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*Peter Bofinger*

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## *Contents*

	<i>Page</i>
<i>Abstract</i> .....	1
<b>I. THE CURRENT DEBATE ON THE REFORM OF THE INTERNATIONAL MONETARY SYSTEM (IMS)</b> .....	1
<b>II. THE SYSTEM OF FLEXIBLE EXCHANGE RATES: MYTHS AND REALITY</b> .....	2
A. Myths of flexible exchange rates .....	2
B. The puzzling and dangerous reality of flexible exchange rates .....	3
<b>III. THE TRIANGLE OF IMPOSSIBILITY</b> .....	4
<b>IV. THE STRATEGY OF MANAGED FLOATING LEADS TO A TRIANGLE OF POSSIBILITY</b> .....	5
<b>V. POSSIBLE LIMITATIONS OF A STRATEGY OF MANAGED FLOATING</b> .....	8
A. How effective are foreign exchange market interventions? .....	8
B. Are there limitations for the sterilization of foreign exchange market interventions? .....	10
C. How costly are sterilized foreign exchange market interventions? .....	12
D. Scope and limitations of managed floating.....	13
E. The risks of managed floating.....	13
<b>VI. UIP PATH VERSUS PPP PATH</b> .....	14
<b>VII. MANAGED FLOATING AS A UNILATERAL, BILATERAL, REGIONAL OR MULTILATERAL SOLUTION</b> .....	16
<b>VIII. MANAGED FLOATING AND “FUNDAMENTAL DISEQUILIBRIA”</b> .....	16
<b>IX. MANAGED FLOATING AND CHINA</b> .....	17
<b>X. THE EUROPEAN MONETARY SYSTEM (EMS): A SUCCESSFUL “DE FACTO” MANAGED FLOATING SYSTEM</b> .....	19
A. A framework for emancipation from the United States dollar .....	19
B. Managed floating with discrete parity adjustments .....	20
<b>XI. MANAGED FLOATING AND THE CURRENT DEBATE ON THE REFORM OF INTERNATIONAL RESERVE SYSTEM</b> .....	23
<b>XII. CONCLUSIONS</b> .....	24
<b>REFERENCES</b> .....	26



# THE SCOPE FOR FOREIGN EXCHANGE MARKET INTERVENTIONS

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## *Abstract*

*The discussion on exchange rate policy is dominated by the so-called “impossible trinity”. According to this principle an autonomous monetary policy, a control over the exchange rate and free capital movements cannot be achieved simultaneously. In this paper, a strategy of managed floating is developed that allows transforming the “impossible trinity” into a “possible trinity”. If a central bank targets an exchange rate path which is determined by uncovered interest parity (UIP), it can at the same time set its policy rate autonomously. As a UIP path removes the incentives for carry-trade, it is also compatible with capital mobility. The approach can be used unilaterally to prevent carry trade as a central bank can always prevent an appreciation of its currency. But it can also be applied bilaterally or multilaterally. Successful examples are the European Monetary System and the exchange rate policy of Slovenia before its EMU membership.*

## I. THE CURRENT DEBATE ON THE REFORM OF THE INTERNATIONAL MONETARY SYSTEM (IMS)

At their meeting in Paris on 18–19 February 2011, the Finance Ministers and Central Bank Governors of the G-20 “agreed on a work programme aimed at strengthening the functioning of the IMS, including through coherent approaches and measures to deal with potentially destabilizing capital flows, among which macro-prudential measures, mindful of possible drawbacks” (G-20, 2011).

So far most proposals for a reform of the IMS have focused on the growth and composition of **international reserves** (Zhou Xiaochuan, 2009; Stiglitz, 2011; Dorrucci and McKay, 2011; Yongding, 2011; Bénassy-Quéré and Pisani-Ferry, 2011). Above all these studies discuss ways:

- to reduce the still dominant role of the United States dollar as an international reserve currency, the so-called “exorbitant privilege”;
- to enhance the use of the renminbi as an international currency above its inclusion in the Special Drawing Right (SDR) basket; and
- to boost the global role of the SDR through bigger new issues and a bigger role in IMF lending.

The priority that is given to the topic of international reserves in the current reform debate shows that most economists regard a reform of the system of global reserves as more urgent than a reform of the global exchange rate system. In fact, there is very little fundamental criticism of the working of the system of flexible exchange rates, especially its lack of multilateral rules and the strong influence it assigns to financial markets in the determination of exchange rates. On the contrary, e.g. Bénassy-Quéré and

Pisani-Ferry (2011: 39) regard the “move towards greater flexibility of the exchange rates of the main currencies” as an immediate priority and Dorrucci and McKay (2011: 7) argue that “more market-driven developments could also help to change the incentives for policy-makers”.

In this paper, an alternative approach is adopted. It regards the current exchange rate system as the central problem of the IMS while the development and structure of global reserves are mainly regarded as a symptom of the serious flaws that characterize the exchange rate system. In other words, a comprehensive reform of the IMS has to start with a reform of the exchange rate system, not with proposals for a reform of the role of international reserve currencies. Above all, the dominant role of the United States dollar as a global reserve currency can only be stopped if countries decide for more consistent exchange rate and interest rate strategies and eventually other pivots for their exchange rate strategies.

## II. THE SYSTEM OF FLEXIBLE EXCHANGE RATES: MYTHS AND REALITY

From the end of World War II until 1973, the IMS was determined by the System of Bretton Woods. This international arrangement was based on a set of binding rules which obliged its members to maintain a stable parity for their currency vis-à-vis the United States dollar, while the United States were obliged to guarantee the convertibility of dollar reserves of member central banks at a fixed rate into gold. After the breakdown of this system in March 1973, no attempts were made to replace the framework of Bretton Woods by a new set of rules for the exchange rate policies of the IMF member countries. Instead, the **rule-based approach** was de facto substituted by a **laissez-faire approach** which de facto allowed each country an autonomous exchange rate policy. The proponents of flexible exchanges rates hoped that the invisible hand of the foreign exchange market would be able to provide the discipline and the coordination that until 1973 had been exerted by the IMF and the rules of the Bretton Woods system.

### *A. Myths of flexible exchange rates*

In the discussions of the 1960s on fixed versus flexible exchange rates, the proponents of a system of flexible exchange rates had a very clear view of how such a system would function. In the words of Harry G. Johnson (1969: 18):

Flexible rates would allow each country to pursue the mixture of unemployment and price trend objectives it prefers, consistent with international equilibrium, equilibrium being secured by appreciation of the currencies of ‘price stability’ countries relative to the currencies of ‘full employment’ countries.

Thus, the exchange rate system of flexible exchange rates is based on the theoretical assumption that exchange rates are at least over the medium term determined by the relative version of the **purchasing power parity** (PPP) theory. According to PPP, differences in national inflation rates are the main determinant of flexible exchange rates so that the real exchange rate remains constant over time. If one assumes that over the medium term inflation differences are reflecting differences in nominal interest rates, the system of flexible exchange rates is at the same time based on the theory of **uncovered interest parity** (UIP). According to this equilibrium condition for international financial markets, the currency of a country with a high nominal interest rate is depreciating against a currency with a low nominal interest rate. In fact, all textbooks on open economy macroeconomics present UIP and PPP as the most important theoretical building blocks of an exchange rate system with flexible exchange rates.

In this stylized world of flexible exchange rates there is no room for **exchange market interventions** of central banks. First, as market determined exchange rates provide an optimum adjustment to differences in national macroeconomic developments, there is no need for a central bank to interfere with the market. And second, as the market has a clear perception of the equilibrium level of the exchange rate, attempts to target a different level are bound to fail given the huge size of foreign exchange market turnover and the seemingly limited amount of central bank’s foreign exchange reserves.



## ***B. The puzzling and dangerous reality of flexible exchange rates***

The **reality of flexible exchange rates** is difficult to reconcile with this idealized picture. It is widely accepted in the literature that bilateral nominal exchange rates cannot be explained satisfactorily with any kind of macroeconomic fundamentals. Obstfeld and Rogoff (2000) speak of a “purchasing power puzzle” and a more general “disconnect puzzle” as one of the six major puzzles in international economics. The first puzzle “highlights just how weak the connection is between exchange rates and national price levels” (Obstfeld and Rogoff, 2000: 373). The second puzzle “alludes broadly to the exceedingly weak relationship (except, perhaps in the longer run) between the exchange rate and virtually any macroeconomic aggregates” (Obstfeld and Rogoff, 2000: 373). As far as the UIP relation is concerned, Froot and Thaler (1990) identified the anomaly of a “forward premium puzzle” which means that contrary to UIP, currencies with a positive interest rate difference are appreciating instead of depreciating.

In the more recent past, this anomaly has been explained with the increasing importance of **carry-trade** as a strategy for investors on foreign exchange markets (Hattori and Shin, 2008). According to this strategy, investors invest funds in currencies with high nominal interest rates and obtain their funding from currencies with low interest rates (UNCTAD, 2007: 15; Hattori and Shin, 2008). Thus, instead of being a stabilizer between high-inflation and low-inflation countries, the flexible exchange rate system tends to destabilize economies. The currency of the country with high nominal interest rates and high inflation appreciates so that it becomes even less competitive. At the same time, the high domestic interest rates attract short-term capital flows that undermine the effectiveness of domestic monetary policy.

The most serious injury under the regime of flexible exchange rates happened to **Japan in the first half of the 1990s**. After the burst of the real estate bubble at the end of the 1980s, the Bank of Japan maintained for several years relatively high nominal interest rates. As a consequence, between November 1990 and August 1993 the yen had a positive interest rate differential vis-à-vis the dollar, although inflation in Japan was lower than in the United States. Due to carry-trade the yen started to appreciate strongly; from April 1990 to May 1995 it almost doubled its dollar value from 159 yen to 83 yen. This led to a significant decline in exports so that in addition to the already weak domestic sector the economy also had to suffer from a strong decline in international competitiveness. In order to improve its international position, Japan started in the mid-1990s a policy of strong wage moderation which generated a deflationary momentum from which its economy has never really recovered since. However, low wage increases helped in the longer run to restore PPP and UIP. The experience of Japan is a good example that even if in the longer term PPP is realized under flexible exchange rates (Rogoff, 1996; Bénassy-Quéré and Pisani-Ferry, 2011), it is not because of the validity of PPP in the longer term but because of an opposite causality by which excessive exchange rate movements have to be compensated by a painful internal devaluation. Thus, it was not the Plaza Accord of 1985 which caused Japan’s “**lost decade**” (International Monetary Fund 2011: 53) but the blind faith of Japanese authorities in the stabilizing forces of a flexible exchange rate. The Japanese experience provides a strong warning sign, especially for China, not to engage in the adventure of flexible exchange rates.

A similarly serious accident under the regime of flexible exchange rates happened to **Iceland** in the years 2005 to 2007. Driven by a high positive interest rate differential and an appreciating currency, the country was flooded by very strong capital inflows. These caused an unsustainable real estate boom, often financed by seemingly cheap foreign currency credits,<sup>1</sup> and when the capital flowed back the economy of Iceland was devastated.<sup>2</sup>

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<sup>1</sup> During the boom period, over two-thirds of lending and over three-quarters of deposits were denominated in foreign currency (Guðmundsson, 2010: 8).

<sup>2</sup> See also Plantin and Shin (2011).

Currently, several advanced and emerging countries are suffering from high short-term capital inflows which are related to the extremely low interest rates in the United States. Speculation and carry trade affect other countries with low interest rates (Japan and Switzerland) but also countries with very high interest rates (Australia and Brazil). While the depreciation of the dollar helps to strengthen the United States export sector it has been regarded as a “**currency war**”<sup>3</sup> by other countries.

### III. THE TRIANGLE OF IMPOSSIBILITY

For many years, the discussion on alternative exchange rate regimes has been dominated by the so-called “triangle of impossibility” (also “impossible trinity” or “unholy trinity”). According to this widely accepted paradigm policy makers in an open economy have to choose between three policy targets which cannot be reached simultaneously:

- an autonomous monetary policy;
- a fixed exchange rate; and
- capital mobility.

Thus, if a country wants to avoid restrictions for capital movements, it has to choose between either an autonomous monetary policy and a flexible exchange rate or a fixed exchange rate and an ineffective monetary policy. The theoretical basis for this approach is the seminal **Mundell-Fleming model** which shows that with free capital mobility monetary policy is inefficient under fixed rates, while it is fully effective under flexible rates (Mundell, 1963). In other words, if a country wants to achieve an autonomous interest rate policy and stabilize the exchange rate at the same time, it has no alternative but to introduce capital controls. After the Asian crisis, this paradigm was also presented under the “**hollowing out**” hypothesis implying that intermediate solutions between fully fixed and freely flexible exchange rates are not sustainable (Fischer, 2001; Rajan, 2003). Eichengreen (2001: 267) has put this view as follows:

...high capital mobility has made it exceedingly difficult...to operate pegged but-adjustable exchange rates ...Intermediate regimes are fragile. Operating them is tantamount to painting a bull’s eye on the forehead of the central bank governor and telling speculators shoot here.

In reality, however, one can observe that especially in the last decade many countries have been intervening heavily on foreign exchange markets, but in most cases without declaring fixed target values for the exchange rate of their currency. This is reflected, above all, by the very **strong increase of foreign exchange reserves**, especially of emerging market economies. In most cases, this upward trend of the reserve stocks exceeds precautionary reserve levels by far. Already in 2006, when reserve levels were much lower than today, a study of the European Central Bank (2006: 32) came to the following conclusion:

This unusual accumulation is a sign that factors other than purely precautionary motives might play an important role.

This “**puzzle of reserve accumulation**” (European Central Bank, 2006: 9) can be solved relatively easily. It shows that central banks in emerging market economies have intervened persistently against the trend in order to maintain an undervalued exchange rate. As the current IMS entails, no rules for exchange rate policy, it is not surprising that countries make use of this institutional vacuum to manipulate the exchange rate in a way that supports their domestic producers. While WTO rules prohibit the instrument of tariffs, the use of the exchange rate as a protectionist instrument is not explicitly prohibited. The International Monetary Fund (IMF) also shares the view that the increase in exchange reserves is the result of a deliberate exchange policy:

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<sup>3</sup> This term was coined by Brazil’s Finance Minister, Mr. Guido Mantega, on 27 September 2010.

The reserves buildup of recent years seems to be a byproduct of policies aimed at ‘leaning against the appreciation wind,’ rather than at strengthening precautionary buffers (International Monetary Fund, 2010: 22).<sup>4</sup>

Of course, most countries do not want to make such policies public. Instead, for the statistics of the IMF they declare to operate a system of flexible exchange rates. This discrepancy was detected already at the beginning of the last decade by Calvo and Reinhart (2000) in a paper titled “**fear of floating**”.

Thus, in contrast to the “hollowing out” hypothesis, many countries are neither willing to peg their currency in a formal way nor to leave the fate of their currency to irrational foreign exchange markets. In other words, disregarding theory, many countries have tried to cope with the triangle of impossibility in a pragmatic way. However, without a comprehensive theoretical framework such an approach bears the risk to produce inconsistencies which lead to undesired results. Above all, the Asian crisis in the year 1997 has demonstrated that an exchange rate targeting which is not compatible with UIP can attract large short-term capital inflows. These do not only produce an unwarranted appreciation of the domestic currency, but at the same time also undermine the effectiveness of domestic monetary policy.

#### IV. THE STRATEGY OF MANAGED FLOATING LEADS TO A TRIANGLE OF POSSIBILITY

In the following, a theoretical framework for a **strategy of managed floating** is developed that shows how the “inconsistency triangle” can be transformed into a “consistency triangle”. This strategy is based:

- on the theoretical equilibrium condition of **uncovered interest rate parity** according to which the path of a bilateral exchange rate should be identical with the interest rate difference between two currencies; and
- on the famous **Tinbergen principle** according to which the number of policy instruments corresponds with the number of policy targets.

As the Mundell-Fleming model shows, in an open economy there are **two targets**: external and internal equilibrium. For these two targets, **two instruments** are needed. In an open economy, a central bank disposes over two instruments that can be targeted directly and combined in different ways:

- Interventions in the **domestic money market** in order to control the short-term interest rate as its policy rate. The effects of money market interventions are reflected in changes of the monetary base.
- Sterilized interventions in the **foreign exchange market** in order to target the exchange rate. The effects of these interventions are reflected in changes of the stock of foreign reserves. Interventions on the foreign exchange market have an immediate impact on the monetary base, but this effect can be sterilized by a compensating adjustment of domestic positions of the central bank’s balance sheet.

Of course, in an open economy these two instruments cannot be used independently. But as the UIP equation shows, for a given foreign interest rate ( $i^*$ ) different combinations for the domestic interest rate ( $i$ ) and the exchange rate target path ( $\Delta s$ ) are possible:

$$(i^* - i) = \Delta s,$$

where  $s$  is the logarithm of the nominal exchange rate expressed in the quantity notation, i.e. an increase of  $s$  implies an appreciation of the domestic currency. The optimum combination of the two policy instruments is determined by the policy targets of internal and external equilibrium.

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<sup>4</sup> See also Dorrucchi and McKay, 2011: 47.

The target of **internal equilibrium** can be defined as a situation where a macroeconomic loss function is optimized.<sup>5</sup> Such a loss function typically includes the output gap and an inflation gap, i.e. the difference between the actual inflation rate and an inflation target.<sup>6</sup> The central bank has to choose an interest rate which minimizes this loss function. This theoretical approach underlies the strategy of **inflation targeting** which has been adopted by many advanced and emerging countries in the last few years.<sup>7</sup>

For the strategy of managed floating, the target of **external equilibrium** is defined according to the UIP condition as a constellation where the positive (negative) difference between the domestic interest rate and the interest rate of a pivot currency is identical with the target value for the depreciation (appreciation) of the domestic currency against the pivot currency. As the foreign interest rate is exogenous and the domestic interest rate is determined by the target of internal equilibrium, the UIP condition determines the target path of the nominal exchange rate. Thus, in this context external equilibrium is defined as a situation where **financial markets** are in equilibrium. I will show later that over the medium term a UIP path is identical with a PPP path so that it also helps to maintain an external equilibrium on goods markets.

In sum, the strategy of managed floating is characterized by the following **policy assignment**:

- Internal equilibrium which is defined by a loss function that is compatible with inflation targeting, is achieved with the domestic short-term interest rate; and
- External equilibrium which is defined as a UIP path of the exchange rate vis-à-vis a pivot currency, is achieved by targeting the exchange rate with interventions on the foreign exchange market.<sup>8</sup>

The approach which is presented in this paper differs from standard approaches to **open economy inflation targeting** as it uses the interest rate and the exchange rate as two operating targets that both can be controlled directly and combined systematically. The standard approach is presented by Stone et al. (2009) where four variants of inflation targeting in an open economy are discussed. In the first three variants the interest rate is used as operating target, in the fourth variant the exchange rate serves as operating target:

- **Plain vanilla inflation targeting**: the exchange rate does not appear explicitly in the policy reaction function or a Taylor rule.
- **Open-economy inflation targeting**: the exchange rate is included in the reaction function so that the interest rate is adjusted systematically in response to exchange rate movements.
- **Inflation targeting with an exchange rate band**: within a predefined exchange rate band this approach is identical with open-economy inflation targeting. If the margin of the band is reached, the inflation target is overridden by the exchange rate objective.
- **Exchange-rate-based inflation targeting**: the exchange rate rather than the interest rate is used as the operating target for monetary policy. This approach can be implemented through unsterilized intervention in the foreign exchange market.

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<sup>5</sup> In the traditional IS/LM-framework, domestic equilibrium is attained if the LM-curve intersects the IS-curve at a point which is compatible with full employment. Thus, the target value for  $i$  is derived from the target of internal equilibrium.

<sup>6</sup> For a simple new-Keynesian model, see Bofinger et al. (2006).

<sup>7</sup> For a survey, see Charles Freedman and Douglas Laxton (2009).

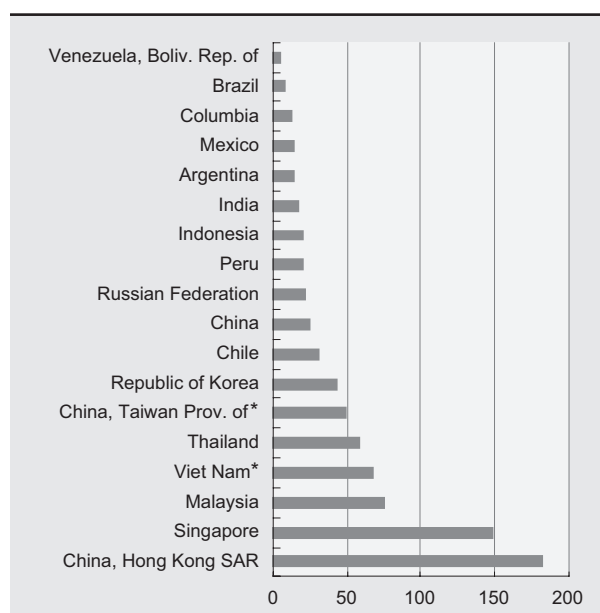
<sup>8</sup> In theoretical papers on open economy inflation targeting, e.g. Svensson (2000: 163), the UIP conditions plays a decisive role. However, while they implicitly assume that UIP always holds, in the strategy of managed floating foreign exchange market interventions are used to guarantee a UIP path.

In all four versions, the central bank always uses only one operating target. This implies that if the interest rate is used as operating target, the exchange rate can only be targeted indirectly with the interest rate.<sup>9</sup> Thus, it is not surprising that very often a direct exchange rate targeting is regarded as detrimental for open economy inflation targeting (Freedman and Ötoker-Robe, 2009). However, by not using the exchange rate and the interest rate as two simultaneous operating targets a central bank gives up an important degree of freedom.

The **practical operation** of a managed floating system can be explained with a concrete example. In Brazil, the policy rate is currently 11.75 per cent. In the United States, the Federal Funds Rate is 0.25 per cent. According to UIP this implies a depreciation of the real vis-à-vis the dollar by 11.5 per cent on an annual basis. Thus, the central bank could at the same time target internal equilibrium with its interest rate policy and external (UIP) equilibrium by targeting the real/dollar rate on a depreciation path of 11.5 per cent p.a. As a depreciation would create an inflationary impact on the economy, the domestic interest rate would have to be higher than the current level. However, with a UIP rule domestic investors could no longer try to circumvent the high domestic interest rates by borrowing in dollar at a very low interest rate. The interest rate advantage of this financing strategy would be fully compensated by the targeted depreciation of the domestic currency. In other words, with a UIP rule the power of domestic monetary policy over domestic households and enterprises would increase considerably. Bacchetta (2000) even argues that with **foreign currency debt**, monetary policy could become ineffective even under floating exchange rates. As borrowing in foreign currency is a major cause for financial and currency crises,<sup>10</sup> removing the incentive for borrowing in foreign currency makes the financial system more stable.

The need to target a devaluation whenever the domestic interest rate is higher than the interest rate of the pivot country makes it clear that the strategy of managed floating can only be applied in countries where the impact of the interest rate on aggregate demand is higher than the impact of the exchange rate. In other words, it cannot be used in countries with a very high **degree of openness**. In many emerging market economies, the degree of openness (measured as the sum of exports and imports divided by GDP times two) is relatively low so that the impact of the domestic interest rate on aggregate demand seems to be sufficiently high (chart 1). For countries with high degree of openness, the corner solution of an

**Chart 1**  
**DEGREE OF OPENNESS IN**  
**EMERGING ECONOMIES, 2010**  
(Per cent)



**Source:** Datastream.

**Note:** Openness is measured as the sum of exports and imports divided by GDP times two.

\* 2009.

<sup>9</sup> This view can be found in many papers on open economy inflation targeting, e.g. Edwards (2006: 25). As they assume that the exchange rate can be only targeted with the interest rate, they necessarily come to a rather skeptical view on targeting the exchange rate under an inflation targeting regime.

<sup>10</sup> Bordo et al. (2009: 4): "Those borrowers involved seemed to dismiss, ignore or discount the possibility that dollar liabilities might increase due to a sharp depreciation. They also appear to have overestimated the capacity or willingness of their governments to maintain fixed exchange rates. Yet repeatedly after 1990 in Mexico, Thailand, South Korea, Indonesia, Malaysia, Russia and Argentina, among many others, governments failed to uphold these pegs against sudden stops to capital inflows. This wreaked havoc on the balance sheets of domestic financial and non-financial firms, leading to successive credit crunches and output losses."



absolutely fixed exchange rate seems more appropriate. In fact, the very open economies of Hong Kong (China), Singapore and Malaysia maintain a relatively stable peg vis-à-vis the dollar (Hong Kong, China) or the renminbi (Singapore and Malaysia) respectively.

Thus, with the concept of managed floating the inconsistency triangle can be converted into a **consistency triangle** with:

- free capital mobility;
- an autonomous interest rate policy; and
- an exchange rate target path which is determined by UIP.

## V. POSSIBLE LIMITATIONS OF A STRATEGY OF MANAGED FLOATING

According to Lee (1997), there are three possible limitations of a strategy of managed floating:

- There exists a broad literature which comes to the conclusion that foreign exchange market **interventions are not effective** so that it is not possible to target the exchange rate: “If capital is highly mobile, attempts at sterilization may prove futile, because they can be rapidly overwhelmed by renewed inflows” (Lee, 1997: 4).
- If a central bank attempts to target the exchange rate with large foreign exchange market interventions it will lose **control over the domestic money supply**. “In many cases, the policy could not be applied indefinitely because the stock of open market bills rose too sharply, swamping the domestic market’s ability to absorb them” (Lee, 1997: 3).
- The attempt to target the exchange rate with sterilized interventions can be associated with **high costs** for a central bank: “For a central bank, operating losses can occur when the funds it raises are invested in foreign assets, which earn prevailing interest rates in the major world currencies – often lower than rates the central bank must pay on the bills it has sold. Large-scale losses can even lead to the need for a recapitalization of the central bank” (Lee, 1997: 5).<sup>11</sup>

### *A. How effective are foreign exchange market interventions?*

There exists a vast literature on the effectiveness of foreign exchange market interventions. The overwhelming result of these studies is that foreign exchange market interventions are not effective. The main methodological problem of such studies is the difficulty to define the **counterfactual situation**. This would require a generally accepted theory of exchange market determination under flexible rates. But as the “disconnect puzzle” demonstrates, such a theory is simply not available. As Wollmershäuser (2003: 212) has shown, most econometric tests of intervention channels (monetary, portfolio balance, signaling) are based on a joint hypothesis of efficient foreign exchange markets and effective sterilized foreign exchange interventions:

While exchange rate economists regularly come to the result that models of exchange rate determination based on the former [i.e. efficient foreign exchange markets] are not able to predict the movements in the exchange rate, one should not be surprised that the attempts to explain the effectiveness of interventions on the basis of the same models are not very satisfying. Most economists, however, treat the assumption of efficient foreign exchange markets as axiomatic and conclude on the basis of the mixed empirical results from the intervention studies that they are not very supportive of the effectiveness of sterilized interventions.

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<sup>11</sup> See also Bénassy-Quéré and Pisani-Ferry (2011: 30).

In addition, as Beine et al. (2009) argue, the objectives followed by central banks are rarely known by external researchers. As these objectives are likely to change over time and to differ across central banks, it is difficult to assess empirically whether interventions have delivered the intended goal. A similar argument can be made from the observation that, as already mentioned, many central banks are frequently intervening on foreign exchange markets and sometimes with high intervention volumes. If interventions are totally ineffective, it would be surprising that in the last decades so many central banks have been intervening with sometimes very large amounts without realizing that their attempts are totally ineffective.

From a **basic microeconomic approach**, the ineffectiveness of foreign exchange market interventions is difficult to justify. It implies that major additional sales or purchases of an asset have no effects on its market price. This would only be plausible if interventions of a central bank have a compensating effect on the demand or supply curves of the other market participants which exactly offsets the sales or purchases of the central bank. But as central bank interventions are in most cases carried out secretly, it is not very likely that such compensating effects take place. In other words, the burden of proof needs to be reversed. Instead of asking why foreign exchange market interventions are effective, evidence should be provided why they should be ineffective.

From a **microeconomic perspective**, the effectiveness of interventions depends above all on their direction. There exists a huge difference between a situation where a central bank tries to stop a depreciation of its currency and a situation where central bank tries to stop an appreciation of its currency.

- In the first case, a central bank buys its currency on the foreign exchange market by selling the foreign currency. As its amount of foreign exchange reserves is limited, such interventions have to be carried out under a **hard budget constraint**. The theory of speculative attacks shows how market participants that are aware of this constraint can try to speculate against the central bank.
- This is different if a central bank tries to prevent an **appreciation** of its currency. In this case, it buys the foreign currency by selling the domestic currency. As there are no limits for the supply of the domestic currency, such interventions can be carried out under a **soft budget constraint**, i.e. in principle without a quantitative limit. As there is no longer a predefined limit for a central bank's intervention, it becomes much more difficult for market participants to speculate against such interventions.<sup>12</sup>

But there is also empirical evidence for the effectiveness of sterilized intervention. The Exchange Rate Mechanism (ERM) of the **European Monetary System** (1979–1998) can be regarded as a de facto managed floating system. Instead of continuous adjustments of the exchange rate, discrete, but unannounced parity adjustments took place frequently. Together with a  $\pm 2.25$  per cent band around the parities and in line with the logic of UIP and PPP these adjustments tried to compensate differences in interest rates and inflation differences. Section X will show in more detail that from 1979 until 1998 the French Franc/Deutschmark rate was almost perfectly targeted along a UIP/PPP path. Astonishingly, the performance of the ERM has never been discussed in the literature on the effectiveness of foreign exchange market interventions.

Another very little discussed example of a successful application of the strategy of managed floating is **Slovenia**. In the years preceding its membership in the euro area, the country followed an explicit managed floating strategy which was identical with the theoretical approach presented in this paper. In its annual report 2003, the Bank of Slovenia describes its strategy as follows:

In conducting its monetary policy the Bank of Slovenia uses two instruments, namely interest rates and the exchange rate. The Bank of Slovenia adjusts interest rates and influences the euro/tolar exchange

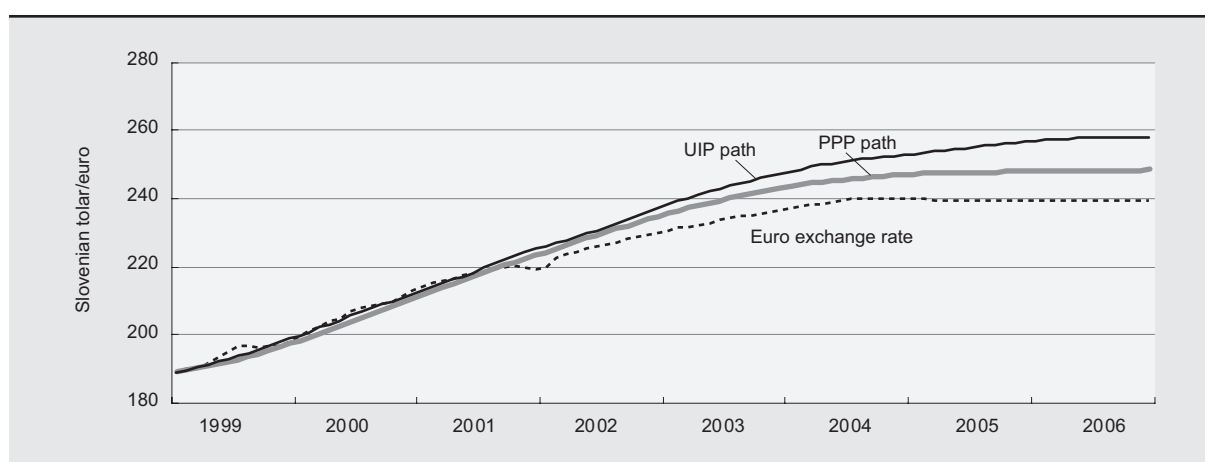
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<sup>12</sup> As the central bank can create the liabilities with which it acquires foreign reserves ex nihilo, it is not true that sterilized interventions “divert savings that could be harnessed for more productive uses” (Bénassy-Quéré and Pisani-Ferry, 2011: 31).

rate in accordance with the principle of uncovered interest parity, taking account of past inflation and inflationary expectations, ECB interest rates and the implicit risk premium. At the same time, it closely monitors a range of monetary and economic indicators and takes account of the need to maintain the level of real interest rates, thereby ensuring a further reduction in inflation and the nominal convergence of interest rates necessary for ERM II and EMU (Bank of Slovenia, 2003: 23).

For many years, the euro exchange rate vis-à-vis the tolar followed a very stable UIP path (chart 2). In the period from January 1999 until the end of 2001, it was perfectly identical with a UIP path. Afterwards it followed a slightly flatter, but still very stable trend. From January 2004 on, a stable exchange rate vis-à-vis the euro was followed as the tolar became a member of the ERM II.

**Chart 2**  
**SLOVENIAN TOLAR–EURO EXCHANGE RATE AND HYPOTHETICAL UIP AND PPP PATH,**  
**JANUARY 1999–DECEMBER 2006**



**Source:** International Monetary Fund, *International Financial Statistics*.

### ***B. Are there limitations for the sterilization of foreign exchange market interventions?***

As sterilized interventions could reach high volumes, one has to ask whether there could be limitations for the sterilization of the increase of domestic liquidity that is associated with the purchase of foreign currencies. For the process of sterilization, two stages can be differentiated. Under normal conditions, the most important position on the asset side of a central bank's balance sheet are refinancing credits for the domestic banking system or domestic government bonds (table 1). If a central bank starts buying foreign assets, it has to reduce these refinancing credits by the same amount in order to avoid an impact of the interventions on the monetary base (**stage I**). As refinancing credits normally have a short-term character, it is not difficult to contract them in a timely matter. There is also the possibility to reduce the stock of domestic bonds by open-market operations.

**Table 1**  
**SIMPLIFIED CENTRAL BANK BALANCE SHEET IN STAGE I**

<i>Assets</i>	<i>Liabilities</i>
Foreign assets (Foreign exchange reserves)	Monetary Base
Domestic assets (Refinancing credits, domestic bonds)	



Stage I comes to an end when the increase of foreign reserves is so strong that sterilization drives the refinancing credits and other domestic assets of the central bank to zero. But this does not mean that at this point the limits of sterilized intervention are reached.<sup>13</sup> If the central bank continues to buy foreign assets, the sterilization can be continued on the liabilities side of the balance sheet (**stage II**). In order to withdraw the liquidity that is created by foreign exchange market interventions from the money market, a central bank can issue short-term notes. Alternatively, it can offer banks to deposit the excess liquidity at an interest-bearing central bank account (**deposit facility**). In principle, both instruments can be applied without quantitative limits. In the second stage, the domestic banking system switches from a net-debtor to a **net-creditor position** vis-à-vis the central bank (table 2). As a consequence, the policy rate with which the central banks control the domestic money market rate is no longer the rate for its refinancing operations but the rate for the deposit facility or the yield that it offers for its short-term notes.

**Table 2**  
**SIMPLIFIED CENTRAL BANK BALANCE SHEET IN STAGE II**

<i>Assets</i>	<i>Liabilities</i>
Foreign assets (Foreign exchange reserves)	Short-term bonds/Deposit Facility
	Monetary Base

The balance sheet of the **People's Bank of China** looks relatively similar to the stylized balance sheet for stage II (table 3).

**Table 3**  
**SIMPLIFIED BANK BALANCE OF THE PEOPLE'S BANK OF CHINA, DECEMBER 2010**  
(100 million yuan)

<i>Assets</i>		<i>Liabilities</i>	
Foreign assets	215 420	Short-term bonds	40 497
Claims on depository institutions	9 486	Monetary Base	185 311
Other domestic assets	34 369	Other liabilities	33 467
<b>Total</b>	<b>259 275</b>	<b>Total</b>	<b>259 275</b>

**Source:** People's Bank of China.

On the assets side, foreign exchange reserves account for 83 per cent of the total, while credits to depository institutions account for only 4 per cent of the central bank's assets. On the liabilities side, 16 per cent of total liabilities are bonds. In China, the central bank heavily relies on the instrument of minimum reserve requirements on its banking sector for the sterilization of foreign exchange market interventions which explains the high share of the monetary base in total assets. Since April 2011, a record minimum reserve rate of 20 per cent is required. From the perspective of the central bank, sterilization with the instrument of minimum reserves could have the advantage of avoiding interest payments from the central bank to the banks so that the costs of sterilization are reduced. However, non-interest bearing minimum reserves are an implicit tax on credit intermediation via banks, they create strong incentives to channel financial funds outside the regular banking system. In China minimum reserves are interest-bearing (Geiger, 2008).

<sup>13</sup> E.g. Lee (1997: 4) argues: "In practice, policy is often limited by an inadequate supply of marketable instruments, or by thin and segmented local market conditions."

Thus, one can conclude that a central bank that tries to prevent an appreciation of its currency vis-à-vis an anchor currency is neither constrained by a given amount of reserves nor by a limited potential for sterilization. Again a practical example of a successful policy of sterilized interventions is provided by the Central Bank of Slovenia. In the words of Bohnc and Košak (2007: 150):

The past experience of the Slovenian central bank proves that it is possible to design a sterilization strategy which can work for longer periods of time.

### *C. How costly are sterilized foreign exchange market interventions?*

Even without quantitative limitations for sterilized interventions, such a strategy might be associated with unacceptable costs for the central bank. The costs of sterilized interventions are determined by interest costs and the valuation losses or gains from a central bank's foreign exchange reserves.<sup>14</sup> The **interest costs** of sterilized intervention are determined by:

- the reduced interest revenue because of lower refinancing credits (stage I) and the additional interest payments for a deposit facility or for bonds that are issued for sterilization (stage II), minus; and
- the additional interest revenue that is generated by the foreign assets acquired with interventions.

If the domestic policy rate is higher than the foreign short-term rate, the central bank makes an interest rate loss from the sterilized intervention. For the total costs of sterilized interventions, the value of the foreign assets is also of relevance. If the exchange rate is targeted along a UIP path and the domestic interest rate is higher than the foreign rate, the value of the foreign assets increases as the foreign currency will appreciate according to UIP. Thus, the interest costs of sterilized intervention are exactly offset by a **revaluation gain**.

Under the assumption that the central bank had no foreign assets before the sterilized intervention, the total costs of sterilized intervention (CS) are as follows:

$$CS = (i-i^*)\Delta FA + \Delta s \Delta FA,$$

where FA are the foreign assets of the central bank. If UIP holds

$$(i-i^*) = -\Delta s,$$

the total costs of sterilized interventions are zero. Thus, one can show that by targeting the exchange rate on a UIP path, sterilized interventions have no costs for a central bank. In the case of  $i > i^*$  the interest rate costs are fully compensated by the revaluation gain of the foreign assets. The zero cost condition for the central bank is identical with a **zero profit condition for carry-traders** under a UIP exchange rate regime: their interest rate profits are fully compensated by revaluation losses of the higher yielding assets.

Again the experience of Slovenia is very instructive. Bohnc and Košak (2007: 149) report that during the whole period between 1992 and 2005 the Central Bank of Slovenia was only once faced with an operating loss. They explain this successful performance mainly with the UIP path of the exchange rate.

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<sup>14</sup> The potential revaluation gains are neglected by Bénassy-Quéré and Pisani-Ferry (2011: 30).

#### ***D. Scope and limitations of managed floating***

In sum, taking into account the main determinants of the scope for sterilized interventions, one can say that a central bank that intends to **prevent an appreciation** of its currency is in principle able to intervene and simultaneously to sterilize the liquidity effect of the interventions:

- without quantitative limits; and
- without direct operating costs.

This is entirely different for a central bank that tries to **avoid a depreciation** of its currency. In this case, it has to operate under the hard budget constraint of a limited amount of foreign exchange reserves.

Thus, the “**consistency triangle**” under a managed floating regime can be formulated as follows. In an open economy, a central bank is able to achieve three targets:

- free capital mobility;
- an autonomous interest policy; and
- a one-side targeting of the exchange rate along a UIP path preventing an unwarranted appreciation of its currency.

Compared with the status quo where, especially in the last few months, many central banks have been suffering from strong appreciations driven by carry-trade, this strategy offers a considerable improvement. It is due to the fact that sterilized interventions provide **an additional degree of freedom** that is left unused if a central bank only targets the domestic policy rate.

The limited room for manoeuvre in a situation where the domestic currency is in a depreciation pressure can only be overcome if both central banks involved in a bilateral exchange rate relation are willing to cooperate. In such a co-operative case, there is always a strong central bank that is able to intervene without a hard budget constraint. This co-operative approach was to some degree practiced in the quasi managed floating rate system of the ERM where the Bundesbank was willing to intervene in favour of weak currencies and where ample short-term intervention credits were available (see section X).

#### ***E. The risks of managed floating***

As the example of China shows, after prolonged sterilized interventions, a central bank can end up with a very high amount of foreign exchange reserves. In Japan intensive foreign exchange market interventions during the years 2003–2005 also led to a very strong increase in its foreign exchange reserves. This implies the risk that once the domestic currency is allowed to appreciate vis-à-vis the pivot currency a central bank will incur high valuation losses. However, as an appreciation can only occur if interventions are discontinued, it is up to a central bank whether such losses will occur or not.

Nevertheless, one cannot rule out shocks which require a one-time exchange rate adjustment that goes beyond a UIP or PPP path. If such a fundamental disequilibrium requires an appreciation of the domestic currency and the central bank has a large stock of foreign assets, losses cannot be avoided. There is also the risk that with a growing amount of foreign exchange reserves, a country might become more reluctant to accept an appreciation. In addition to negative effects for its competitiveness, it also has to accept high valuation losses on its foreign exchange reserves.

However, an unwarranted appreciation of a currency is also associated with high costs. Although these costs are more difficult to evaluate than the losses in a central bank’s balance sheet, they should not be disregarded. Japan’s “lost decade of the 1990s” and the chronic deflationary tendency of its economy

show that the macroeconomic costs of an excessive appreciation can be very high. The same applies to the experience of Iceland in the last decade.

Of course, the strong depreciation of the foreign currency can be related to a lack of macroeconomic discipline by the pivot country. In this case, the attempt to avoid the appreciation of the domestic currency leads to growing reserves denominated in that foreign currency. And continued sterilized intervention leads de facto to the financing of the current account deficits of the foreign country. This is the problem with which many countries are confronted today when they have to decide how to cope with the appreciation of their currency vis-à-vis the United States dollar. However, there is always the alternative of a regional exchange rate co-operation which would make countries more independent from changes in the United States dollar exchange rate.

## VI. UIP PATH VERSUS PPP PATH

As an alternative to a managed floating system based on uncovered interest parity, proposals were made to use purchasing power parity as the determinant of the exchange rate path. For instance, UNCTAD in its *Trade and Development Report, 2009* proposed an international agreement on a “**constant real exchange rate (CRER) rule**”.

From a **technical perspective**, a UIP rule is easier to implement than a PPP rule.

- While **data** on interest rates are available on a contemporary basis, data on inflation are normally published with a lag of about a month.
- UIP has also the advantage that it is relatively obvious how to **derive the target values**. In order to achieve equilibrium on financial markets and to avoid carry-trade, UIP should be based on a short-term money market rate (ideally for one month, as it is more stable than the overnight rate). In contrast, for a PPP rule several indices could be used, which all have their flaws. Consumer price indices include a large portion of non-tradable goods and they are defined differently in each country. For the export sector, price indices are often not available so that one would have to use export unit values which, however, are not always comparable.

In the **short-term** the two rules can differ markedly, especially as the short-term interest rate is used as the main macroeconomic policy instrument of a central bank. While a UIP rule guarantees equilibrium on financial markets, a PPP rule focuses on goods market equilibrium. In other words, if one tries to target the exchange rate along a PPP path there can be still a potential for carry trade. On the other hand, a UIP path can lead to short-term PPP deviations. However, taking into account the large short-term and medium-term exchange rate swings under the current regime of flexible rates, such temporary deviations seem to be of minor importance.

Over the **medium term**, the difference between the two approaches is not significant. For the sake of simplicity, one can assume that in both countries the nominal policy rate ( $i$ ) is determined by a simple Taylor rule:

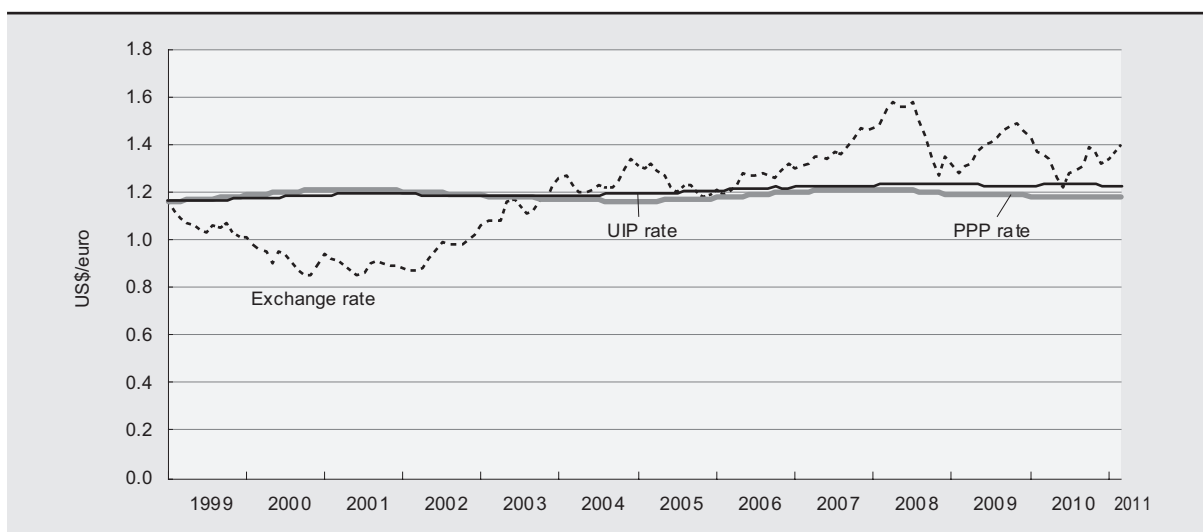
$$i = r + \pi + 0.5 (\pi - \pi^T) + 0.5 y$$

If both countries use the same rule and if one assumes that over the medium-term the output gap ( $y$ ) and the inflation gap, i.e. the difference between the actual inflation rate and the inflation target ( $\pi^T$ ), are zero, and that the neutral real interest rate ( $r$ ) is identical, the differences between nominal interest rates and inflation rates are identical. Thus, a UIP path and a PPP path should lead to the same result even if two countries have different inflation targets.

For the **euro/United States dollar** exchange rate, one can show that over the last 12 years the differences are almost negligible (chart 3).

Chart 3

## EURO/UNITED STATES DOLLAR RATE COMPARED WITH A UIP AND A PPP PATH, JAN. 1999–MARCH 2011



**Source:** Deutsche Bundesbank; and Federal Reserve Bank of St. Louis.

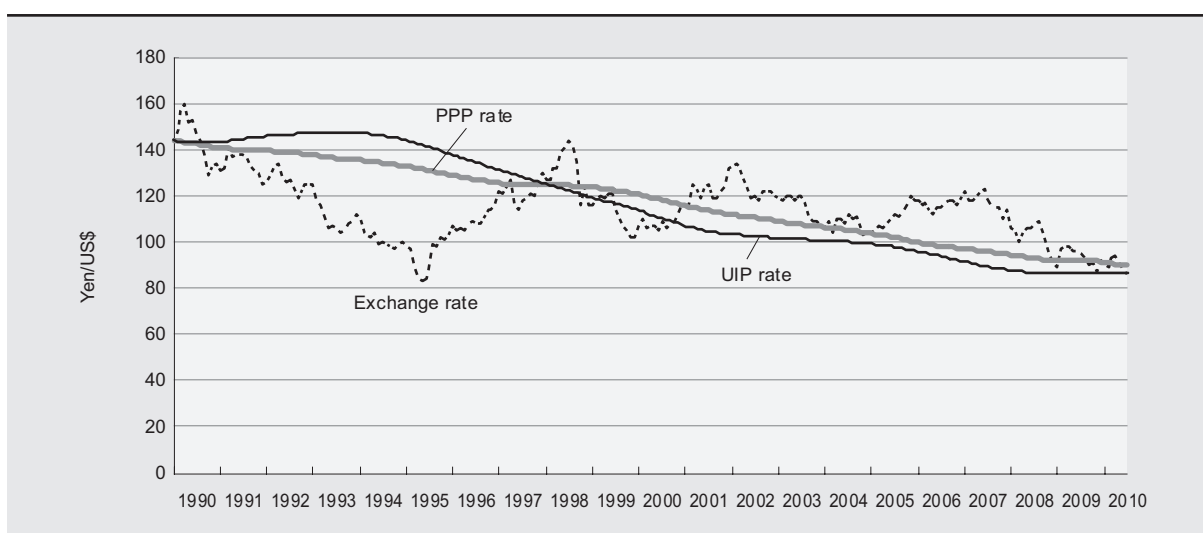
**Note:** The starting point is January 1999.

For the **yen/United States dollar** rate, the picture is rather similar (chart 4). Over the medium and long-term the differences between a UIP path and a PPP path are relatively small, especially if one compares them with the actual variations of the exchange rate.

Nevertheless, while the rationale of a UIP rule and a PPP rule is in principle identical, for practical reasons and because of the need to avoid carry-trade a UIP rule seems the better solution.

Chart 4

## YEN/UNITED STATES DOLLAR RATE COMPARED WITH A UIP AND A PPP PATH, JAN. 1990–JULY 2010



**Source:** IMF, *International Financial Statistics*; and Federal Reserve Bank of St. Louis.

**Note:** The starting point is January 1990.

## VII. MANAGED FLOATING AS A UNILATERAL, BILATERAL, REGIONAL OR MULTILATERAL SOLUTION

Managed floating can be practiced as a unilateral exchange rate strategy or as a bilateral solution. It can also be applied in the context of a framework for regional monetary cooperation. Finally, managed floating could even be used as a rule for the international monetary system.

As a **unilateral approach**, the strategy of managed floating offers individual countries an effective protection against the threat of carry-trade in situations where the domestic interest rate is higher than the interest rate of the pivot country. As the targeted depreciation equals the interest rate difference, managed floating completely removes the profit potential of carry-traders. Thus, an appreciation with its negative effects on the competitiveness of the international sector of an economy can be avoided. In addition, a UIP rule also removes the incentive for domestic debtors to incur their debt in the foreign currency. The advantage of low foreign interest rates is fully compensated by an appreciation of the foreign currency vis-à-vis the domestic currency. The Asian crisis, but also the experience of Iceland and some East-European countries in the last decade show the high risks that are associated with household and enterprise debt that is denominated in foreign currency. The unilateral approach reaches its limits, if a currency comes under strong **downward pressure**. Due to the hard budget constraint of a limited amount of foreign exchange reserves, the scope for managed floating will relatively soon be exhausted.

As a **bilateral approach**, managed floating allows two countries an almost perfect control over their bilateral exchange rate. As always one of the two countries is in a strong position, they are able to defend their bilateral parity without the limitations of the hard budget constraint. In other words, the two countries could no longer become the prey of a speculative attack. It is obvious that such a bilateral solution is only possible, if the countries pursue relatively similar macroeconomic policies. Otherwise, there would be the risk that a stability-oriented country ends up buying high amounts of foreign exchange reserves of a partner that pursues an inflationary policy.

As a **regional approach**, a group of countries could agree on a common exchange rate policy based on the rule of managed floating. They could agree on a matrix of bilateral exchange rate parities which are modified continuously in accordance with UIP. The European Monetary System can be regarded as a de facto managed floating system where the adjustments were made in a discrete way (see section X). In this regard, managed floating could be used as a framework for regional monetary cooperation in Asia or in Latin America. As the European experience from the 1970s shows, an enhanced regional integration makes participating countries more independent from fluctuations of their exchange rate vis-à-vis the dollar.

For the **international monetary system**, managed floating could be established in the form of a multiple hub and spoke system. Major currencies (United States dollar, euro, renminbi, yen, pound sterling) could arrange a mutual network of bilateral UIP exchange rate paths. The remaining countries could choose one of the hubs as the pivot of their currency and organize on this basis a bilateral UIP path with the central bank of a hub currency. Depending on the willingness to co-operate in the stabilization of bilateral exchange rates the need to hold precautionary reserve balances could be reduced significantly.

## VIII. MANAGED FLOATING AND “FUNDAMENTAL DISEQUILIBRIA”

The rationale of a UIP rule, which can be regarded as an implicit PPP rule, is to maintain an equilibrium path of a bilateral exchange rate. Thus, this policy rule should only be applied in a situation where the actual exchange rate is more or less in an equilibrium position. While it is difficult to derive such equilibrium values from economic analyses, the experience of the European Monetary System shows that in practice it is always possible to agree on reasonable starting points. If at the starting point of a managed floating system, a bilateral exchange rate is under- or overvalued, an initial one-time adjustment should be made.



During the lifetime of a managed floating system, it cannot be excluded that major shocks occur that require a nominal exchange rate adjustment that goes beyond the UIP/PPP path. As Lee (1997: 4) has correctly stated, sterilized intervention cannot deal with “the underlying cause of shocks to the system”. But a managed floating system can be organized in a way that it can also cope with such shocks.

In principle, a managed floating regime based on a UIP rule can be regarded as a **dynamic version of the Bretton Woods system**. This historical exchange rate arrangement was based on the basic rule of **fixed nominal exchange rates**. However, as an exception the articles of agreement allowed an adjustment of the exchange rate parities in the situation of a “fundamental disequilibrium”. In contrast to the Bretton Woods system, the strategy of managed floating is based on the rule of a **nominal exchange path** determined by the UIP condition. As long as differences between interest rates exist, this rule implies a continuous adjustment of the nominal exchange rate. But analogous to the Bretton Woods system, in addition to such continuous rule-based adjustments, **discrete adjustments** of the nominal exchange rate could be envisaged whenever shocks in the real sector occur which create a “fundamental disequilibrium”.

In a bilateral setting, the two partner central banks would have to agree on such an adjustment. In a multilateral setting, it would be advisable to entrust the International Monetary Fund with such a role, which to this day is envisaged in its articles of agreement:

6: A member shall not propose a change in the par value of its currency except to correct, or prevent the emergence of, a fundamental disequilibrium.

7: A change may be made only on the proposal of the member and only after consultation with the Fund. When a change is proposed, the Fund shall concur in or object to the proposed par value within a reasonable period after receipt of the proposal. The Fund shall concur if it is satisfied that the change is necessary to correct, or prevent the emergence of, a fundamental disequilibrium (International Monetary Fund, Articles of Agreement, Article XXII, Schedule C, Par Values).

Even if a managed floating regime on a global scale seems not very realistic for the time being, the UIP rule could be used for an enhanced **monitoring of exchange rate policies** by the IMF. This approach has been suggested by the so-called Palais-Royal Initiative (2011):

The IMF should develop globally consistent exchange rate ‘norms’. These norms would be broadly consistent both with globally sustainable external positions and with each country’s internal and external macroeconomic balance. Taking into account the respective underlying fundamentals (stage of development, demographic make-up, resource endowment, productivity trends and other structural features), these ‘norms’, to be updated regularly, would be used to help identify significant exchange rate instability and misalignments, at least for the most systemically relevant economies. ...

Under this approach, each country would be expected to refrain from exchange rate policies that push or keep their exchange rate away from its norm.

## IX. MANAGED FLOATING AND CHINA

In line with this paper, Chinese authorities show a clear preference for a system of managed floating. Hu Xiaolian, Deputy Governor of the People’s Bank of China rightly stresses the flaws of a system of nominally fixed exchange rates:

A fixed exchange rate may make accounting and risk management easier for market participants for some time, but if misaligned with the fundamentals of supply and demand for too long a time, such a regime will distort relative prices on domestic and foreign markets, undermine the efficiency of resource allocation and accumulate domestic and foreign economic imbalances (Xiaolian, 2010).

And he comes to the conclusion:

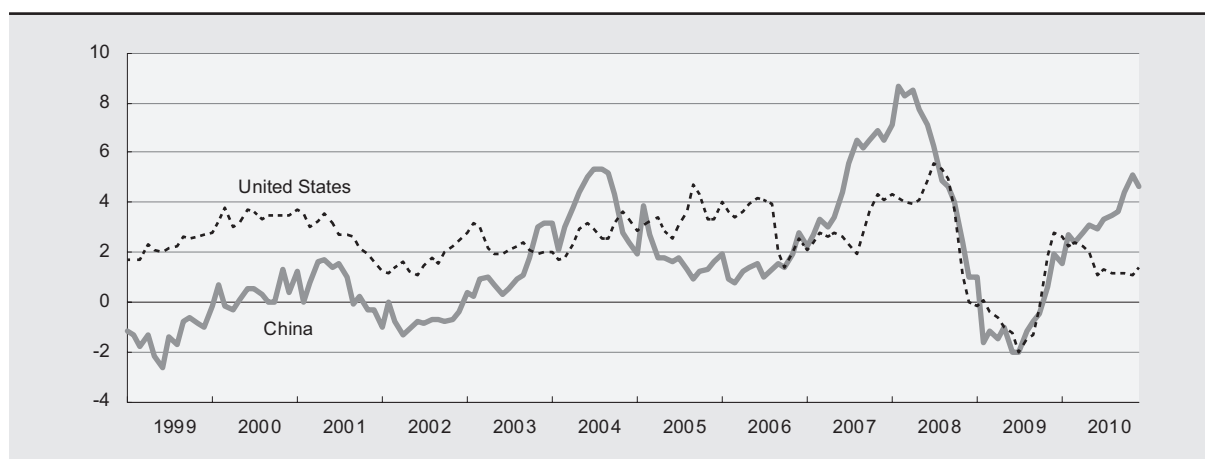
Thus, it is necessary for large countries to have flexible exchange rate policy. China has adopted and will continue to improve the managed floating exchange rate regime (Xiaolian, 2010).

The example of Japan in 1990s shows how dangerous it is to leave the exchange rate to the erratic and even destabilizing processes of the foreign exchange market. Thus, managed floating is definitively the adequate exchange rate strategy for China in the foreseeable future. But as already stated, a managed floating system based on a UIP rule should only be introduced in a situation with an **equilibrium exchange rate**. This raises the difficult question whether the current renminbi exchange rate can be regarded as an equilibrium exchange rate.

Over the last decade, the inflation rate in China was for many years lower than in the United States (chart 5). For an emerging market economy this was not a typical development. According to the **Balassa-Samuels theory**, a country with relatively strong productivity increases should exhibit a relatively high inflation rate. This theory assumes that wages in the manufacturing sector are increased in line with the above average productivity growth in this sector. It also assumes that wages in the non-tradable sector with lower productivity growth are increasing at the same rate as wages in the manufacturing sector. As a result, the inflation rate of a country with high productivity growth should be higher than the inflation rate of a country with low productivity growth. Thus, the relatively low inflation rate in China was not typical for an emerging market economy. However, in the last few years, the inflation difference of China vis-à-vis the United States has become positive and is now in line with the Balassa-Samuels theory.

Chart 5

INFLATION RATE IN CHINA AND THE UNITED STATES, JANUARY 1999–DECEMBER 2010



Source: IMF, *International Financial Statistics*.

As the renminbi-dollar exchange rate was held constant in the first half of the last decade, the real exchange rate of China had been depreciating considerably. However, in the following years, the nominal dollar exchange rate was appreciated. On the basis of PPP and with January 1999 as a starting point, the renminbi seems no longer undervalued but rather overvalued vis-à-vis the dollar (chart 6). The same applies if one chooses January 1997 as a starting point before the Asian crises broke out. Nevertheless, some authors still regard the renminbi as undervalued by a rate of 25 per cent vis-à-vis the United States dollar (see Bergsten, 2010), but they base their calculations not on a PPP equilibrium but on the current account equilibrium.

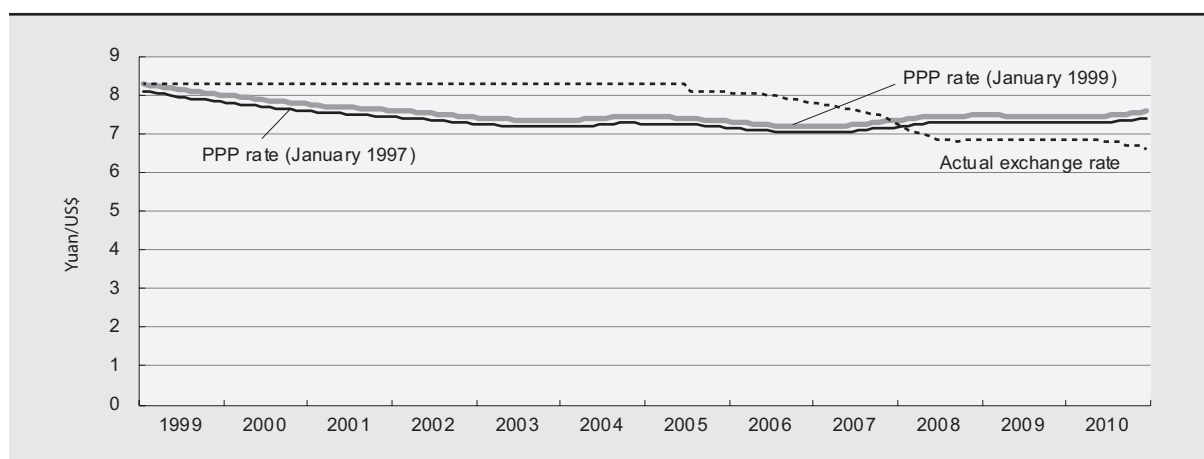
As a definition of an equilibrium renminbi-dollar exchange rate goes far beyond the scope of this paper, it is sufficient to state that before establishing a UIP based managed floating system in China, it seems necessary to reach an equilibrium dollar exchange rate for the renminbi. Such an equilibrium real exchange rate can be realized either with a nominal appreciation or with an increase in domestic wages. As a nominal appreciation would encourage additional capital inflows, a nominal wage increase generated by higher minimum wages seems to be a better solution. In fact, this adjustment process is under way. For



instance in Beijing city, the minimum wage was raised by 20 per cent in June 2010 and it will be raised by 21 per cent this year. In all other provinces and municipalities, minimum wages were raised in 2010 with a minimum increase of 12 per cent (Anderlini and Jacob, 2010).

**Chart 6**

**ACTUAL YUAN/DOLLAR RATE AND HYPOTHETICAL PPP PATHS, JANUARY 1999–DECEMBER 2010**



**Source:** IMF, *International Financial Statistics*.

Once such equilibrium is reached, it would be possible to implement a UIP path vis-à-vis the United States dollar with a depreciation of the renminbi as long as the interest rate and inflation rate in China are higher than the corresponding rates in the United States. As soon as a UIP path is reached, the problems of capital inflows undermining the effectiveness of monetary policy could be stopped.

## **X. THE EUROPEAN MONETARY SYSTEM (EMS): A SUCCESSFUL “DE FACTO” MANAGED FLOATING SYSTEM**

Today, there are two main reasons to study the experience of the European Monetary System. First, it was a de facto managed floating system that for most participants worked successfully. Second, it made it possible for its member countries to become more independent from the fluctuations of the United States dollar and thus also from the influences of the monetary policy in the United States.

### ***A. A framework for emancipation from the United States dollar***

The origin of the EMS dates back to the year 1972 when the member States of the European Economic Community (EEC) decided to set up a mutual exchange rate system between their currencies. In the post-war years, the exchange rate stability within the EEC had been generated implicitly by the rules of the Bretton Woods system obliging European countries to maintain a fixed parity vis-à-vis the United States dollar with a narrow margin of  $\pm 1$  per cent around the parity. This implied a bilateral margin of  $\pm 2$  per cent between the EEC currencies. With the Smithsonian Agreement of December 1971, the IMF member countries decided to widen the band to  $\pm 2.25$  per cent around the dollar parity. This implied a maximum band width between the EEC countries of  $\pm 4.5$  per cent. With the establishment of the **European Exchange Rate Arrangement** (often also called “the snake in the tunnel”) the member countries decided to limit the fluctuations between their currencies to  $\pm 2.25$  per cent. In retrospect, this regional arrangement paved the way for the complete dismantling of the Dollar pegs in March 1973 which marked the de facto breakdown of the Bretton Woods system. With the establishment of the **European Monetary System**

in March 1979, the main principles of the “snake” were put in a more formal structure. The increasing monetary integration in Europe made the European economies more independent from the fluctuations of the United States dollar. In fact, from April 1972 to December 1979, the Deutschmark/dollar appreciated from 3.18 to 1.73 Deutschmark/dollar without causing major damage to the European economies.

### *B. Managed floating with discrete parity adjustments*

As the functioning of the EMS has already been described by the author in another paper for UNCTAD,<sup>15</sup> in this study only the main features of the EMS will be addressed. The essence of the EMS was the so-called **Exchange Rate Mechanism (ERM)** which is based on a matrix of bilateral parities with a  $\pm 2.25$  per cent band. Whenever the exchange rate reached the limits of the band, the central banks were obliged to intervene. Due to the formal symmetry of the system, always both central banks in a bilateral exchange rate relation were obliged to intervene: the central bank with the weak currency at the upper intervention point, the central bank with the strong currency at the lower intervention point (the parities were expressed in the price notation). Thus, in principle interventions without a budget constraint were possible.

However, according to the EMS rules, the foreign assets acquired by the central bank with the strong currency in interventions were immediately transferred to the central bank with the weak currency. Thus, they were treated like an intervention credit provided by the central bank with strong currency that had to be repaid by the central bank with the weak currency according to the rules of the “**Very Short-term Financing Facility**” (VSTF) of the EMS, i.e. normally within three months. De facto, for the central bank with the weak currency the hard budget constraint was only temporarily removed.

While the ERM was formally a system with fixed parities, it was operated as a system with very adjustable parities (table 4). Especially in the first years of the system, parity adjustments happened quite frequently; in the first five years, seven realignments took place.

In the context of managed floating, it is interesting to analyse whether the actual exchange rate developments in the ERM can be explained by a PPP or UIP rule. As the German interest rate and inflation rate were the lowest throughout almost the whole period of the EMS, the **Deutschmark** became de facto the key currency of the system. According to UIP and PPP, it was necessary that all other member currencies followed a depreciation trend vis-à-vis the Deutschmark. In fact, in all realignments the Deutschmark was de facto always appreciated vis-à-vis the other member countries. Together with the  $\pm 2.25$  per cent band around the parities ( $\pm 6$  per cent in the case of Italy), it was possible to keep the Deutschmark exchange rates of the “satellite currencies” on a relatively steady devaluation path.

An interesting case is the **French franc**. If one compares its actual Deutschmark exchange rate with a hypothetical UIP and PPP path, one can see that it very closely followed a UIP as well as a PPP rule for almost two decades (chart 7). In the second half of the EMS period, this outcome was also achieved under free capital movements, as in the mid 1980s all French capital controls were removed (Drumetz, 2003).

This exchange rate targeting was achieved with frequent and sometimes high **foreign exchange market interventions** by the Banque de France (chart 8). The fluctuations in the foreign exchange reserves show a clear pattern. During tranquil periods, the Banque de France tried to replenish its reserves in order to be able to support its currency in phases with speculative attacks. As the development of the exchange rate shows, the interventions were used in a way that the Franc never appreciated significantly vis-à-vis the Deutschmark although this would have been possible within the  $\pm 2.25$  per cent band around the parity.

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<sup>15</sup> See Bofinger and Flassbeck (2000).

**Table 4**  
**REALIGNMENTS IN THE EXCHANGE RATE MECHANISM OF THE EMS**

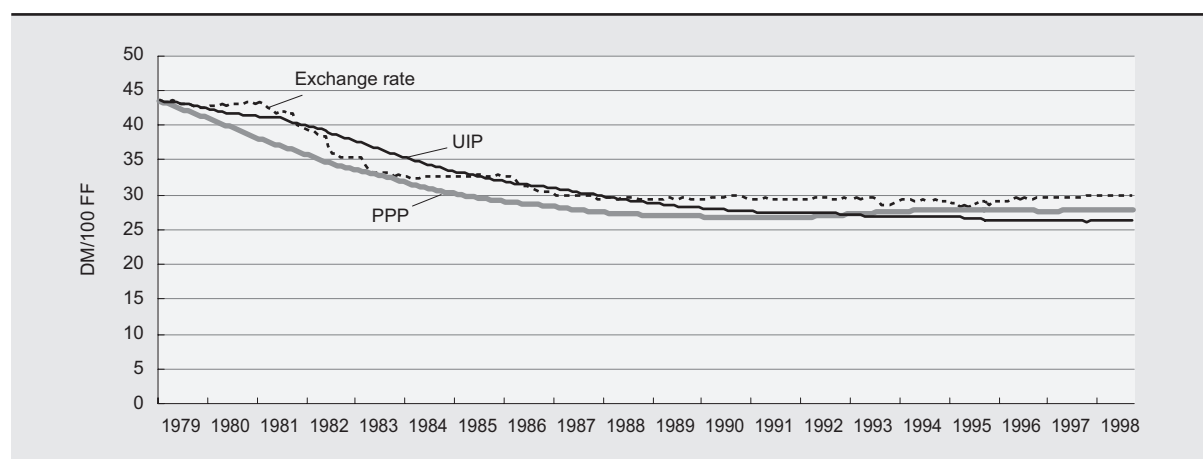
Date	Deutsch- mark	Belgian/ Luxemb. franc	Danish krone	French franc	Irish punt	Nether- lands guilder	Italian lira	Spanish peseta	Pound sterling	Portu- guese escudo
24 September 1979	+2.00	-	-2.86	-	-	-	-	NM	NM	NM
30 November 1979	-	-	-4.76	-	-	-	-	NM	NM	NM
23 March 1981	-	-	-	-	-	-	-6.00	NM	NM	NM
05 October 1981	+5.50	-	-	-3.00	-	+5.50	-3.00	NM	NM	NM
22 February 1982	-	-8.50	-3.00	-	-	-	-	NM	NM	NM
14 June 1982	+4.25	-	-	-5.75	-	+4.25	-2.75	NM	NM	NM
21 March 1983	+5.50	+1.50	+2.50	-2.50	-3.50	+3.50	-2.50	NM	NM	NM
22 July 1985	+2.00	+2.00	+2.00	+2.00	+2.00	+2.00	-6.00	NM	NM	NM
07 April 1986	+3.00	+1.00	+1.00	-3.00	-	+3.00	-	NM	NM	NM
04 August 1986	-	-	-	-	-8.00	-	-	NM	NM	NM
12 January 1987	+3.00	+2.00	-	-	-	+3.00	-	NM	NM	NM
08 January 1990	-	-	-	-	-	-	-3.86	-	NM	NM
14 September 1992	+3.50	+3.50	+3.50	+3.50	+3.50	+3.50	-3.50	+3.50	+3.50	+3.50
17 September 1992	-	-	-	-	-	-	-	-5.00	NM	-
01 February 1993	-	-	-	-	-10.00	-	-	-	NM	-
14 May 1993	-	-	-	-	-	-	-	-8.00	NM	-6.50
06 March 1995	-	-	-	-	-	-	-	-7.00	-	-3.50

**Source:** Deutsche Bundesbank, 1997.

**Note:** Purely technical adjustments are not reported. NM: Country does not participate in the exchange rate mechanism.

**Chart 7**

**FRENCH FRANC IN THE ERM: ACTUAL EXCHANGE RATE AND HYPOTHETICAL UIP AND PPP PATH, JANUARY 1979–SEPTEMBER 1998**

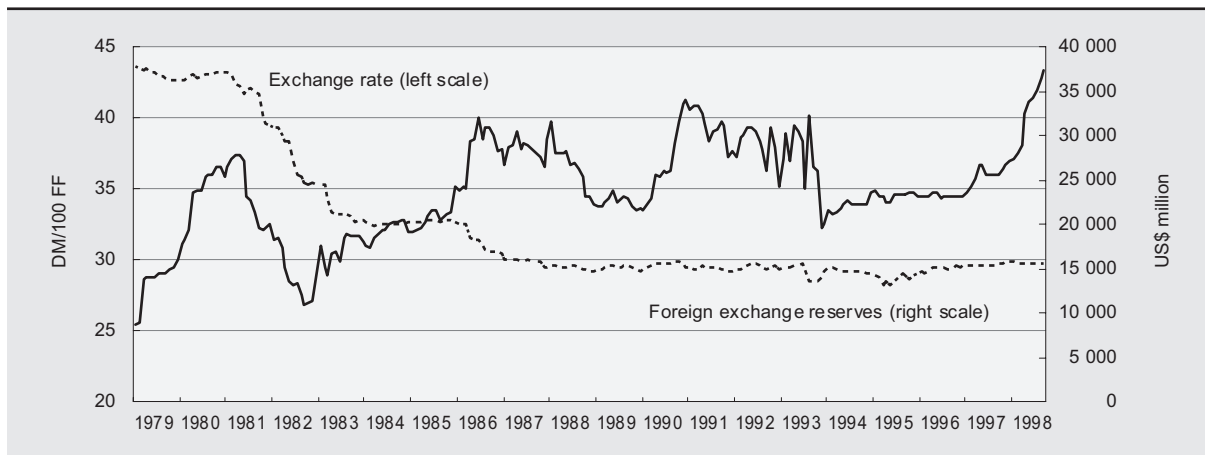


**Source:** Deutsche Bundesbank.

Another explanation for the success of the ERM is provided by the at least formally **symmetric structure** of the system and the short intervention facilities provided by VSTF. The Bundesbank's position vis-à-vis the European Monetary Cooperation Fund (EMCF) shows that the German central bank had been actively supporting weak currencies in periods of speculative attacks (chart 9).

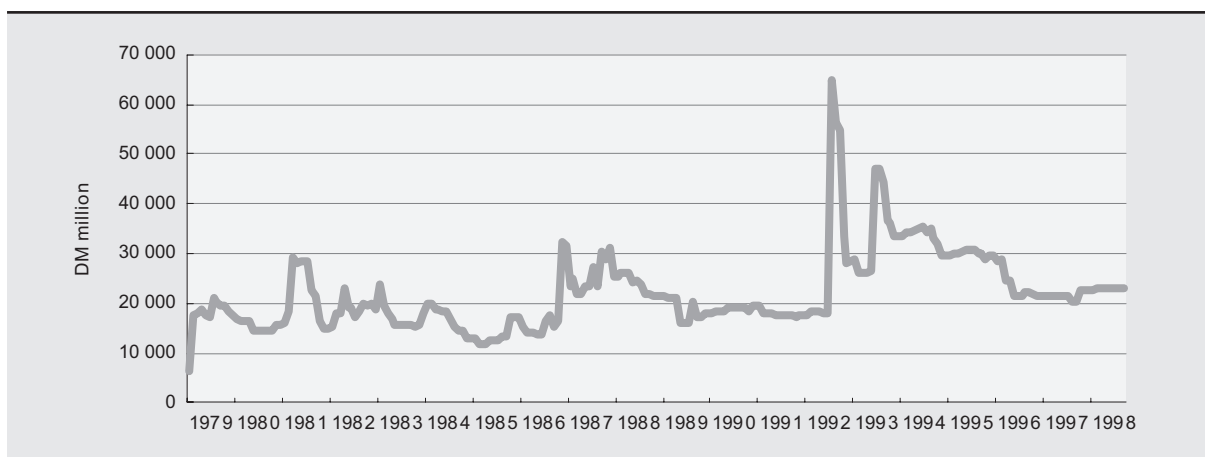
The case of **Italy** in the ERM shows the limitations of the scheme. From the beginning of the EMS until 1990, the Italian authorities had been very successful in keeping their currency on a PPP path. But in the EMS crisis of September 1992, the pressure on the Lira was so strong that the Italian authorities decided

**Chart 8**  
**FRENCH FRANC–DM EXCHANGE RATE AND FRENCH FOREIGN EXCHANGE RESERVES, JANUARY 1979–SEPTEMBER 1998**



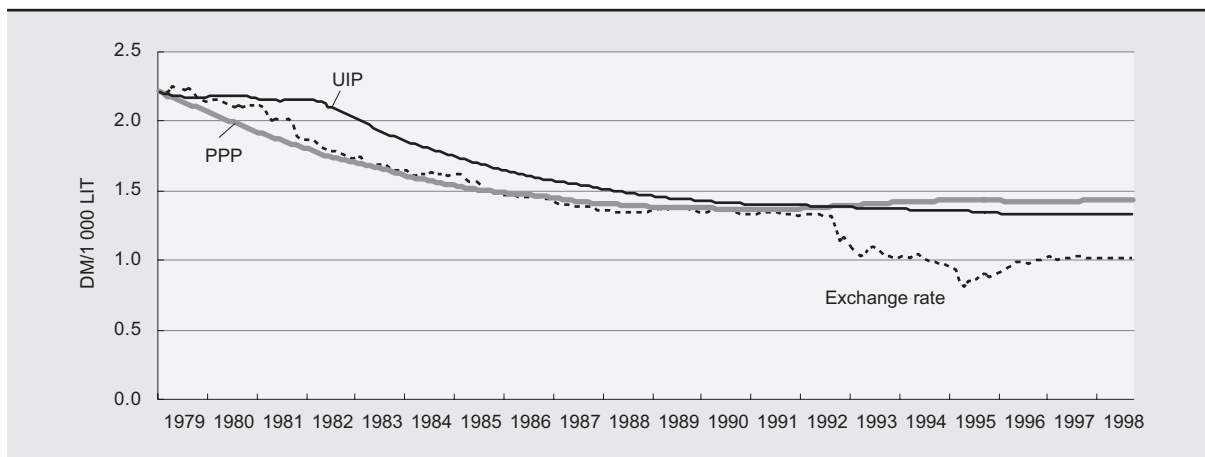
Source: IMF, *International Financial Statistics*.

**Chart 9**  
**POSITION OF THE DEUTSCHE BUNDESBANK VIS-À-VIS THE EMCF, MARCH 1979–NOVEMBER 1998**



Source: Deutsche Bundesbank.

**Chart 10**  
**ITALIAN LIRA IN THE ERM, ACTUAL EXCHANGE RATE AND HYPOTHETICAL UIP AND PPP PATH, JANUARY 1979–SEPTEMBER 1998**



Source: Deutsche Bundesbank; and IMF, *International Financial Statistics*.

to withdraw from the ERM (chart 10). While the VSTF was helpful for coping with temporary shocks, it was insufficient to overcome the hard budget constraint of a limited amount of foreign exchange reserves in a serious speculative attack.

## XI. MANAGED FLOATING AND THE CURRENT DEBATE ON THE REFORM OF INTERNATIONAL RESERVE SYSTEM

As already mentioned, the current debate on the reform of the international monetary system is mainly focused on the international reserve role of major currencies. And although it is widely accepted that the strong increase in foreign exchange reserves is mainly attributable to attempts at maintaining “persistently undervalued exchange(s)” (Dorruci and McKay 2011: 47), the future of the global reserve system is very often discussed without an explicit reference to the exchange rate system and more specifically to concrete exchange strategies. This applies above all to Chinese central bankers and academics complaining about the still very dominant role of the United States dollar, e.g. Yongding (2011):

The fundamental problem with the current system is that the US dollar is used as the key international reserve currency, which gives the US central bank the ‘exorbitant privilege’ of printing the United States’ way out of its economic difficulties.

But this dominant role cannot be changed by new definitions of the Special Drawing Right, e.g. by including the renminbi in its currency basket, or by additional emissions of drawing rights. The main reason for the “exorbitant privilege” is a dollar oriented exchange rate policy of China and many other emerging market economies. As long as countries use the United States dollar as the pivot of their exchange rate policy and as long as they target exchange rates that are not equilibrium exchange rates, their dollar reserves will continue to rise. In other words, China could stop the privileged role of the dollar simply by discontinuing its foreign exchange market interventions vis-à-vis the dollar. The increase of dollar reserves could also be dampened by allowing Chinese citizens to hold dollar assets.

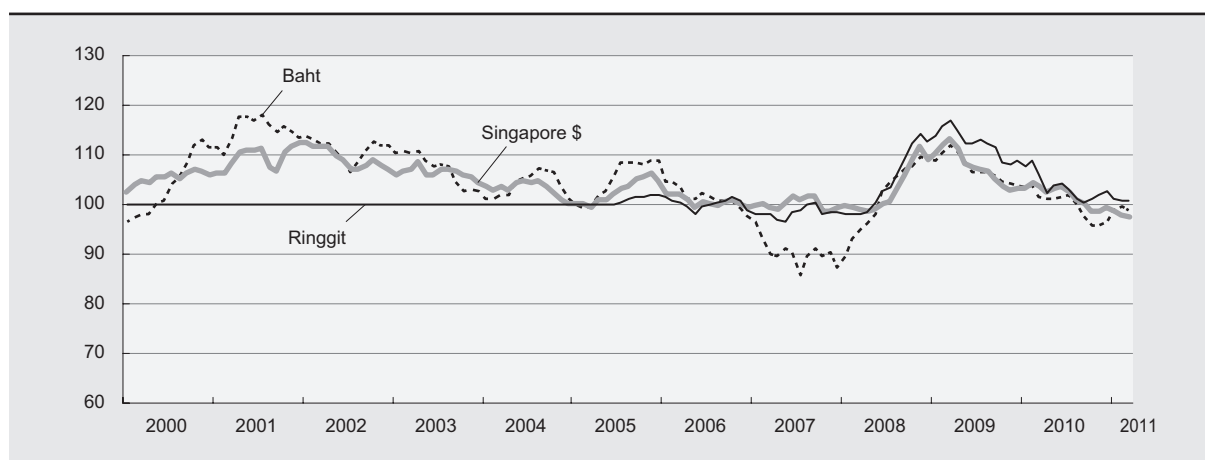
Thus, this paper shows strategies with which the increase of dollar reserves can be stopped and how a more balanced distribution of global reserves can be reached:

- Major countries could decide to choose **other pivot currencies** for their exchange rate policies than the dollar. This is the only way how the transition from the dollar hegemony to a multipolar reserve system can be realized.
- Countries with a still undervalued dollar exchange rate should try to achieve an **equilibrium real exchange rate** either by an appreciation or by an increase of domestic wages (internal appreciation).

For the first strategy, the experience of European countries in the early 1970s is instructive. By creating a **regional exchange rate arrangement**, they became more independent from the fluctuations of their dollar exchange rates. Today, large economies like the euro area, China, Japan, Brazil or India could decide to build-up networks of bilateral or multilateral exchange rate co-operation which would reduce the influence of the dollar exchange rate on their economies. The model of managed floating could be used to derive the target values of such an exchange rate co-operation. In other words, the dollar’s role as an international reserve currency can only be reduced, if major countries decide to choose other currency pivots than the dollar. And if China wants a stronger role for the renminbi, it must convince other countries to use the renminbi as pivot for their currencies. In fact, Singapore, Thailand and Malaysia already seem to track the renminbi, at least over the medium term (chart 11).

The second approach can be realized unilaterally. It would require first to achieve an **equilibrium real exchange rate** vis-à-vis the dollar either by a one-time appreciation of the nominal exchange rate or by increasing domestic wage levels. Once an equilibrium rate is reached, a credible rule of managed floating would reduce the volume of carry trade considerably. Thus, the UIP rule would help to limit the increase of dollar reserves.

**Chart 11**  
**RENMINBI EXCHANGE RATE OF THE BAHT, SINGAPORE DOLLAR AND THE RINGGIT,**  
**JANUARY 2000–MARCH 2011**  
*(January 2005 = 100)*



**Source:** Federal Reserve Bank of St. Louis.

In other words, the exorbitant privilege of the dollar is mainly the result of a specific exchange rate policy in many emerging market economies. It can only be changed if these countries are willing to use either other pivots for their currencies or if they adjust their exchange rate target in a way that capital inflows are significantly reduced.

## XII. CONCLUSIONS

The paper shows that the current debate on the reform of the International Monetary System is dealing mainly with symptoms but not with the fundamental problems. The strong increase of foreign exchange reserves, the still hegemonic role of the dollar and destabilizing short-term capital inflows are mainly the result of serious defects of the global exchange rate regime. It relies on the functioning of foreign exchange markets which are completely disconnected from fundamental macroeconomic data and it allows individual countries complete autonomy in their exchange rate policies. As most emerging market economies still use the United States dollar as a pivot currency, it is not surprising that the United States dollar still enjoys an “exorbitant privilege”.

In this paper, a strategy of managed floating is presented that allows overcoming the “impossibility trinity” which is defined by an autonomous interest rate policy, a target for the exchange rate and free capital mobility. For the target of **domestic equilibrium**, a central bank follows a policy of inflation targeting for which it uses the instrument of the domestic short-term interest rate. The exchange rate is targeted with sterilized interventions on a path that is determined by uncovered interest parity which guarantees an **external equilibrium**.

This strategy has to be applied **asymmetrically**. If a country is faced with short-term **capital inflows**, managed floating can be applied without quantitative limitations and also without operating cost for a central bank. Thus, in this case a central bank gains an **additional degree of freedom** which makes it possible to cope with the problems of carry-trade. In fact, an exchange rate that is targeted along a UIP path completely removes the incentives for carry-trade. In the case of short-term **capital outflows**, a central bank is confronted with the hard-budget constraint of foreign exchange reserves which limits unilateral attempts to target the exchange rate.

Over the medium term, a managed floating strategy based on UIP is not very different from a strategy which targets the exchange rate on a **PPP path**. As financial markets react faster and more sensitive to deviations from UIP than goods markets in the case of PPP deviations and as a UIP rule can be derived more easily, this paper prefers a UIP path. Targeting the exchange rate in this way requires that a starting value is chosen which is within the range of an **equilibrium exchange rate**. Thus, countries should first try to establish an equilibrium level by a discrete parity adjustment before implementing a managed floating strategy. During the operation of a managed floating strategy, it cannot be excluded that shocks occur which lead to a “**fundamental disequilibrium**” of the exchange rate. In this case, discrete parity adjustments are also necessary.

The strategy of managed floating can be applied in different settings. It can be implemented **unilaterally**, especially as a defense against carry-trade and an increasing indebtedness of households and firms in foreign currencies. The experience of **Slovenia** in the years before its membership in the euro area shows that such an approach can be very successful. If **two countries** are willing to co-operate they are able to defend their bilateral parity without a hard budget constraint which provides a perfect protection against short-term capital inflows and outflows. Managed floating can be also used as a framework for **regional monetary cooperation**. The **European Monetary System** (1979–1998) can be regarded as a de facto managed floating system (with discrete instead of continuous parity adjustments). Especially the French franc/Deutschmark rate was successfully targeted on a UIP/PPP path for almost two decades with sometimes high intervention volumes. Finally, managed floating could also provide a solution for the **global monetary system**. The major currencies could target their mutual exchange rates along a UIP path while smaller currencies could use one of these hubs as pivot for their currency. As such a global system is not very likely for the time being, the target paths derived by UIP could be used as an element for a better global surveillance of national exchange rate policies by the IMF.

In sum, the road to a **multipolar reserve system** which is better protected against short-term capital flows has to start with a better design of the global exchange rate system. Instead of providing more influence to foreign exchange markets, governments and central banks must take the initiative by targeting exchange rates along UIP paths. With this approach, they do not interfere with fundamental market logic. On the contrary, they establish the equilibrium condition for international financial markets which the textbooks expected in vain from foreign exchanges markets. Attempts to reform the reserve system with a comprehensive reform of the exchange rate system are nothing else but putting the cart before the horse.



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