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Monetary Policy and Exchange Rate Targeting in Open Economies

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1. Introduction

In the last few years several emerging market economies have been threatened by a new generation of currency crises which in Krugman's (1998) words is characterised "by financial excess and then by financial collapse". Our main question is whether emerging market economies can follow exchange rate targets without incurring the risk of excessive capital inflows which sooner or later would lead to a collapse of their currencies and severe economic disruption. Our analysis is based on the assumption that monetary policy in open economies has two interrelated operating targets: the interest rate and the exchange rate (or an exchange rate path). It differs from the analysis in Svensson (1998) as we regard the exchange rate as a *direct* target of monetary policy which is realised by exchange market interventions. In contrast to Svensson we do not pay attention to the effect of interest rate differentials on the exchange rate as the empirical evidence for this channel is extremely weak and often anomal (Froot and Thaler 1990).

A central bank that tries to target the exchange rate and the interest rate simultaneously has to observe two important conditions. One the hand, the combination of an exchange rate target path with a certain level of domestic interest rates (which is identical with a certain value of a monetary conditions index) has to be consistent with the domestic economic situation. For this purpose an open-economy Taylor rule can be constructed which allows to determine the domestic interest rate for a targeted exchange rate path. On the other hand, the exchange rate target and the domestic interest rate have to fulfil the uncovered interest rate condition for a given risk premium. In our view sustained violations of this constraint provide an important explanation for the problem of speculative capital inflows.

Given this theoretical framework two main options for exchange rate policy are investigated: a fixed nominal exchange rate target (constant exchange rate, currency board) and an adjustable nominal exchange rate target (crawling peg, crawling band, discretionary devaluations). We show that a regime of a fixed nominal exchange rate is difficult to reconcile with the two conditions for an open-economy monetary policy. It is suitable only for very small countries, for countries with a rather small inflation differential vis-à-vis the anchor country, and in the initial phase of a stabilisation programme. For all other situations flexible exchange rate targeting is recommended. It provides more leeway for domestic interest policy without violating the UIP conditions. It is less prone to shifting risk premia

which are a major problem under fixed exchange rate targets. Above all it allows to sterilise capital inflows without any costs for the domestic central bank. Thus, there is no need for capital-inflow controls which have been proposed by many prominent economists[1]. Our theoretical considerations are supported by empirical evidence from Asia, Latin America, Eastern and Central Europe and the ERM I.

An important assumption of the whole paper is that the overall macroeconomic policy is stability-oriented so that the risk of capital outflows because of inflationary policies can be neglected.[2]

In section 2 we present a somewhat simplified (but nevertheless sufficient) classification of the options for exchange rate management in emerging market economies. Section 3 analyses the mechanics of exchange rate targeting in general and under the specific conditions of a disinflation phase. The problems of a fixed nominal exchange rate target are the topic of section 4. Section 5 explains why a more flexible arrangement is much less prone to excessive capital inflows. Section 6 proposes a dynamic interpretation of the inconsistency triangle and summarises the main implications that can be derived from the results of the previous sections. Section 7 concludes.

2. Options for the exchange rate management

The number of possible institutional arrangements for the exchange rate policies of emerging market countries is limited, in principle, to three approaches:

- a **fixed nominal exchange rate target**, either in the form of a currency board or a unilateral peg, e.g. like Austria's "Hartwährungspolitik" vis-à-vis the D-mark,
- a **flexible nominal exchange rate target**, either in the form of a pre-announced crawl or crawling band, of a non-announced crawl ("managed floating") or in the form of a unilateral fixed peg with frequent discrete adjustments,
- a **freely floating exchange rate**, which implies that the central bank is not aiming at a certain target for the exchange rate. This case can be differentiated from all forms of an

[1] See Council on Foreign Relation (1999, p. 3): "Emerging market economies with fragile financial systems should take transparent and non-discriminatory tax measures to discourage short-term capital inflows and encourage less crisis-prone, longer-term-ones, like foreign direct investment." See also Begg et al. (1999, p. 7) , Reisen (1998) and Radelet and Sachs (1998b, p. 71).

[2] For a comprehensive discussion of the requirements in other fields of macroeconomic policy see Kopits (1999).

flexible exchange rate targeting by the criterion of a constant level of foreign exchange reserves.

With this classification we do not make a categorical difference between “managed floating” and a crawling peg. For the interaction between interest rate policy and exchange rate policy the public announcement of an exchange rate target is of secondary importance. But as such an announcement has an important effect on the transparency of monetary policy, we will discuss it in section 7.

In the following, the option of a **freely floating exchange** rate will not be analysed in detail. Above all, the empirical evidence of flexible exchange rates is rather devastating. In the last 25 years countless econometric studies on the determinants of flexible exchange rates have been published. Almost all of them have come to the clear result that “fundamentals” however defined have no systematic impact on the exchange rate under a floating system - at least over time horizons of up to four or five years. Isard (1995, p. 138) summarises the evidence as follows:

> “In short, neither the behavioural relationships suggested by theory, nor the information obtained through autoregression, provided a model that could forecast significantly better than a random walk. And furthermore, while the random walk model performed at least as well as other models, it predicted very poorly.”

For small open economies a completely unpredictable exchange rate would make it very difficult to achieve macroeconomic stability. In addition, foreign exchange markets in emerging market economies are relatively thin, so that some large transactions could have an even more destabilising effect. In sum, we agree with the conclusion by Eichengreen and Masson (1998, p. 3):

> “For developing and transition countries, as with the smaller industrial countries, there are good reasons why the right exchange rate regime (except perhaps in cases of continuing high inflation) is not something close to an unfettered float.”

In fact, with the exception of the exchange rates between the three key currencies (Dollar, Euro, Yen) there are almost no countries that have deliberately refrained from foreign exchange market intervention.[3]

Besides the definition of the target, a comprehensive strategy for exchange rate policy has to determine the **width of the band** around the exchange rate target, the anchor currency, and it has to decide whether **capital controls** for short-term capital flows will be imposed.

3. The mechanics of exchange rate targeting in a disinflation phase

For all forms of open economy monetary policy it is important to differentiate between two main transmission channels: the exchange rate channel and the interest rate channel. Even if a central bank is committed to an exchange rate target, it has to be aware of the fact that domestic interest rates have an important effect on the domestic economy – either via the traditional IS/LM channel or via the balance sheet channel (Bernanke and Gertler 1995). This co-existence of an internal and external lever of monetary policy is of special importance if a policy of exchange rate targeting is conducted in a period of disinflation.

It is obvious that any form of open economy monetary policy has to observe two important external constraints. From the real side, a constraint is set by **purchasing power parity**. If a policy of exchange rate targeting leads to a substantial real appreciation, it undermines the competitiveness of domestic producers, increases unemployment and leads to growing current account deficits. Kaminsky et al. (1998) show that a real appreciation is a very serious warning signal for a currency crisis. From the financial side, an important constraint is set by the **uncovered interest parity** (UIP) condition. Our article concentrates on the second constraint, because it provides an important explanation for the problem of speculative capital inflows.

Applied to a policy of exchange rate targeting, the uncovered interest parity (UIP) condition can be written as:

[3] See Jadresic et al. (1999, p. 9): "Indeed, while an increasing number of these countries (together with the emerging market economies) officially describe their exchange rate regimes as 'managed float' or 'independent floating' (...), the fact is that most of these countries do maintain some form of *de jure* or *de facto* exchange rate peg or otherwise narrowly limit fluctuations of the exchange rate."

(1) $\Delta s^T + \alpha = i - i^*$.

The targeted depreciation of the logarithm of the domestic currency Δs^T plus a risk premium α on the expected depreciation[4] has to equal the difference between the home interest rate i and the interest rate of the anchor country i^*.

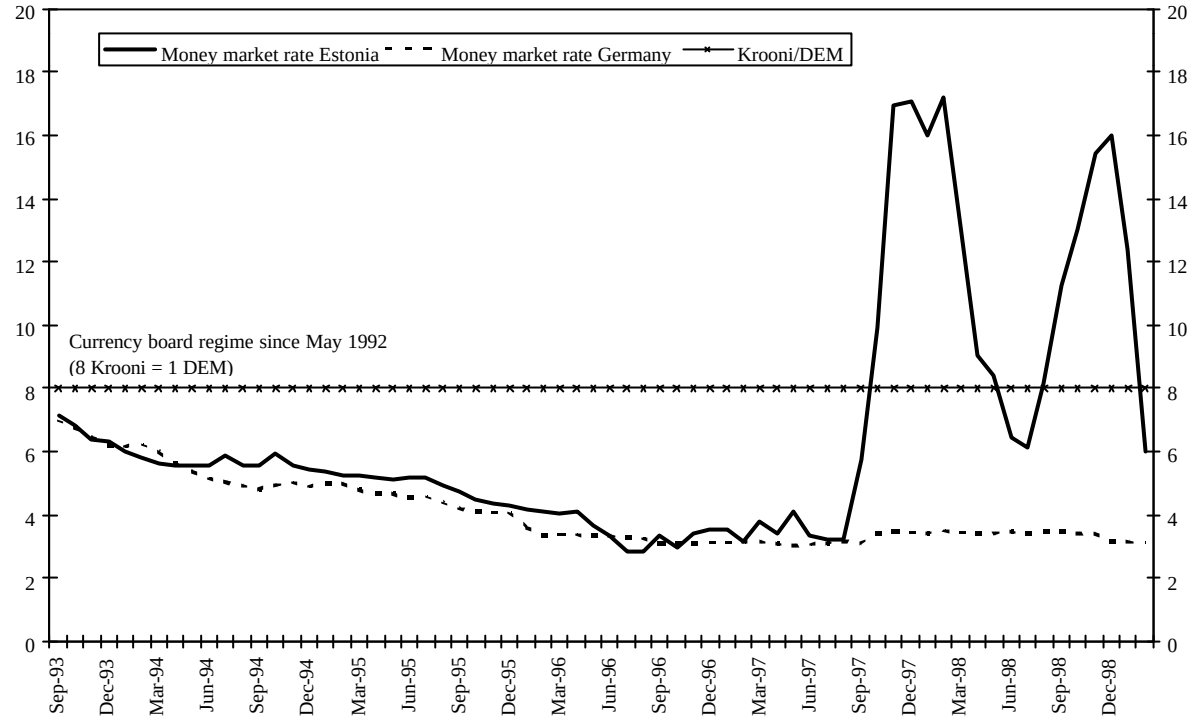
This condition can be formulated for different **time horizons**. In the context of monetary policy it seems useful to use it for relatively short periods (one or three months). This is due to the fact that short-term interest rates are normally the main operating target of central banks. Thus, for that time horizon the UIP condition allows to analyse the interrelationship between the foreign and the domestic levers of monetary policy. It also takes into account the rather myopic behaviour of foreign exchange market participants.[5]

If the domestic central bank completely refrains from an autonomous interest rate policy, the domestic interest rate is only determined by the three other variables of the equation and there is always an equilibrium for short-term capital flows. This situation is typical for a **currency board**, where traditional instruments for targeting domestic short-term rates are not available. Figure 1 shows that the money markets rates in Estonia remained remarkably close to German money market rates until the outbreak of the Asian crisis. Thus, the decisive feature of a currency board is a completely endogenous domestic interest rate.

[4] The term "risk premium" as it is used here and in the literature (see Isard 1995, p. 84) is defined as a risk premium on the expected *exchange rate* change. Thus it is different from the literature on financial markets where risk premia are added to a risk free *interest rate*.

[5] The "anomal behaviour" of floating exchange rates in the context of the uncovered interest parity theory is due to time horizons that are even shorter than the one or three month periods for which econometric tests of the "efficiency" of foreign exchange markets are made.

Figure 1: Interest differential and exchange rate Estonia



Source: IFS

In all other forms of exchange rate targeting central banks have to target the domestic interest rate together with the exchange rate. The best indicator for an interest rate policy that is incompatible with UIP are high short-term capital inflows or outflows. Thus, the problem of excessive capital inflows simply shows a persistent violation of this equilibrium condition and proposals to impose capital controls mean nothing else but to suspend this condition so that countries can follow interest rate policies that are incompatible with UIP. If a disequilibrium leads to capital inflows, the increase in reserves has to be sterilised, at least partially. The co-existence of strong capital inflows with a constant or sometimes increasing interest rate differential indicates that sterilised interventions can be much more efficient than it is recognised by the literature. As Table 1 shows, the ratio of domestic assets to total assets declined in almost all cases considerably.

Table 1: Exchange rate targeting and changes in central bank portfolios

	Period with a fixed rate	Interest rate differential vis-à-vis the dollar	Increase in reserves ($ million)	Share of domestic to total central bank assets at the beginning	Share of domestic to total central bank assets at the end
Indonesia	1987-96 (avg. crawl: 4.0% p.a.)	7.0	14,200	67.9	24.0
Korea	1992-96	8.4	20,336	69.3	48.9
Thailand	1987-96	3.1	34,927	60.0	15.6
Malaysia	1986-96 (almost fixed, 2.8% total appr.)	-0.3 1.9 (92-96)	22,097 16,123 (92-96)	16.5	21.7
Czech Republic	1991-96	7.4 (DM and $)	8,563	40.4	29.5
Italy	1987-90	7.1 (DM)	52,990	68.2	59.6
Argentina	1991-98	11.3 (91-98) 2,3 (93-98)	20,160	82.8	26.0
Brazil	1994-98 (avg. crawl: 0.0002 Reais/day)	28.4	11,976		
Mexico	1990-93	19.2	18,781	69.3	30.3

Source: IFS

If a central bank uses the interest rate together with the exchange rate channel, it has to target a monetary conditions index (MCI)

(2) $MCI = r - \delta \Delta q^T$ with $\delta > 0$

which is defined as the difference between the real interest rate $r = (i - \pi)$ and the real exchange rate target Δq^T. The factor δ represents the relative weight with which the real exchange rate affects aggregate demand. The latter is defined as

(3) $\Delta q^T = \Delta s^T + (\pi^* - \pi)$.

This formulation assumes that a constant real exchange change rate has a neutral effect on the domestic economy.

In the closed economy a Taylor-rule can be defined for the real interest rate:

(4) $r = \bar{r} + \beta(\pi-\pi^T) + \gamma(y-y^P)/y^P$ with $\beta, \gamma > 0$.

In this context r can be regarded as a proxy for the MCI. However, if we consider an open economy, the Taylor rule has to be modified:

(5) $(MCI =)\ r - \delta\Delta q^T \stackrel{!}{=} \bar{r} + \beta(\pi-\pi^T) + \gamma(y-y^P)/y^P$.

Substituting $i - \pi$ for r and rearranging for i leads to an open-economy Taylor rule:

(6) $i = \bar{r} + \pi + \beta(\pi-\pi^T) + \gamma(y-y^P)/y^P + \delta\Delta q^T$.

According to this rule, the optimum domestic interest rate is calculated as the sum of an average real interest rate $\bar{r}$ plus the actual inflation rate π, the weighted difference between the actual inflation rate and the target inflation rate π^T, the weighted output gap and the target for the real exchange rate. Assuming for simplicity that in the home and the anchor country the output gap is zero, that the anchor currency has no inflation problem, and that $\bar{r}$ is identical in both countries, the interest differential becomes:

(7) $i-i^* = \pi-\pi^* + \beta(\pi-\pi^T) + \delta\Delta q^T$

or $i-i^* = \pi-\pi^* + \beta(\pi-\pi^T) + \delta\Delta s^T + \delta(\pi^*-\pi)$

or $i-i^* = (1-\delta)(\pi-\pi^*) + \beta(\pi-\pi^T) + \delta\Delta s^T$.

As the combination of interest rate and exchange rate policy has to be compatible with UIP equation (7) can be inserted in the equilibrium condition formulated in equation (1):

(8) $\Delta s^T + \alpha = i-i^* = (1-\delta)(\pi-\pi^*) + \beta(\pi-\pi^T) + \delta\Delta s^T$.

The intuition of this equilibrium condition is quite simple: A central bank can use domestic interest rates for disinflation only to the extent that the foreign exchange market demands a sufficiently high risk premium for the domestic currency at the given exchange rate target. Thus, strong capital inflows are a signal that a central bank is following a restrictive interest policy which is incompatible with an equilibrium on international financial markets.

This "disinflation-adjusted uncovered interest parity condition" can now be used to analyse three different macroeconomic strategies:

- The most abrupt disinflation via the exchange rate channel is achieved if the central bank keeps the nominal exchange rate constant , i.e. $\Delta s^T = 0$. This approach has been followed by Estonia, the Czech Republic (until the May 1997 crisis), Argentina, Mexico (until the 1994 crisis) and most of the East Asian countries.
- An intermediate solution can be characterised by an exchange rate target that aims at a depreciation that equals the difference between the targeted inflation rate and the foreign inflation rate, i.e. $\Delta s^T = \pi^T - \pi^*$. Such an "*active crawl*" has been followed by Poland and Hungary.
- A third, least restrictive variant is an exchange rate target which simply compensates for the existing inflation differential , i.e. $\Delta s^T = \pi - \pi^*$. Chile's crawling band system and the exchange rate policy of Brazil and Indonesia (until the crises) are examples for such a "*passive crawl*".[6]

From equation (8) the equilibrium risk premia α^* for these three strategies can be calculated as follows (Table 2):

Table 2: Equilibrium risk premia (α^*) for different exchange rate targets

Case	Δs^T	α^*
I. constant nominal rate	0	$(1-\delta)(\pi-\pi^*) + \beta(\pi-\pi^T)$
II. active crawl	$\pi^T-\pi^*$	$(1-\delta)(\pi-\pi^T) + \beta(\pi-\pi^T)$
III. passive crawl	$\pi-\pi^*$	$\beta(\pi-\pi^T)$

These results show that the equilibrium risk premium declines from case I over case II to case III. Table 3 presents some concrete values for the policy variables: $r^*=3\%$, $\pi^*=2\%$, $\beta=0.5$,

[6] See Eichengreen and Masson (1998, p. 32).

δ=0.25, π=10%, π^T=6%. It also shows the value for the domestic and the foreign nominal interest rate.

Table 3: Three examples for equilibrium risk premia

Case	**D**s^T	**a***	**i***	**i**
I. constant nominal rate	0	8	5	13
II. active crawl	4	5	5	14
III. passive crawl	8	2	5	15

Thus, for an exogenous risk premium a central bank has to find out the optimum policy mix (Table 4). For instance, if the exogenous risk premium is 5 %, a domestic interest rate of 14 % requires an "active crawl", while a constant exchange rate would lead to undesired capital inflows. In other words, for any disinflation strategy a choice has to be made about the relative importance of the interest rate channel and the exchange rate channel. This will depend above all on the openness of an economy (a more open economy needs less restriction via the interest rate channel) and on the interest rate sensitivity of its foreign and domestic sectors. The concrete path for exchange rate targeting would be the outcome of this assessment.

Table 4: The equilibrium interest rate for α^*=5

Case	**D**s^T	**a***	**i**
I. constant nominal rate	0	5	10
II. active crawl	4	5	14
III. passive crawl	8	5	18

4. Monetary policy under a constant nominal exchange rate target

4.1 Theory

For a **constant nominal exchange rate** the UIP equilibrium condition from equation (8) is:

(9) $\alpha^* = (1-\delta)(\pi-\pi^*) + \beta(\pi-\pi^T)$.

Compared to the other strategies of Table 2 it requires the highest risk premium. Thus, capital inflows can be avoided only under three conditions:

- if the inflation differential vis-à-vis the anchor currency (π-π*) is rather small and if at the same time the need to disinflate (π-π^T) is not very high,
- if the risk premium is very high,
- if a country is so small that monetary policy can mainly rely on the exchange rate channel, i.e. δ is very high.

The third condition is compatible with the observation that most countries which were able to maintain a fixed nominal exchange for longer periods of time are typically very small countries (Jadresic et al. 1999, p. 24).

Good examples for the first condition represent the stable long-run pegs of Austria and the Netherlands against the D-mark. Table 5 shows that these two countries had a an inflation differential of almost zero vis-à-vis the anchor country Germany at the time they fixed their exchange rates.

The second condition explains why a constant exchange rate target can be useful policy tool in the early stages of a macroeconomic stabilisation strategy (Bofinger 1996). After a period of very high and volatile inflation and a low credibility of policy-makers, the markets will not immediately be convinced that the new regime is sustainable. Thus, the risk premium can be very high. But as soon as the risk premium declines, an exit strategy is needed (Eichengreen and Masson 1998).

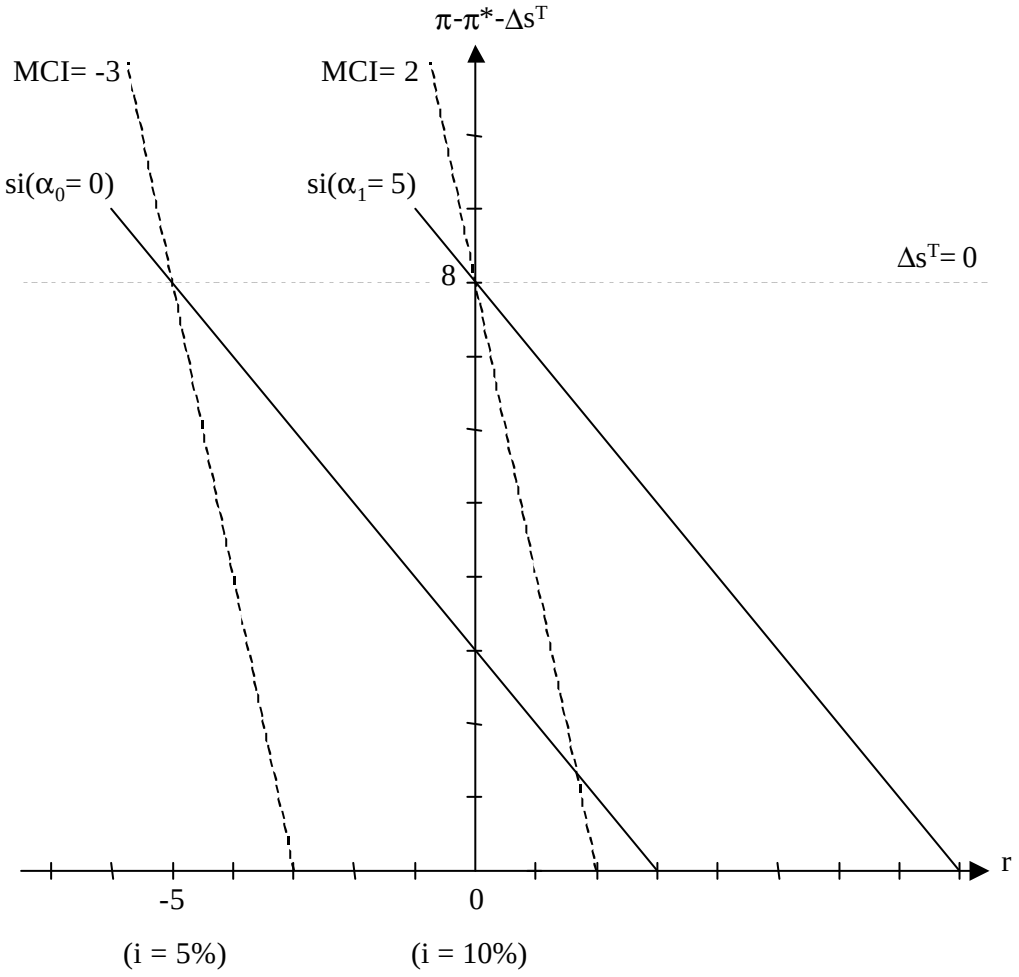
This illustrates a specific problem of all constant exchange rate targets. The risk premium for short-time horizons (one to three months) can be very unstable over time. If a fixed peg is introduced in a period of very high inflation, the risk premium will initially be very high, then go down to almost zero and after some time increase again. In countries with lower inflation differentials vis-à-vis the anchor currency, investors will normally expect that the exchange rate will remain constant for the time being even if they do not believe in the sustainability of an announced exchange rate target in the longer run. Over time, especially if a constant nominal rate is associated with a real appreciation, the risk premium increases sharply.

The problem of a variable risk premium is described in Figure 2 which presents the policy options of a central bank in an open economy. The y-axis shows the restrictive pressure which is exerted by the exchange rate target: it is defined as the difference between the actual

inflation differential (π-π*) and the targeted depreciation Δs^T (which is identical with a measure for the real appreciation of the currency considered). The domestic real interest rate r is depicted on the x-axis. The parameters are assumed to be the same as for Table 3 (r*=3%, π*=2%, β=0.5, δ=0.25, π=10%, π^T=6%).

For given values of i* and α the si-lines show combinations of Δs^T and i which are compatible with an UIP equilibrium. From the logic of UIP, the interest rate differential has to increase with the targeted depreciation. Thus, the si-line is downward sloping. Each point of the si-line is associated with a certain monetary conditions index. As the real interest has a higher weight than the real appreciation, the MCI increases, i.e. monetary policy becomes more restrictive if one moves the si-lines downward. .

Figure 2: Variable risk premium and constant nominal exchange rate



For a constant nominal exchange rate (Δs^T=0) and a risk premium α_0 of zero, the domestic nominal interest rate has to equal the foreign rate. With the values of Table 4, the nominal

interest rate is 5 % and the real rate is – 5%. On the real-exchange axis, the value is 8 (i.e. the difference between π and π^*) as the exchange rate does not accommodate the inflation differential. This policy mix is associated with an MCI of -3, which indicates an expansionary monetary policy. If the central bank wants to maintain at least a real interest rate of zero (which would lead to an MCI of 2), this point is not on the si-line with a risk premium (α_0=0); it would require a risk premium of α_1=5 . Thus, such a monetary policy would lead to short-term capital inflows. The experience of several currency crises has shown that after a period with a very low risk premium, the risk premia tend to get very high. If the premium exceeds the value of 5, but if the central bank does not increase the interest rate, capital outflows are induced.

Thus, under a constant nominal exchange rate target, shifts in risk premia confront a central bank with two equally unpleasant options:

- It can try to maintain an UIP equilibrium permanently, which leads to unstable monetary conditions in the domestic economy,
- It can try to maintain stable monetary conditions but this leads first to excessive inflows and later to excessive outflows.

If a constant nominal exchange rate is maintained for a rather long period of time, the specific problem of an *exchange-rate illusion* is created: private agents develop a very strong belief in the constancy of the nominal exchange rate. As a result domestic firms start borrowing abroad in the "cheap" foreign currency. In this situation, a restrictive interest rate policy can become completely ineffective. A high domestic interest rate policy simply drives the enterprise sector into more foreign currency lending. Additional counterproductive effects are produced as higher domestic interest rates attract more foreign investors that want to profit form the short-term stability of the domestic currency even if they know that it is not sustainable. Their lending to domestic banks in the domestic currency has the effect that it weakens the credit rationing by domestic banks. This destabilising effect of higher interest rates in a situation with exchange rate illusion is described by Froot et al. (1998, p. 3):

> "(...) international investors are 'trend chasers'. Indeed, trend chasing – interpreted to mean that an increase in today's returns leads to an increase in future flows, without holding current and past inflows constant- seems to explain 60-85 percent of the quarterly covariance between emerging market inflows and returns."

4.2 Evidence

Table 2 shows that the conflict between stable domestic monetary conditions and an equilibrium on the foreign exchange market increases with the inflation differential vis-à-vis the anchor currency and the difference between the actual inflation rate and the inflation target. It is therefore interesting to look at those ERM I countries which have successfully fixed their exchange rate vis-à-vis the D-mark (Table 5). From this experience the critical inflation differential seems to lie in the range of 3.75 percentage points. Subtracting a certain safety margin, the critical value could be established at 3 %.

Table 5: ERM I experience

	Date of realignment (entry)	Inflation differential to Germany (averages of 6 months before and 6 months after realignment)	Interest differential to Germany (averages of 6 months before and 6 months after realignment)	Last realignment?
Netherlands	21.03.83	**-0.49**	0.30	**yes**
Denmark	12.01.87	**3.79**	5.84	**yes**
Belgium	12.01.87	**1.48**	1.87	**yes**
France	12.01.87	**3.15**	3.56	**yes**
Italy	12.01.87	4.25	7.33	no
	08.01.90	3.53	5.09	no
	25.11.96	**1.50**	4.71	**yes**
Spain	19.06.89 (entry)	3.86	7.78	no
	06.03.95	**2.56**	3.68	**yes**
Portugal	06.04.92 (entry)	4.25	8.26	no
	06.03.95	**2.17**	4.28	**yes**
Greece	16.03.98 (entry)	**3.60**	/	**yes**
Sweden	17.05.91 (peg) [1)]	8.10	3.27	no
Finland	14.10.96 (entry)	**-0.84**	0.14	**yes**
United Kingdom	08.10.90 (entry)	7.43	6.07	no
Austria	December 81 (peg) [2)]	**0.12**	-0.76	**yes**

1) Sweden pegged its currency to the ECU from 17 May 91 – 19 November 92.

2) The last significant change of the Schilling/DM exchange rate took place between September 79 and the end of 81 (appreciation of the Schilling of about 4.5 %).

Source: IFS

If the inflation differential is higher, a constant nominal exchange rate target is normally unsustainable. This is not only confirmed by those ERM I countries which had to adjust their parities after 1987 or even left the system (United Kingdom), but also by the failed attempts

of the Czech Republic and Mexico to maintain a constant exchange rate at a time where they still had a pronounced inflation differential against their anchor countries (more than 10 percentage points in the Czech Republic in 1993 and about 9 percentage points in Mexico in November 1991). The only exceptions are Estonia and Argentina, but it was already pointed out that these countries had not tried to follow an activist disinflation policy by keeping domestic interest rates high.

The experience of the Asian countries is more difficult to interpret. On the one hand, the long periods of a stable Dollar rate in Malaysia and Thailand fit the observation that a fixed rate can be sustainable if the inflation differentials are very low. In the second half of the 1980s both countries had lower inflation rates than the United States. In this area the crises were initiated by the very low short-term Dollar rates in 1994/95 combined with a substantial Dollar depreciation vis-à-vis the Yen. Thus, the external and the internal channel of monetary policy were too expansionary. As a result the Asian countries tried to dampen the domestic economy with a restrictive interest policy in the years 1994/95. But as already mentioned, in a situation of exchange rate illusion such a policy induced domestic firms to lend more and more in the foreign currency without dampening the domestic economy. As it was not possible to exert a sufficiently strong pressure on the domestic sectors under fixed rates, a depreciation should have been targeted combined with higher nominal rates.

5. Disinflation under an adjustable nominal exchange rate target

5.1 Theory

Thus, for countries which have an inflation differential of more than 3 to 4 percentage points an adjustable exchange target seems the preferable solution. Of course, as Table 2 shows, an adjustable exchange rate target also requires a consistent interest rate policy, if excessive capital inflows are to be avoided. But for situations with a substantial inflation differential or a strong asset-price inflation this approach offers many advantages compared with a fixed rate. For the real sector of the economy the risk of a real depreciation due to inflation inertia can be avoided. For financial markets an adjustable exchange rate target makes it much easier to cope with the problems of capital inflows:

- For a given risk premium Table 4 and Figure 2 illustrate that a higher MCI can be achieved without jeopardising the equilibrium on foreign exchange markets.

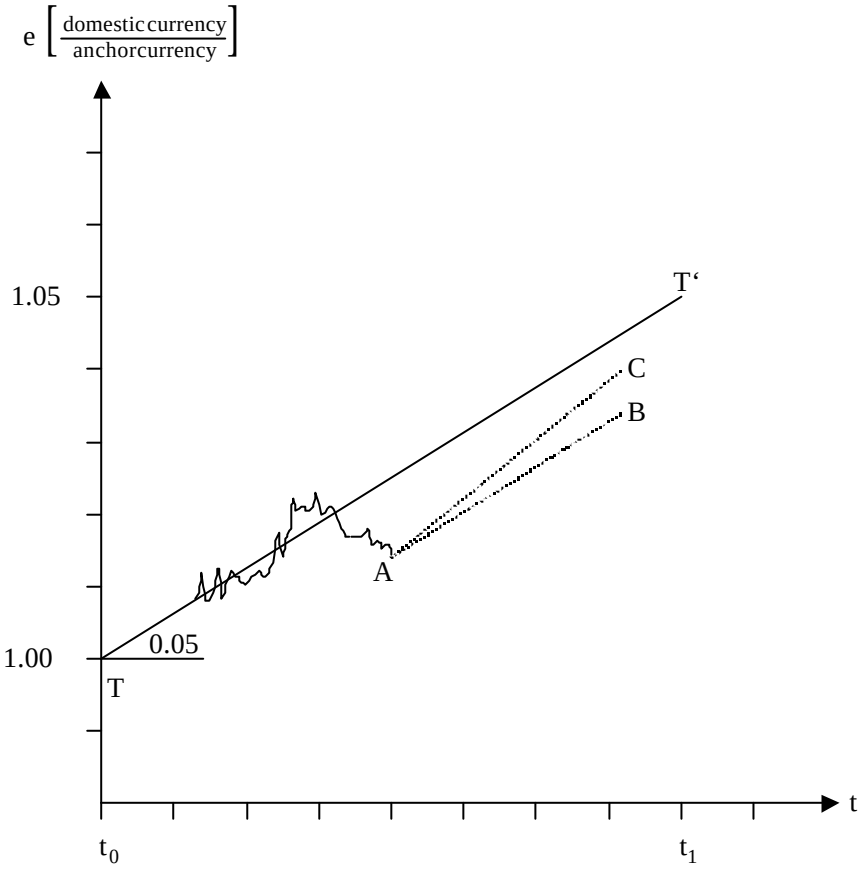
- If the exchange rate adjustment is made in the form of a permanent depreciation ("crawling peg"), the problem of **shifting risk premia** can also be reduced, as one-way bets are no longer possible. A more constant risk premium avoids the threat of unstable interest rates for domestic firms.
- In addition, a central bank can always increase a risk premium which it regards as too low. While this is possible under a fixed and a flexible exchange rate target, a flexible target with a wide band avoids that such a policy of "causing ripples" is limited by reaching the limit of the band.
- If the targeted depreciation and the interest rate are **substitutes** for monetary restriction, which the construction of the MCI assumes, a central bank could react to shifting risk premia by adjusting the policy mix. For instance on the si-line for $\alpha_0=0$ an MCI of 2 is associated with a nominal depreciation of 6 2/3 % and a nominal interest rate of 11 2/3 %. If α shifts to 5, the same MCI can be achieved with a nominal interest rate of 10 % and a constant nominal exchange rate. However, this substitutability requires the somewhat unrealistic assumption that the risk premium is independent of the concrete exchange rate target.

A very important advantage of an adjustable exchange rate is related to the **sterilisation of interventions**. In principle, a central bank is able to avoid an appreciation of its own currency simply by interventions on the foreign exchange market. In order to maintain a certain level of domestic interest rates, the liquidity impact of interventions has to be sterilised with domestic monetary policy instruments (reduction of domestic credits or even offering some kind of deposit facility). While domestic assets are in principle available without any limitation and in the case of a deposit facility the sterilisation potential is also unlimited, a hard budget constraint can be created by the costs of intervention. With a constant exchange rate, these costs are determined by the difference between the domestic interest rate and the interest rate in the anchor country. With a positive interest rate differential to the anchor currency, a prolonged policy of sterilised intervention can become very costly. If a central bank follows a flexible exchange rate target, sterilisation can be made without any costs. Thus, sterilised intervention provides an additional degree of freedom to monetary policy. It can simultaneously target the domestic interest rate and a floor for an exchange rate path.

This is illustrated in Figure 3. Let us assume that the central bank targets an annual (t_0 to t_1) depreciation of 5%. At the time when the exchange rate reaches the lower limit A of the band

(say –1% from the target path TT'), the central bank starts to intervene in the foreign exchange market. The two dotted lines AB and AC represent the "no-loss-paths" which means that along these lines the loss from the interest rate differential (i-i*= 5% on line AB and i-i*= 5%+α on line AC when there is a risk premium)[7] is compensated by the increase of the value of the foreign exchange reserves caused by a successful depreciation of the domestic currency. Costs are only created if the exchange rate moves below the no-loss-path despite the intervention of the central bank. But this situation will never occur provided that the central bank has an unlimited sterilisation potential.

Figure 3: Intervention policy in the case of capital inflows



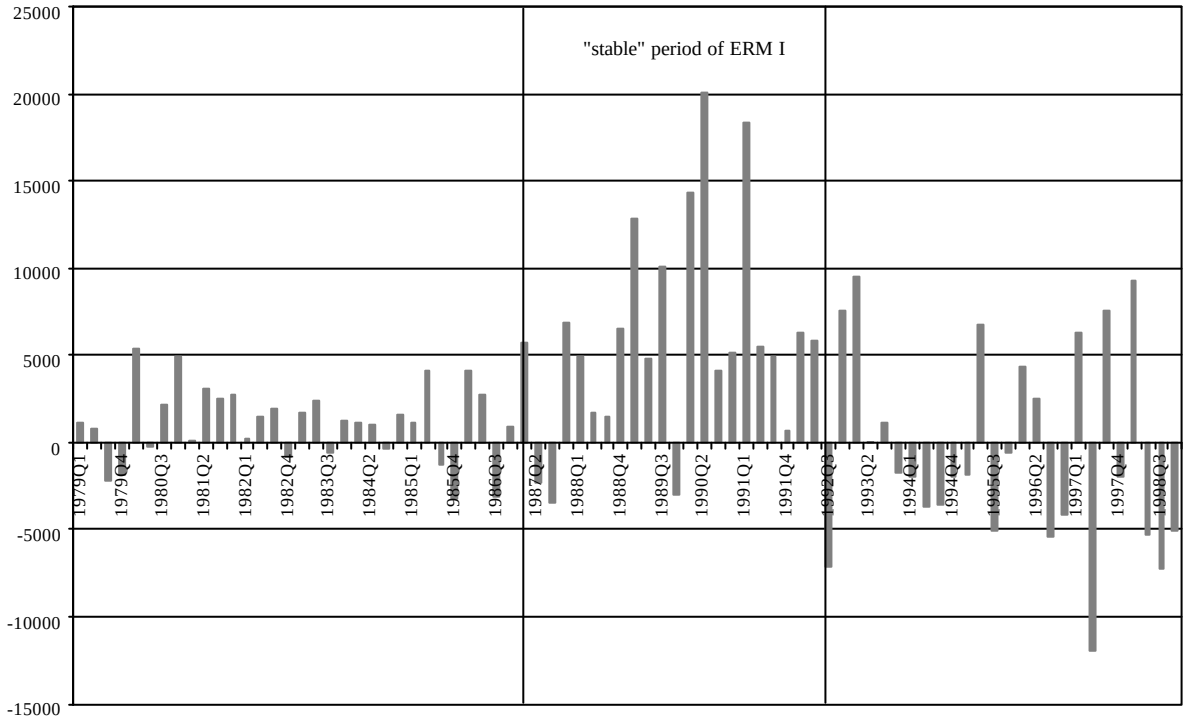
The situation turns out to be much more different in the case of **capital outflows**. There is a clear budget constraint for a central bank trying to defend its currency against a devaluation. Nevertheless, by avoiding speculative inflows, a central bank can reduce the risk of excessive outflows.

[7] Remember that we are considering sterilised interventions. An increase in low interest bearing foreign assets

5.2 Evidence

The experience with flexible exchange rate targets shows that in most cases speculative capital inflows have not been a major problem. In the ERM I from 1979 to 1986 Italy has followed a policy of infrequent depreciations (7 realignments with a first adjustment only six months after the start of the system) within a ± 6 % band. Figure 4 shows that during this period capital inflows remained rather limited. The situation changed significantly in the 5 ½ years of the "stable" ERM where the lira was devalued only once (3.68 %) and where the fluctuation band was reduced to ± 2.25 %.

Figure 4: Financial inflows (net) minus FDI (in millions of US-$) Italy



Source: IFS

The experience of the Eastern European countries also confirms that capital inflows are mainly a problem of fixed exchange rates combined with inconsistent interest policies. As Table 6 shows, the only country with excessive capital inflows was the Czech Republic which maintained a fixed exchange rate (± 0.5%) against a currency basket until 1996. In all other countries direct investment inflows were higher than the other financial inflows which

yields to this loss when we reduce the higher interest bearing domestic credits at the same time.

remained relatively small. Between 1993 and 1996, Estonia was – as already mentioned – under a currency board arrangement, Hungary and Poland followed a crawling peg and Slovenia had a managed float.

Table 6: Cumulative direct investment and other financial inflows (net) to the Eastern European countries (1993-96)

Country	**Other financial inflows (net) in % of GDP**	**Direct investment inflows in % of GDP**
Czech Republic	28.3	9.8
Estonia	9.2	16.7
Hungary	9.9	22.2
Poland	-2.0	8.7
Slovenia	2.2	3.1

Source: IFS

In the Asian region, Indonesia with its de facto crawl received much less currency inflows than Korea, Thailand and Malaysia (Table 7). The fact, that the Asian crisis started in Thailand fits with its extremely high exposure to capital inflows. But because of a strong contagion effect (Ito 1999, p. 28) Indonesia was also hit by the crisis.

> "Indonesia appears to be the clearest case of contagion in the region. (...) By most, Indonesia's imbalances were among the least severe in the region, and clearly much less dramatic than in Thailand." (Radelet and Sachs 1998a, p. 37).[8]

Table 7: Cumulative direct investment and other financial inflows (net) to selected Asian countries (1993-96)

Country	**Other financial inflows (net) in % of GDP**	**Direct investment inflows in % of GDP**
Indonesia	7.6	8.6
Korea	13.5	1.2
Malaysia	12.1	21.3
Thailand	35.1	4.5

Source: IFS

[8] Above all Radelet and Sachs (1998b, p. 38) show that there was no evidence for a "boom-bust pattern in Indonesia".

As above all the example of France in the ERM crises of 1992/93 shows that currency crises tend to affect countries in the same region even if their fundamentals are solid and if they have been able to avoid excessive currency inflows.

In Latin America, a similar picture as in the five Eastern European transition countries emerges. Mexico, which de facto followed a fixed peg, received by far the highest capital inflows, while the inflows were rather limited in Argentina (currency board) and Brazil (crawling peg).

Table 8: Cumulative direct investment and other financial inflows (net) in Latin America (selected four year periods)

Country	**Other financial inflows (net) in % of GDP**	**Direct investment inflows in % of GDP**
Argentina (1995-1998)	8.5	8.7
Brazil (1995-1998)	5.1	8.7
Mexico (1991-1994)	19.1	6.1

Source: IFS

In sum, a flexible exchange rate targeting has the important advantage that it considerably reduces the risk of destabilising capital inflows. In this respect it is identical with a currency board. In both cases, interest rate policies that are incompatible with UIP can be avoided.

6. Lessons for monetary and exchange rate policy in open economies

As we have shown, flexible exchange rate targeting provides a limited solution to the so-called inconsistency triangle (see Padoa-Schioppa 1987). Instead of choosing one of the two corner solutions (perfectly fixed exchange rates or an autonomous monetary policy with freely floating exchange rates) a dynamic interpretation of the triangle allows to combine free capital movements with an autonomous interest policy and a stable floor for an exchange rate path. The notion dynamic refers to a time *path* for the exchange rate which at the given interest rate differential has to ensure a permanent UIP equilibrium.

While such a policy is a good recipe against a currency crisis, it does not completely rule it out. The examples of France, Indonesia and Brazil show that contagion effects can play an

important role. In these cases the risk premium increases to levels which would require an overly restrictive monetary policy stance. Therefore, if countries are obliged to support an exchange rate target without external support, in the short run a major devaluation is the only solution. As such an exit can have disastrous consequences, an international framework for stabilising such currencies would urgently be needed.

The experience with different exchange rate arrangements in the last two decades provides relatively clear implications for the exchange rate policy of emerging market economies:

- A complete neglect of exchange rate policy, i.e. **flexible exchange rates** in the pure sense that the central bank refrains from foreign exchange market interventions, should be ruled out. In the past this arrangement has been practised only between the three key currencies (Dollar, Euro, Yen) and it has led to excessive exchange rate fluctuations. The experience of all three areas (Asia, Latin America and Central and Eastern Europe) does not support the popular view that a flexible exchange rate regime is required because "pegged exchange rate regimes are a very dangerous strategy for emerging market economies and make financial crises more likely." (Mishkin 1999, p. 22) [9]
- A **fixed nominal exchange rate target** can be adopted only if the disinflation process and the process of price liberalisation is completed. For such a step the inflation differential between the domestic currency and the anchor currency should not exceed 3 percentage points.
- A **currency board** is only advisable for countries which have a very open economy. With a ratio of 72.5[10] Estonia certainly belongs to the group of countries with the highest degree of openness. Under this condition it can be sufficient to rely on the external lever of monetary policy only. The risks of this strategy have been extensively discussed in the literature on monetary unions. However, in contrast to a monetary union, a currency board does not protect a country against the risks of excessive interest rates due to speculative pressure. In addition, it lacks a lender of last resort.
- A **flexible exchange rate target** with a relatively wide band is the safest policy option. The findings of this article confirm Williamson's (1996) analyses of the experience with crawling bands in Chile, Colombia and Israel.[11] Hungary and Poland have practised this

[9] See also Blöndal and Christiansen (1999).
[10] 1/2 (exports+imports)/nominal GDP.
[11] "(...) a crawling band is capable of achieving a reasonable trade-off between the conflicting objectives of reducing inflation and maintaining export growth. Furthermore crawling bands appear to perform quite well in limiting both exchange rate and reserve volatility; fixed rates perform better in the former dimension, as long as

strategy successfully. This approach avoids above all the risk of destabilising capital inflows. Flexible exchange rate targeting can be practised in different forms. A central bank has to decide whether it announces the target ("crawling peg") or not. In addition, the crawl can be active (not fully compensating for the inflation differential) or purely accommodating. A nominal anchor is provided only by a publicly announced active crawl.

- If the exchange rate target is not announced, the nominal anchor has to be provided by a publicly announced inflation target. Such an **inflation targeting** would signal to the public that the inflation target has priority but it would also make clear that the exchange rate will not be allowed to fluctuate in an uncontrolled way. Thus, "a nominal (non-fixed) exchange rate target could coexist with an inflation target" (Masson et al. 1997, p. 9). If a policy of inflation targeting is combined "with greater exchange rate flexibility" (Masson 1999, S. 17), the risk of missing the inflation target because of erratic exchange rate fluctuations is high.
- **Capital controls** for short-term capital flows can be avoided if the framework for exchange rate policy is compatible with the requirements of domestic interest rate policy. In addition the exchange rate target should be surrounded by a "wide" band. Williamson (1996, p. 110) recommends a band width of ± 7 to 10 percent. The experience of ERM I shows that Italy had been able to manage a substantial disinflation with a ± 6 percent band.

7. Conclusion

The purpose of this article was to design a link between domestic monetary policy conditions on the one side and international financial markets restrictions on the other side. A main reason for the numerous collapses of fixed nominal exchange rate arrangements in the past two decades can be found in a simple disregard of the inconsistency triangle's rules. Central banks that are inclined to pursue a certain degree of autonomous interest rate policy in order to disinflate while pegging their exchange rates, become increasingly vulnerable to speculative capital inflows caused by sustained violations of the UIP. To solve this problem a closer look at the inconsistency triangle turns out to be instructive. While ruling out capital controls and independently floating exchange rates, two other options that have already been

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they really remain fixed, but the crawling band outperforms (although not significantly) an average of fixed rates and the adjustable peg." (Williamson 1996, p. 101).

practised successfully seem to be adequate for exchange rate management in emerging market economies. First, a currency board arrangement removes all kind of monetary autonomy from potential policy makers. Second, a flexible exchange rate targeting allows the central bank to use both instruments, the exchange rate and the interest rate, in a way that is consistent with an international financial markets equilibrium. The experience shows that such regimes do not give rise to excessive capital inflows. A flexible exchange rate targeting should be followed under the overall framework of an inflation targeting. The target values for the inflation rate, the exchange rate and the domestic interest rate have to be derived in a way that guarantees an UIP equilibrium.

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