment, a value close to zero (one) implies low (high) commitment, in case of *IS* a value close to zero (one) indicates low (high) compatibility of the institutional setting with high commitment. Low (high) compatibility leads to the probability of a good monetary performance being low (high). We have chosen an absolute form to make sure that the summand is positive. As a result of (2), the costs of commitment decrease when compared to

the highest costs not only if the degree of commitment is too low, but also if it is too high. To properly take these into account, we specify the costs of commitment as follows:

$$(3) \quad (k\pi^e) = \frac{1}{|C - IS|},$$

The economic reason for this specification is that the public has rational expectations and is well informed about the interaction of monetary commitment and other institutions. It recognises deviations from an economically sound design of the monetary regime under given constraints and adjusts its expectations adequately. This has consequences for the consistency of a monetary regime. Equation (3), therefore, has another interesting property. The expression $1/|C - IS|$ can be interpreted as a proxy for credibility. Credibility does not only depend on the degree of commitment, but also on the compatibility of commitment and institutional framework in the country. The lower the absolute difference between the two values is, the higher the credibility of the monetary regime will be and vice versa. Thus, here we have an ex-ante proxy for credibility, which is important for policy conclusions. It enables the policymaker to assess the credibility of a monetary reform in advance.[8] The economic logic of the proxy can be made intuitively clear by a simple example: imagine a very strong monetary commitment, e.g. a currency board, which does not leave discretionary leeway for the government. Suppose at the same time very corporatist wage negotiations, valid for all industries on a national level. If this regime is not subject to a turn towards more flexibility, a tight monetary policy will probably cause unemployment to rise. Then, unemployment may become unbearable for the government. The latter may feel the need to abandon the currency board; the monetary regime fails.

Finally, let us determine the optimal inflation rate of a policymaker under commitment. Equation (2) and (3) can be maximised with respect to π. Maximisation of Z leads to:

$$(4) \quad \delta \frac{M}{P} = 2\pi \exp\left(\pi^2 + \frac{1}{|C - IS|}\right).$$

Equation (4) can be rearranged into:

$$(5) \quad \ln 2\pi + \pi^2 = \ln \delta + \ln(M/P) - \frac{1}{|C - IS|}.$$

The higher the credibility is, i.e. the better the monetary regime acknowledges institutional constraints, the lower the politically optimal inflation rate will be. A high inclination for seigniorage and a high demand for real balance is likely to increase the inflation rate. These results are in line with the macroeconomic literature.

What does this imply for the appropriate exchange rate regimes in advanced transition countries. As it is one component of the measure of legal commitment, an exchange rate

---

[8]   By way of contrast, other proxies used for credibility are ex-post measures, which can only be applied after the reform has been made. See e.g. Blackburn and Christensen (1989, pp. 35-40).

arrangement does not exclusively distinguish success and failure in reform by itself. Nevertheless, they play a role when determining the credibility of the monetary regime. They can raise legal monetary commitment and enhance the credibility if the commitment fits the institutional setting. To separate the exchange rate arrangement from the other components of economic order, we rearrange the index of commitment as follows: $C = \beta IC + (1-\beta)ER$, where IC denotes the internal aspects of monetary commitment and ER those related to the exchange rate arrangement; β is the weight given to the internal aspects. Equation 3 can be rearranged in the following way.

$$(6) \quad (k\pi^e) = \frac{1}{\left| (\beta IC + (1-\beta)ER) - IS \right|},$$

Equation (6) illustrates more clearly than before that the choice of the exchange rate arrangement (ER) – commonly with other elements of economic order – determines the credibility of the monetary regime and, thus, the politically optimal inflation rate. Given the objective of long-term stability for Central European countries, this is a very important hypothesis based on the theoretical reasoning. In the following section, this hypothesis will be tested empirically.

IV. EXCHANGE RATE POLICIES IN CENTRAL EUROPE: THE APPROPRIATE CHOICE?

a) The choice of exchange rate regimes in CEE

The countries in Central and Eastern Europe have opted for very different exchange rate arrangements. Moreover, most of them have changed the arrangement at least once since the beginning of the transition period. This can either reflect a high degree of uncertainty of the policymakers or an institutional change, which also has lead to an adjustment of the exchange rate policy.

However, the motivation for the choice of an exchange rate arrangement is not in the focus of our analysis. We are interested in an answer to the question of whether or not it enhances stabilisation if the exchange rate is properly embedded into the economic order. For an empirical test of the hypothesis expressed in equation (5), an econometric model has to be created based on the theoretical considerations. The sample consists of all exchange rate arrangements in Central and Eastern Europe since the beginning of transition. The arrangements, which have been chosen by the countries in transition since 1991, can be seen in *Table 2*.

Table 2
Exchange rate arrangements in CEE countries (April 2000)

Country	Change in the Exchange Rate Regime	Year
Bosnia and Herzegowina	Currency Board	1997*
Bulgaria	independent floating	1991*

	Currency Board	1997*
Croatia	independent floating	1993*
Czech Republic	Peg	1991*
	managed floating	1997*
Estonia	Currency Board	1992*
Hungary	crawling peg	1995*
Latvia	flexible exchange Rate	1992*
Lithuania	fixed exchange rate (to the rouble)	1992
	Currency Board	1994*
Macedonia	independent floating	1992*
	conventional pegged arrangement	1994*
Poland	crawling band	1995*
	floating	2000
Romania	managed floating	1991*
Russia	fixed exchange rate	1994*
	managed floating	1998*
Slowak Republic	fixed exchange rate	1993*
	managed floating	1998*
Slovenia	managed floating	1991*

* included in the sample for the empirical test.
Source: Fischer (2001), IMFa, IMFb.

b) Data restrictions

Table 2 consists of 21 exchange rate regime switches taking place in the 1990s, of which 19 are used in the econometric assessment. As mentioned earlier, we restrict the index of commitment to the five components shown in Table 1. We are also unable to generate all data required for the institutional factors. Thus, we construct a restricted index *IC*, consisting of four components (*obj*, *lim*, *conv* and *mult*). In addition, the external relationship (*ER*)is expressed through the component *extern*. The institutional setting will be represented by the index of economic freedom (EF) as well as the EBRD Liberalisation index.

c) The variables

Equation (5) has to be rearranged for the theoretical considerations to be tested empirically. The endogenous variable is the natural log of the consumer price inflation (CPI) in the period *t+1* to *t+3* after the regime switch, in some cases it has to be restricted to two periods (see *Table 2*). This choice reflects the dynamics of the disinflation process. Following equation

(6), credibility is expressed as the absolute difference between monetary commitment ($IC + ER$) and the institutional setting in the form of the index of economic freedom (EF) and the EBRD Liberalisation ($EBRD$)index respectively. Both are composed of different aspects

of economic order and restricted between 0 and 1.[9] We calculate the ex-ante proxy for credibility based on EF and $EBRD$ as $CRED_{EF} = (0.6 * IC + 0.4 * ER - EF)$ and $CRED_{EBRD} = (0.6 * IC + 0.4 * ER - EBRD)$ respectively with $IC = (obj + \lim)/2$ and $ER = (0.6 * extern + 0.2 * conv + 0.2 * mult)$ (see *Table 1*). The expression $\ln \delta + \ln(M/P)$ in equation (5) will be approximated by the share of money growth in the public revenues for the period *t+1* to *t+3* after the regime switch (or shorter, depending on the data). This is a common proxy for seigniorage.[10] Therefore, the basic econometric equation for a cross-section analysis is given in equation (7):

(7) $CPI = \beta_0 + \beta_1 CRED_{EF(EBRD)} + \beta_2 SEIGN + \varepsilon$,

where $\varepsilon \sim \mathrm{ND}(0, \sigma_\varepsilon^2)$. *CPI* denotes inflation after the introduction of the new exchange rate arrangement, *CRED* stands for the ex-ante measure of credibility and *SEIGN* for seigniorage. Theoretically, one would expect a negative sign for the credibility variable and a positive sign for *SEIGN*. In a second step, we test whether the elements of the ex-ante proxy for credibility on their own have a positive impact on monetary stability. Equation 8 is a similar approach, adding up the single elements:

(8) $CPI = \beta_0 + \beta_1 C + \beta_2 ER + \beta_3 EF(EBRD) + \beta_4 SEIGN + \varepsilon$

d) The econometric results

The estimations of equations (7) and (8) are reported in *Table 3*. Estimations 1 and 2 are directed to the core of the theoretical analysis of the paper. They show the expected signs, although the parameter of *CRED* is insignificant. Seigniorage is significant and can explain the dynamics of inflation. Estimations 3 through 5 show that the importance of institutions can be better highlighted if the additive approach of equation (8) is applied. They also show that internal monetary commitment (IC) as defined in *Table 1* cannot explain a disinflation process when combined with institutions. Estimations 6 and 7 make clear that the exchange rate regime can only explain a small part of the monetary performance in CEE countries. Although the commonly held view that external commitment can improve the monetary performance cannot be rejected on the basis of this regression, it is clear that there is no a priori superior exchange rate system for the purpose to reduce inflation. Estimations 8 through 11 control for the importance of institutions. Economic freedom as approximation and liberalisation as proxies for the economic order can restrict the policymakers discretionary power to increase inflation. In general. the *EBRD* variable explains the

---

[9]   In our sample, these indicators are highly correlated with each other (correlation coefficient: 0.64) and to a much lesser extent with IC and ER (correlation coefficients between 0.08 and 0.38).

[10]   For methodical details see Freytag (2001b). For a critique see Klein and Neumann (1990) as well as Neumann (1992).

disinflation process better, which may be due to the dynamic properties of this index.[11]. Finally, the variable *SEIGN* is significant for inflation. This result confirms conventional wisdom.

Table 3
Credibility of exchange rate regimes in CEE: the econometric results[1]

Estimation	CRED	ER	IC	EF	EBRD	SEIGN	R²adj	N
1	-1.3²					0.09***	0.16	16
2	-2.13³					-0.1**	0.25	17
3		-1.25	2.49**	-5.52		0.09**	0.37	16
4		-1.57*	2.41***		-4.59**	0.07*	0.51	17
5		-1.73**	2.32***			0.1**	0.33	17
6		-1.33	-0.22				0.03	19
7		-1.45					0.09	19
8					-6.12***		0.33	18
9				-7.25**			0.25	16
10					-4.71*	0.07*	0.44	17
11				-5.93*		0.07**	0.36	16

[1] Cross-sectional OLS-regression applying the White heteroscedasticity test;
[2] $CRED_{EF}$;
[3] $CRED_{EBRD}$. The estimations are made with EViews3. The absolute ($ß_0$) is not reported.
*, **,*** significant at 10 per cent level, 5 per cent level, 1 per cent level respectively.
Source: IMFa, IMFb, IMFc. Central bank laws have been downloaded from the internet. See Institute for Economic Policy 2001, Gwartney, Lawson and Samida (2000), Fidrmuc (2000), own calculations.

    To summarise, although to be treated extremely cautiously, the results can be called promising in that they show the relevance of institutions for the appropriate choice of the exchange rate arrangement for CEE countries, if monetary stabilisation is the goal of monetary policy including exchange rate policy. At the same time, they show that the reservations against the empirical application concept of central bank independence for others than industrialised countries (Eijjfinger and de Haan 1996) are sensitive, as *IC* displays the expected sign only when commonly estimated with *ER* and without other exogenous variables (estimation 5). However, the coefficient of determination R²adj in this case is extremely low. In addition the significant positive sign of *IC* in the other equation is difficult to explain. [12]

---

[11] The EBRD Liberalisation index has explicit dynamic properties, as it is meant to document progess in libralisation. Therefore, we do not use it for the credibility measure, but for other estimations.

[12] It can mean a misspecification of commitment as analysed by Posen (1993): commitment as well as institutions are influenced by a third unknown variable. This problem remains an open question for further research with better data. As it is not in the focus of this paper, we end the discussion here.

V. SOME LESSONS FOR THE CEE COUNTRIES

This analysis has confirmed the view that exchange rate arrangements are important, but not exclusively relevant for the success of a monetary reform. Fixing the exchange rate to a hard currency is likely to raise the degree of legal monetary commitment. The theoretical considerations as well as empirical evidence suggest that beside the legal monetary commitment the institutional framework in the country is decisive. If the latter matches the commitment, the credibility of a new monetary regime is relatively high, obviously encouraging monetary stability.

The result of both the theoretical and empirical part of this analysis does not come as a surprise. For instance, Eichengreen, Masson et al. (1998, pp. 20-23) draw similar conclusions concerning the criteria for the choice of an exchange rate system. They distinguish floating exchange rates (pure and managed), target bands, a crawling peg, a CBS and a currency union. The criteria for the choice of an adequate exchange-rate system are the following: inflation, level of reserves, capital mobility, labour mobility and nominal flexibility, trade integration, political integration, and preponderance of shocks. The general conclusion is that compatibility of the exchange rate regime with these components of economic order makes the exchange rate regime potentially successful.

The analyses has consequences for the choice of an appropriate exchange rate arrangement in those Central European Countries striving for EMU membership. First, each country should be analysed extensively along the lines offered in this research project – in particular in the country studies – before an exchange rate arrangement is chosen. The results secondly make it necessary to analyse carefully whether another policy option for the Central European countries – a common strategy with a floating or fixed exchange rate towards the Euro – is appropriate. The latter is similar to an EMS II (Jochem and Sell 2001). In any case, this option implies fixed exchange rates of the Central European currencies towards each other, which needs more analysis beforehand.

REFERENCES

Baliño, Tomás J.T., Charles Enoch et al. (1997), Currency Board Arrangements. Issues and Experiences, IMF Occasional Paper 151, Washington D.C.

Barro, Robert J. (1983), 'Inflationary Finance under Discretion and Rules', Canadian Journal of Economics, Vol. 16, pp. 1-16.

Bennett, Adam G.G. (1994), 'Currency Boards: Issues and Experiences', IMF Paper on Policy Analysis and Assessment, PPAA/94/18, p. 25, Washington D.C.

Blackburn, Keith and Michael Christensen (1989), 'Monetary Policy and Policy Credibility: Theories and Evidence', Journal of Economic Literature, Vol. 27, pp. 1-45.

Cagan, Phillip (1956), 'The Monetary Dynamics of Hyperinflation', in: Milton Friedman (ed.) Studies in the Quantity Theory of Money, The University of Chicago Press, Chicago, London and Toronto, pp. 25-117.

Cukierman, Alex S. (1992), Central Bank Strategy, Credibility and Independence. Theory and Evidence, The MIT Press, Cambridge/Mass. and London.

Eichengreen, Barry and Paul Masson et al. (1998), Exit Strategies. Policy Options for Countries Seeking Greater Exchange Rate Flexibility, IMF Occasional Paper 168, Washington D.C.

Eijffinger, Sylvester C.W. and Jakob de Haan (1996), The Political Economy of Central-Bank Independence, Special Papers in International Economics, No. 19, International Finance Section, Department of Economics, Princeton University, Princeton.

Fidrmuc, Jan (2000), Liberalization, Democracy and Economic Performance during Transition, ZEI, Bonn.

Fischer, Stanley (2001), Exchange Rate Regimes: Is the Bipolar View Correct?, Distinguished Lecture on Economics in Government, delivered at the Annual Meeting of the AEA in New Orleans, January 6, 2001, http://www.imf.org/external/np/speeches/2001/010601.htm.

Fontaine, Juan Andrés (2000), 'Official versus Spontaneous Dollarization', The Cato Journal, Vol20, pp. 35-47.

Freedom House (2001)
Freedom in the World, http://www.freedomhouse.org/research/freeworld/2000/index.htm.

Freytag, Andreas (2001a), 'Does Central Bank Independence Reflect Monetary Commitment Properly? – Methodical Considerations', BNL Quarterly Review, forthcoming.

Freytag, Andreas (2001b) Why Have Some Monetary Reforms Succeeded and Others Not? – An Empirical Assessment, Institute for Economic Policy at University of Cologne, Discussion Paper 2001/4.

Gwartney, James D., Robert A. Lawson and Dexter Samida (2000), 'Economic Freedom of the World', 2000 Annual Report, The Fraser Institute, Vancouver.

Hanke, Steve H. and Kurt Schuler (1994), Currency Boards for Developing Countries, International Center for Economic Growth, Sector Study No. 9, San Francisco.

Henderson, David (1999), The Changing Fortune of Economic Liberalism. Yesterday, Today and Tomorrow, The Institute of Public Affairs and New Zealand Business Roundtable, Melbourne and Wellington.

Institute for Economic Policy (2001), Central Bank Addresses, http://www.uni-koeln.de/wiso-fak/iwp/.

International Monetary Fund (a), International Financial Statistics Yearbook, current issue, Washington D.C., quoted as IMFa.

International Monetary Fund (b), Exchange Arrangements and Exchange Restrictions, Annual Report, current issue, Washington D.C., quoted as IMFb.

International Monetary Fund (c), World Economic Outlook, current issue, Washington D.C., quoted as IMFc.

Jochem, Axel and Friedrich Sell (2001), Währungspolitische Optionen für die Mittel- und Osteuropäischen Beitrittskandidaten zur EU, Tübingen, Mohr Siebeck.

Johnson, Bryan T., Kim R. Holmes and Melanie Kirkpatrick (1999), 1999 Index of Ecomomic Freedom, Heritage Foundation and The Wall Street Journal, Washington D.C. and New York.

Klein, Martin and Manfred J.M. Neumann (1990), 'Seigniorage: What is it and Who Gets it?', Weltwirtschaftliches Archiv, Vol. 126, pp. 205-221.

Neumann, Manfred J.M. (1992), 'Seigniorage in the United States: How much does the U.S. Goverment make from Money Production?', Federal Reserve Bank of St. Louis Review, Vol. 74, pp. 29-40.

Posen, Adam S. (1993), 'Why Central Bank Independence Does Not Cause Low Inflation: There Is No Institutional Fix For Politics', in: Richard O'Brian (ed.) Finance and the International Economy, Vol. 7, Oxford, Oxford University Press, pp. 41-65.

Schuler, Kurt (1992), Currency Boards, Ph.D. Thesis at the George Mason University, Fairfax, Virginia.

Szapáry, György (2000), Maastricht and the Choice of Exchange Rate Regime in Transition Countries During the Run-Up to EMU, NBH Working Paper 2000/7, Budapest.

Tinbergen, Jan (1952), On the Theory of Economic Policy, North-Holland, Amsterdam.