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Potentialities and Opportunities of the Euro as an International Currency

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RÉSUME

L'accession de l'euro au statut de monnaie internationale a souvent été citée comme un sous-produit possible de l'unification monétaire. Ce rapport étudie une telle éventualité d'un point de vue positif et normatif.

La première partie examine rapidement les évolutions récentes dans l'usage des monnaies internationales pour chaque fonction. Une diversification monétaire a eu lieu depuis 1973, mais à un rythme lent. La diversification semble plus dynamique pour la fonction de réserve de valeur, ce qui est cohérent avec la levée presque générale des restrictions aux mouvements de capitaux durant les années 1980.

La deuxième partie défend l'idée selon laquelle l'éventuelle émergence de l'Euro comme monnaie internationale sera liée au comportement de change des pays tiers. Les politiques de change de fait sont examinées à travers une analyse statistique et économétrique des fluctuations à court terme des taux de change nominaux, et des évolutions à long terme des taux de change réels. L'étude montre que la plupart des monnaies d'Europe de l'Ouest sont ancrées sur le Deutsche mark en termes à la fois nominaux et réels, alors que les pays d'Europe de l'Est ne suivent que partiellement la monnaie allemande. Enfin, les pays asiatiques semblent en grande partie ancrer leurs monnaies sur le dollar en termes nominaux et réels.

La troisième partie analyse les causes des comportements de change en Europe de l'Est et en Asie. Après un examen de quelques statistiques clés, un modèle théorique simple permet d'interpréter les choix d'ancrage réel. L'étude conclut que l'Euro pourrait avoir davantage de chances que le yen de devenir monnaie d'ancrage (sur une base régionale). Cependant, les politiques de change aussi bien dans les économies en transition qu'en Asie du Sud-Est dépendront largement des monnaies dans lesquelles seront effectuées les flux de financements vers ces pays, de l'évolution de la répartition géographique du commerce, de la coordination des pays d'Europe autour du projet d'union monétaire et des pays d'Asie sur une base plus multilatérale, et enfin, d'effets d'échelle. Même si un développement simultané de l'Euro et du yen serait plus aisé (car le marché du dollar serait plus rapidement restreint), ce scénario n'apparaît pourtant pas le plus probable.

La dernière partie est consacrée à l'étude des coûts et bénéfices d'une éventuelle émergence de l'Euro comme monnaie internationale. Les bénéfices pour l'Union Européenne ne seraient peut-être pas aussi grands que ce n'est le cas actuellement pour les Etats-Unis avec le dollar. En outre, un modèle de portefeuille simple montre qu'un système multipolaire ne réduirait pas nécessairement la volatilité du dollar. En tout état de cause, le mode de coordination international par le G7 devrait être revu.

SUMMARY

The possible emergence of the Euro [1] as an international currency has often been underlined as a by-product of European monetary unification. This report deals with such a possibility both from a positive and from a normative point of view.

In the first section, we take a brief look at recent figures on the use of international currencies in their various functions. It is shown that the dollar today remains the most important international currency. Currency diversification has taken place since 1973, but at a slow pace. Still, currency diversification is more dynamic for the store-of-value function than for other functions, which is in line with the removal of most restrictions in capital flows in the 1980s.

The second section argues that the emergence of the Euro as an international currency will depend on the pegging strategy of third countries. Actual exchange rate policies are examined through the statistical and econometric analysis of short run nominal fluctuations and long run real evolutions. It is shown that most West-European countries are closely pegged to the DM, in nominal and in real terms, while East-European countries only partially weigh the DM in their pegging baskets. Finally, most Asian currencies seem to be broadly pegged in nominal and real terms to the dollar.

In the third section, the reason why East-European currencies may be pegged to the Euro is analysed. A parallel is drawn with the behaviour of Asian countries *vis-a-vis* the yen. After reviewing some key statistics on both regions, a small optimisation model is proposed to rationalise the choice of a real anchor. We conclude that the emergence of the Euro as an international anchor may be more likely (on a regional basis) than that of the yen. Nevertheless, the exchange rate policy of transition countries as well as East Asian countries will be dependent on the currency-denomination of capital flows, on the evolution of the distribution of trade, on monetary coordination around the EMU project (in Europe) or on a multilateral basis (in Asia), and on size effects. Although a simultaneous development of the Euro and of the yen would be easier because the narrowing of the dollar market would entail increasing costs in the transaction of this currency, this scenario is not the most likely.

The last section turns to the costs and benefits of making the Euro an international currency. The benefits for the EU may not be as large as there are for the US with the dollar. A simple portfolio model shows that the impact of a multipolar system on the USD volatility is unclear. Coordination on exchange rates will need a transformation of the G7 framework.

[1] During the Madrid summit, in December 1995, the word « Euro » was prefered to « Ecu » for calling the forthcoming European single currency.

Potentialities and Opportunities of the Euro as an International Currency

Agnès Bénassy-Quéré[2]

INTRODUCTION

Since the breakdown of the Bretton Woods regime, the US dollar has no longer been the institutional key currency of the International Monetary System. Yet, European integration and the affirmation of Japan as a major economic and financial power have not entailed an important decline in the international use of the US currency. The Deutsche mark as well as the yen still play a modest international role, especially as means of payment and as units of account. This study examines whether the Euro may become an important international currency in the future, and whether this is a desirable evolution for Europe and for the rest of the world.

Three monetary functions are usually distinguished: means of payments, unit of account and store of value. An international currency is a currency that is used by the residents of countries that are not the country of issue.

There is an extensive, theoritical debate on whether *money* is useful in the general equilibrium framework. In fact, interest-bearing assets should be prefered as a store of value, and also as a means of payment. Given that the unit of account function does not imply holding money, there is no reason why private agents should hold money.

The international *currency* does not suffer from this problem, because holding it includes holding both money and interest-bearing assets. Thus, the three traditional functions have a somewhat different meaning, which can be further distinguished according to the type of agents using it (Table 1.1).

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Table 1.1.: the functions of the international currency

Functions	Private sector	Public sector
Means of payments	Vehicle	Interventions
Unit of account	Denomination	Anchor
Store of value	Portfolio allocation	Official reserves

Source: Krugman (1991).

In the past, the internationalisation of a currency has generally started with the private means of payments function (see Bourguinat, 1992). The first example of an international currency is the Alexander's currency which was widely used in Minor Asia in the III rd century b.c. The vehicle function was the key determinant of the internationalisation process. In more recent years, the Bretton Woods system of fixed exchange rates against the dollar was coupled with the Marshall plan which boosted the United-States as the major goods supplier of Europe.

Today, capital flows are forty times larger than trade flows. Thus, the most important means of payment function is the use of the international currency as a vehicle in transactions between third currencies [3]. The most important determinant for this function is the size of the market. The larger the market, the lower the transaction costs and the lower some forms of risk [4]. What determines the size of the market for a currency? Three elements are crucial. The first one is inertia: the larger the market today, the larger the market tomorrow, because the additional volume of international transactions will likely use the existing international currency which already has a cost advantage. The second element is the use of the international currency as a store of value, because this entails a deeper market. The third element is the use of the international currency as a unit of account, because it lowers the exchange rate risk and it entails the existence of official reserves and official interventions which broaden the market. Through reduced risk, the unit-of-account function reinforces the store-of-value function. In brief, it is now difficult to assess the hierarchy in the functions of the international currency, because any function has an influence on the others [5].

Previous studies on the international use of currencies have stressed the hysteresis of the internationalisation process [6]. The present international currency takes advantage of positive externalities stemming from lower transaction and information costs and from network effects. These externalities make the emergence of a new international currency less likely. According to this analysis, the simultaneous emergence of two international currencies should be easier, because the size of the existing international currency would be eroded more quickly.

[3] The exchange of currency i against j is split into an exchange of i against the international currency and an exchange of the international currency against j.
[4] This is because a large market offers more liquidity and a larger range of instruments which better suit the needs for hedging.
[5] Bénassy and Deusy-Fournier (1994) underline these externalities between the three functions.
[6] See Kenen (1993), Bourguinat (1992).

Previous studies have also reviewed the role of the main currencies in the various functions of the international currency. But the unit of account function has been largely neglected. The unit of account function is generally limited to the trade-invoicing function, the debt-invoicing being related to the store-of-value function. The anchoring function has been simply left aside. Using a foreign currency as an anchor means keeping a stable (or crawling) exchange rate against that currency in nominal or real terms. The anchoring function is crucial to understand the role of the international currency in every other function, because it determines the exchange risk when using the international currency [7].

Finally, for the means-of-payment and store-of-value functions, two types of international currencies should be distinguished. When country A carries out transactions with country B, either currency A or currency B can be used as means-of-payment or store-of-value. If currency A is systematically used, it will be considered as an international currency for country B. But a third currency (C) can also be used. Then, currency C is an international currency for both countries, and it can be called a euro-currency [8]. Both the European Union and Japan are very large economic powers, facing a third, large economic power: Northern America. This configuration makes unlikely the emergence of the euro or of the yen as euro-currencies before being just international currencies. More likely will be the emergence of both currencies first as international currencies on a regional basis. Such an evolution will depend on the behaviour of regional partners of the EU (especially CEECs) and of Japan (especially NICs and ASEAN countries).

In relation with the above arguments, the present report studies the possible emergence of the Euro as an international currency with a special focus on (i) the anchoring function, (ii) the possible emergence of the yen as a third international currency and (iii) the behaviour of regional partners of both the EU and Japan. Section 1 reviews some recent figures on the use of international currencies. Section 2 provides empirical evidence of the use of the dollar, the Deutschemark and the yen as international anchors. Section 3 studies the potential use of the Euro and of the yen as anchor currencies, on the basis of statistics on trade and capital flows, together with a simple optimisation model. The last section looks at potential costs and benefits of developing the Euro as an international currency.

1. THE INTERNATIONAL USE OF MAJOR CURRENCIES SINCE 1974

The international role of the dollar has declined since 1974, but at a slow pace, so that the US currency remains the most widely used currency. Still, the extent of the diversification differs for the various functions of an international currency. The present

[7] It is often argued that exchange rate risk is not important for both the store of value function and the means of payment function, because hedging is costless. In fact, only a part of the risk can be covered. A firm cannot cover the exchange rate risk on its direct investment abroad, or during the delay between the computation of its price and the signature of a contract.

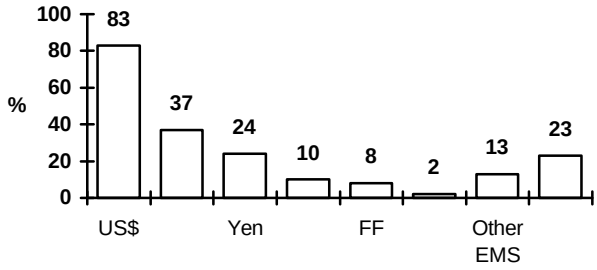
[8] The word « euro-currency » appeared in the 1960s with the « euro-dollars ». It has nothing to do with the forthcoming European single currency, although a market for the « euro-euro » may emerge.

report focuses on the anchor function which has not been stressed in the literature. This preliminary section provides an overview of the evoluting use of international currencies for the five other functions.

1.1. The size of foreign exchange markets

In April 1995, the dollar was still used in 83% of all foreign exchange transactions, while the share of the mark and of the yen were only 37% and 24% respectively, the share of the ECU still being very low (Graph 1.1). The dollar continues to be more traded than national currencies in all cities but Frankfurt. An interesting aside is that in Hong Kong and Singapore, the volume of DM trade is similar to that of yen trade (both volumes being much smaller than dollar trade). The turnover is dynamic for EMS currencies other than the DM: the share of the French franc rose from 2% in April 1989 to 8% in April 1995. During the same period, the share of other EMS currencies rose from 3% to 13%.

Graph 1.1: Currency breakdown of foreign exchange transactions in April 1995*



Source: BIS, *Central Bank Survey of Foreign Exchange Market Activity*, May 1996.
* Daily averages. Given that each transaction concerns two currencies, the percentages add up to twice the total amount of transactions (200%).

1.2. Trade invoicing

The decline of the US dollar as a trade invoicing currency from 56% of total world trade in 1980 to 48% in 1992 (Table 1.2) is partly due to composition effects, especially to the decline in the OPEC countries' share of world exports (from 16% in 1980 to 5% in 1992). Nevertheless, industrial countries increasingly invoice imports in their own currency. In other words, an increasing part of world exports is invoiced in the importing country's currency. The only exception is Japan whose share of yen-invoiced exports increased from 29% in 1980 to 40% in 1992. Yet, the dollar remains the only currency used as a vehicle, i.e. as an invoicing currency for trade between countries other than the issuing country. The Deutschemark is hardly used as a vehicle, even for intra-EU

trade (Ecu Institute, 1995). Finally, the dollar is the only currency that is used in the quotations of raw materials and energy.

Table 1.2: Trade invoicing (% of trade invoiced in each currency)

	Main exporting countries			All countries (extrapolation)		
	1980	1987	1992	1980	1987	1992
US dollar	55	46	47	56	48	48
DM, Guilder	16	19	17	16	19	18
Yen	4	7	8	2	4	5
FF, £, Lira	15	15	15	15	15	15
Other	10	13	13	11	14	14

Source: European Commission.

1.3. Private portfolios

The existing statistics do not allow for a comprehensive picture of the allocation of private portfolios, since data on the foreign assets owned by institutions other than private banks are not available. Thus this analysis is limited to the amount outstanding of international bonds (supply variable) and to the cross-border assets of reporting, private banks (demand variable).

The dollar's share in the amount outstanding of international bonds declined steadily from 62.3% in 1985 to 32.8% in 1995 (Graph 1.2). This decline is almost only due to euro-dollar bonds, while the share of US dollar bonds has been sustained by Treasury bill issues. The decline in the global share of the dollar benefited mainly the yen, whose share in non-dollar bonds rose from 17.7% in 1958 to 26.6% in 1995 (Table 1.3). Over the same period, the share of the DM declined. In fact, the DM was almost caught up by the EMS core currencies [9], whose total share rose from 7% in 1985 to 16.2% in 1995. Starting from a very low level, the share of other European currencies increased over the period, while the weight of the Swiss franc declined from 32.5% in 1985 to 11.7% in 1995.

Table 1.3: Amount outstanding of international non-dollar bonds: currency breakdown (% at end-Dec.).

	1985	1986	1987	1988	1989	1990
DM	21.0	20.2	17.6	16.8	17.8	17.0
Yen	17.7	19.7	21.6	21.5	19.2	19.3
SF	32.5	30.7	27.9	22.6	20.6	20.1
£	8.0	7.9	9.7	12.1	12.2	13.8
EMS core (2)	7.0	7.7	7.3	7.4	8.1	8.6
Li, Pta, Esc	0.2	0.3	0.4	0.7	1.6	2.4
Other currencies	13.6	13.5	15.5	18.9	18.1	18.8
		1991	1992	1993	1994	1995(1)
DM		15.7	16.7	16.6	16.8	17.6
Yen		20.0	20.7	22.5	24.6	26.6
SF		17.2	15.4	13.3	11.8	11.7
£		13.7	12.0	12.8	11.8	10.6
EMS core (2)		9.7	12.0	13.5	15.8	16.2
Li, Pta, Esc		3.4	3.4	3.6	3.9	3.9
Other currencies		20.3	19.8	17.7	15.3	13.4

(1) June. (2) French franc, Belgian and Lux. Franc, Dutch Guilder, Danish Krona.
Source: BIS, *Monthly Report*, Table 12.

Similarly, the dollar's share in the cross-border banking positions in foreign currencies declined from 75.0% in 1977, to 65.6% in 1985, and to 47.9% in 1995 (Table 1.4). This movement benefited mainly European currencies whose share increased

[9] See Footnote 2 of Table 1.3.

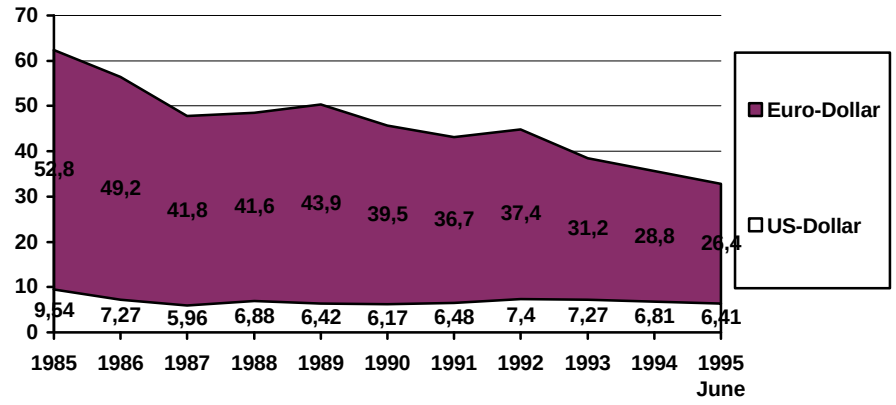
from 15.6% in 1977 to 18.7% in 1985 and 29.6% in 1995. Conversely, the share of the yen remained very low (6.1% in 1995) compared to the development of Japanese banks, and given the strong appreciation of this currency. But it should be stressed that these figures do not include cross-border positions *in domestic currency*. The low weight of the yen means that the Japanese currency is little used for bank loans of banks situated in other countries than Japan, and that yen deposits in Japan by foreigners are relatively small.

Table 1.4: Cross-border positions of banks in industrial countries, vis-a-vis all sectors: currency breakdown of assets in foreign currencies (% at end-December).

	US$	Yen	Pound Sterling.	Other EMS *	Swiss franc	Other
1977	75.0	0.3	1.1	15.6	4.7	3.4
1978	72.9	0.8	1.2	17.1	4.3	3.7
1979	74.0	0.6	1.2	14.7	4.0	5.5
1980	75.3	0.9	1.2	13.0	4.6	5.0
1981	72.1	1.7	1.5	14.9	6.6	3.2
1982	72.4	1.6	1.3	14.7	6.1	3.9
1983	74.0	1.7	1.2	14.6	5.7	2.7
1984	73.5	2.1	1.4	15.0	4.9	3.1
1985	65.6	4.0	1.9	18.7	6.4	3.5
1986	63.0	5.1	1.9	19.0	6.7	4.3
1987	58.4	7.0	2.2	19.5	6.6	5.3
1988	59.0	7.1	3.1	19.8	5.1	5.9
1989	57.5	6.7	3.6	22.1	4.2	5.9
1990	52.8	6.7	4.4	24.9	4.5	6.7
1991	51.6	5.9	3.8	26.4	4.4	7.9
1992	53.3	4.5	3.4	27.5	4.1	7.3
1993	53.3	4.4	3.0	27.9	3.2	7.7
1994	51.2	5.2	3.2	28.4	3.3	8.8
1995 (March)	47.9	6.1	3.2	29.6	3.6	9.7

* Deutsche mark, French franc, Dutch guilder, Belgian franc, Italian lira and Ecu.
Source: BIS, *Monthly Report*, Table 4A.

Graph 1.2: Share of the dollar in the amount outstanding of international bonds (% at end-December)



Source: BIS, monthly Report, Table 12.

Attempts to summarise the currency breakdown of the global portfolio of private agents have been carried out by Emerson *et alii* (1990) and by the Ecu Institute (1995). Their findings are in line with partial results presented here: according to the Ecu Institute, the share of the dollar in the global portfolio declined from 67.3% in 1981 to 44.3% in September 1993. During the same period, the share of EU currencies rose from 13.2% to 35.6%. The role of the yen increased to 8% in 1993, starting from a very low level (2.2% in 1981).

1.4. Debt invoicing

Although the LDCs' (as well as the transition countries') external debt and the OECD's external portfolio are two sides of the same coin, it is interesting to study the currency composition of LDCs' external debt because it is not denominated in the domestic currency. Thus, it might influence the choice of an exchange rate policy in these countries. This is not the case in OECD countries whose external liabilities are denominated in the domestic currency mainly.

The LDCs' debt is highly dependent on exchange rate fluctuations because LDCs are not able to reallocate their liabilities when exchange rates fluctuate. Thus, it is interesting to compare the currency breakdown of the debt at constant exchange rates. This work was done by the BIS in 1989 (Table 1.5). It shows that except in Africa, the dollar's share in the developing countries' debt *vis-à-vis* the industrial countries' banks declined between 1983 to 1988. The evolution is striking in Asia and in the Middle East, where the dollar's share dropped by 15%, using end-1988 exchange rates. In Africa, the dollar's share remained stable, but it was already quite low in 1983 (40%).

This movement benefited mainly to the yen in Latin America, and over all in Asia where the yen's share rose from 15% at end-1983 to 28% at end-1988. Still, these figures under-estimate the share of the yen, since they do not take into account the activity of banks located in HongKong and Singapore.

Table 1.5: The share of selected currencies in the external assets of reporting banks vis-à-vis 4 regions*

% of total identified assets of industrial countries reporting banks, at end-1988 exchange rates (end of year).

	US dollar		Deutsche Mark		Yen		Pound Sterling		French franc		Swiss franc	
	1983	1988	1983	1988	1983	1988	1983	1988	1983	1988	1983	1988
Lat.Amer.	86.9	75.5	3.9	5.3	2.4	6.8	1.4	2.3	2.2	2.7	1.4	1.8
Asia	67.2	52.1	4.2	5.1	14.6	27.7	2.7	3.5	4.8	5.5	2.9	2.1
Mid.-East	65.5	50.8	11.7	10.0	3.5	1.5	3.5	7.7	9.0	16.2	4.1	5.4
Africa	41.6	42.7	3.4	3.9	2.9	3.9	5.3	6.8	35.8	29.6	3.9	5.8

* excluding OPEC countries.
Source: BIS.

Tavlas and Ozeki (1992) show that the weight of the yen in the total debt of five East-Asian countries [10] rose from 20% in 1980 to 40% in 1989 (at current exchange rates). According to Touzard (1995), this evolution has been confirmed in more recent years for Indonesia, Thaïland and Philippines, but not for Malaysia, where the share of the yen in the long run debt fell between 1990 and 1993. China is the only Asian country whose share of long run, external debt denominated in yen decreased steadily between 1985 and 1993. Figures for 1993 are given in Section 3.

Despite the rise of the yen's share in most Asian countries, the Japanese currency remains under-represented compared to the weight of banks located in Asia in the total debt of Asian countries *vis-à-vis* reporting banks (table 1.6). The yen's share increased between 1983 and 1991, but the share of banks located in Asia increased too, and the discrepancy between the two figures was reduced only in Indonesia, Philippines, Hong Kong and Singapore [11]. Hong Kong and Singapore are special cases since their liabilities towards foreign banks refer to interbank liabilities, for respectively 96% and 98% in 1991. The rise in the yen's share reflects a development of banking activities in yen.

[10] Indonesia, Korea, Malaysia, Philippine and Thailand.

[11] In these four countries, the rise in the weight of the yen cannot be explained only by the rise of the debt vis-à-vis banks located in Asia. Thus, some form of catching-up must have taken place, meaning either that banks located in Asia have increasingly lent in yen, or that other banks have diversified their holdings through lending to Asian developing countries in yen.

Table 1.6: The share of the yen and of banks located in Asia in selected Asian countries' external debt vis-à-vis reporting banks (at current exchange rates)

Debtor country	Share of the yen in % (1)		Share of banks in Asia in % (2)		(2) - (1)	
	end 1983	end 1991	end 1983	end 1991	end 1983	end 1991
China	23.5	24.2	63.0	78.5	39.5	54.3
South Korea	5.7	12.9	45.1	56.7	39.4	43.8
Indonesia	10.8	21.2	62.4	60.9	**51.6**	**39.7**
Malaysia	14.8	27.0	63.4	69.3	48.6	42.3
Philippines	10.0	16.3	56.7	42.1	**46.7**	**25.8**
Taiwan	3.7	12.3	54.1	74.0	50.4	61.7
Thaïland	19.7	21.9	63.0	77.0	43.3	55.1
HongKong	4.6	56.9	38.2	79.8	**33.6**	**22.9**
Singapore	2.9	50.3	43.6	63.2	**40.7**	**12.9**

(1) Reporting banks of industrial countries only. (2) % of liabilities vis-à-vis banks located in Asia in the total debt vis-à-vis reporting banks, including off-shore centres. Under the hypothesis of financial and monetary regionalism (capital flows towards Asian developing countries come from other Asian countries and are invoiced in the regional currency), the figures in the two columns should be equal.
Source: BIS, august 1992.

Conversely, the withdrawal of North American banks from Latin American's external debt *vis-à-vis* reporting banks since 1983 has often been larger than, or similar to, the corresponding decrease in the dollar's share (Table 1.7). Thus Latin American countries have simultaneously diversified their creditors and the currency breakdown of their debt.

Table 1.7: The share of the dollar and of banks located in North America in selected Latin American developing countries' external debt towards reporting banks (at current exchange rates)

Debtor country	Share of the dollar in % (1)		Share of banks in North America, in % (2)		(1) - (2)	
	end 1983	end 1991	end 1983	end 1991	end 1983	end 1991
Argentina	88.3	66.4	44.1	21.4	44.2	45.0
Brazil	89.8	71.5	35.8	22.4	54.0	49.1
Chile	93.4	75.6	47.1	41.3	46.3	34.3
Colombia	93.5	74.6	50.3	40.3	43.2	34.3
Mexico	94.4	86.1	49.8	30.9	44.6	55.2
Peru	88.6	68.8	39.6	21.9	49.0	46.9
Uruguay	88.3	81.5	50.5	33.6	37.8	47.9
Venezuela	93.6	76.2	41.0	19.5	52.6	56.7
Average	91.8	76.0	43.2	26.2	48.6	49.8

(1) Reporting banks of industrial countries only. (2) % of liabilities vis-à-vis banks located in North America in the total debt vis-à-vis reporting banks, excluding off-shore centres. Under the hypothesis of financial and monetary regionalism (capital flows towards American developing

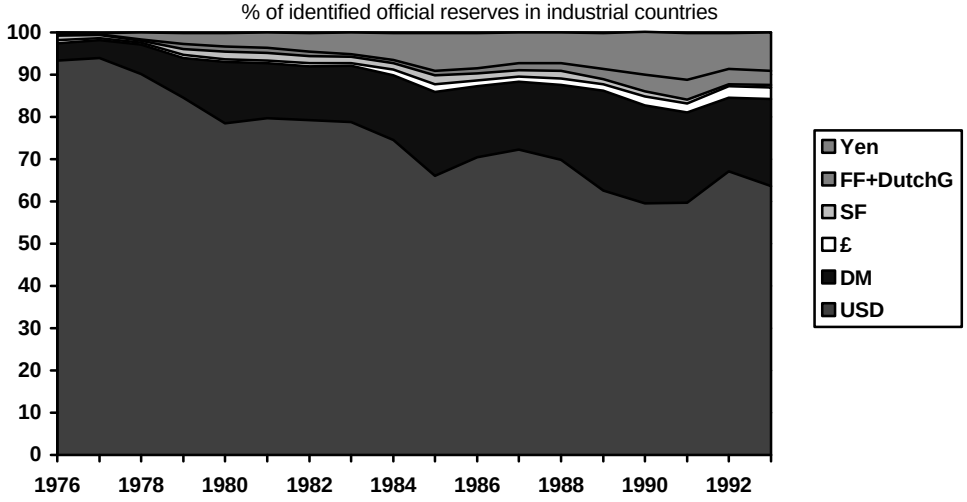
countries come from other American countries and are invoiced in the regional currency), the figures in the two columns should be equal.
Source: BIS, august 1992.

In Central and Eastern Europe, foreign capital comes mainly from the EU, but the dollar stays prominent in the composition of the long-term debt, except in Poland and in the Slovak Republic (see Section 3.2.2).

1.5. Official reserves

Between 1976 and 1995, the dollar's share in the official reserves of the industrial countries declined from 93.3% to 63.6% (Graph 1.3). But this decline may be exaggerated by the dollar's depreciation, and by composition effects [12]. The decline in the dollar's share benefited all other currencies, but mostly the Deutschemark, whose share rose from 7.6% in 1976, to 20.3% in 1993. This can be explained by the rising share of the European countries in the official holdings of all the industrial countries, stemming from the creation of the European Monetary System: the share of European central banks (excluding the Bundesbank) abruptly increased from 52% at end-1978 to 62% at end-1979.

Graph 1.3: The currency breakdown of the industrial countries' official reserves



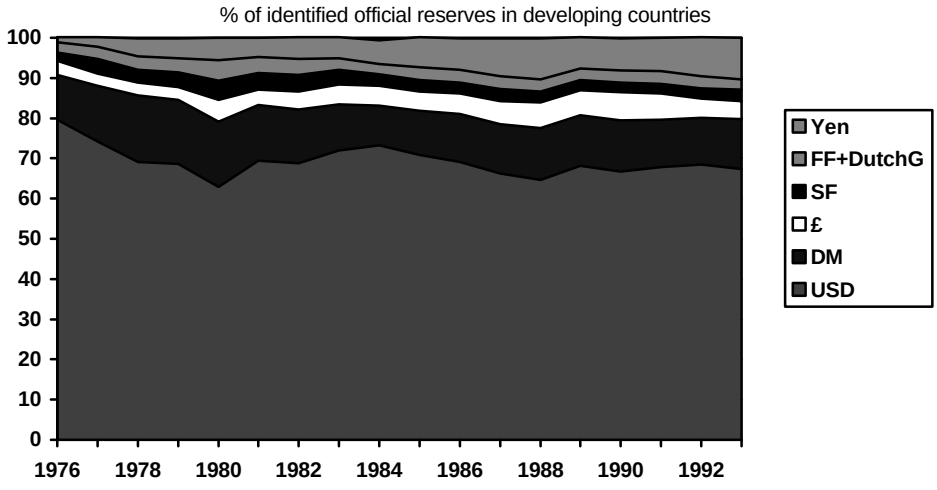
Source: IMF, Annual Report, various issues.

[12] US official reserves increased from 0% of world reserves in 1973 to 3.7% in 1994. Over the same period, the growth of German and Japanese official holdings has been slower than that of the total of industrial countries reserves.

The dollar's share in developing countries official reserves declined between 1976 and 1980, but this fall may be explained by the dollar depreciation. Over the entire period, the dollar's share remained approximately constant, which means that developing countries as a whole did not diversify their reserves out of the dollar (Graph 1.4). The yen's share increased at the expense of that of European currencies (except the pound sterling). This movement, which accelerated in 1985, can be explained by the yen appreciation and by the rise in the share of Asian countries' official holdings (Graph 1.5). In fact, the share of the yen actually increased at a slower pace in Asian reserves than in total world reserves during the 1980s (Tavlas and Ozeki, 1992). But the rising weight of Asian countries as reserve holders made the share of the yen increase. In sum, the change in the currency breakdown of developing countries' official reserves since 1980 is mainly due to composition effects. We shall see in Section 2 that this phenomenon can be related to the persistence of the use of the dollar as a nominal anchor.

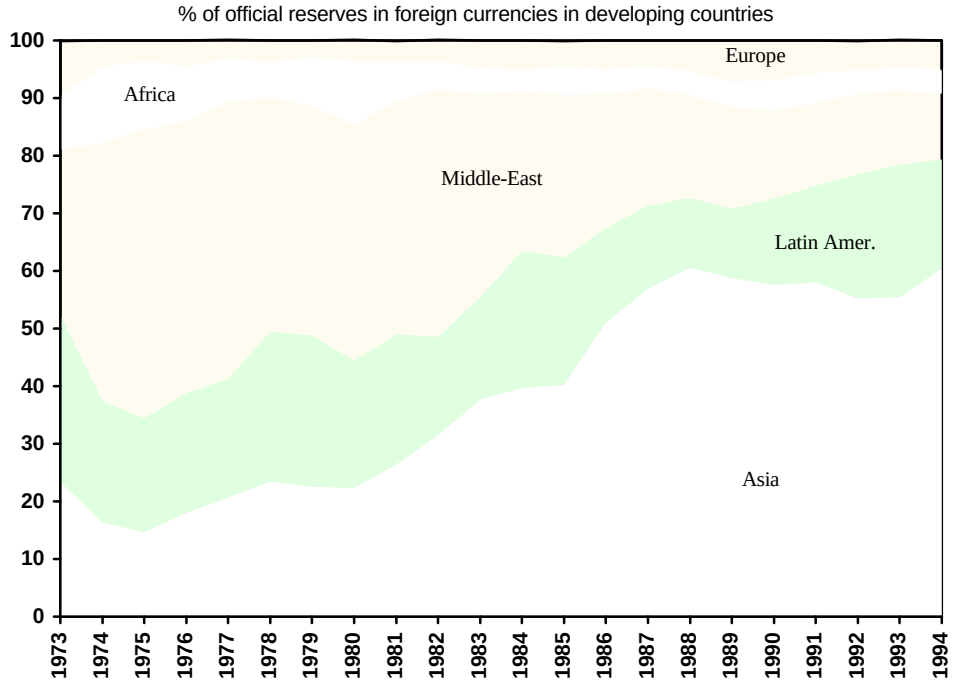
In very recent years, some Asian countries have started to diversify their official reserves (see Touzard, 1995 and Roche, 1995). In 1994, Indonesia increased the share of the yen in its reserves from 27 to 35%, while it reduced the share of the dollar from 52 to 49%. China announced its intention to allocate its reserves in equal parts between the dollar, the mark and the yen, while the dollar represented 77% of official reserves at end-1994 (and 90% at end-1993). Taïwan reduced the dollar's share from 59 to 54%. Finally, the yen's share is already predominant in the Philippines' reserves, while Malaysia does not seem to dislike having only 25% of its reserves denominated in yen.

Graph 1.4: The currency breakdown of developing countries' official reserves



Source: IMF, Annual Report, various issues.

Graph 1.5: The country breakdown of developing countries' official reserves



Source: IMF, International Financial Statistics, various issues.

1.6. Conclusion

From this brief analysis of the use of currencies, it is possible to conclude that the internationalisation of EU currencies (mainly the DM) and, to a lesser extent, of the yen, is more dynamic for the store of value function than for the means of payment function. This finding is in line with the quick development of capital flows and with the generalisation of portfolio diversification which was made possible by the removal of most restrictions during the 1980s. Although financial markets have developed for the DM and for the yen, the internationalisation of both currencies seems to be limited to the store of value function. We think this is not just a result of the hysteresis of the international status of the dollar (more than 20 years after the breakdown of the Bretton Woods system !). Given the externalities between the various functions of an international currency, the internationalisation of the DM and of the yen may have been delayed by the pegging behaviour of the monetary authorities in third countries. This justifies a close analysis on the anchor function.

2. THE USE OF INTERNATIONAL CURRENCIES AS INTERNATIONAL ANCHORS

2.1. Official versus de facto exchange rate regimes

Exchange rate policies can be observed through several methods. The most straightforward one is to look at exchange rate regimes as listed by the IMF [13]. The various exchange rate regimes are defined in Box 2.1. Table 2.1 gives an insight into the evolution of the exchange rate regimes for IMF member countries since 1978.

Since the breakdown of the Bretton Woods system, many countries have abandoned fixed exchange rate regimes, especially fixed parities against the dollar and against the SDR. Meanwhile, crawling-pegs, managed floats and floating regimes have expanded in absolute as well as in relative terms (given the increasing number of IMF members). For these countries, which made up to 97 currencies and 76.2% of world GDP at end-1994, the official exchange rate regime gives little information about the effective exchange rate policy.

(see Table 2.1., p.20)

[13] IMF: *Exchange Arrangements and Exchange Restrictions*, Annual. Summary table in the IMF *Annual Report*.

Table 2.1: The exchange rate regimes of IMF members in 1978, 1983, 1988 and 1994 (end of year). (number of currencies under each regime)

Exchange rate regimes	1978	1983	1988	1994	1994 % of world GNP(7)
Pegged to a currency:					
US dollar	43	34	39	25	1.53
French franc	14	13	14	14	0.19
Pound Sterling	4	1	0	0	0.00
Rubble	-	-	-	1 (1)	0.01
Deutschemark	0	0	0	1 (2)	0.02
Others (3)	3	4	5	6	0.02
Pegged to a basket of currencies:					
SDR	15	13	8	3	0.00
ECU (4)	-	1	1	1	0.03
Other baskets	21	26	30	20	1.40
Limited flexibility:					
European snake, European ERM	4	7	7	9	19.81
Other pegs with narrow fluctuation bands	cf. pegging	9	4	4	0.78
Crawling-pegs and managed floats:	7 (5)	29	27	36	10.48
Independently floating:	27 (6)	9	17	61	65.73
Total	*138*	*146*	*152*	*181*	*100.00*

(1) Tajikistan (2) Estonia. (3) South-African Rand, Indian rupee, Spanish peseta, Italian lira, Portuguese escudo and Australian dollar.(4) Austria (1984, 1988), Cyprus (1994). (5) Crawling-pegs only. (6) Including managed floats.(7) 1993 GNP at market rates (source: World Data Bank).Source: International Monetary Fund, *Exchange Arrangements and Exchange Restrictions*, several issues.

(see Box 2.1., p.21).

Box 2.1: Exchange Rate Regimes

Exchange rate regimes are often classified according to the degree of exchange rate flexibility. In fact, the crucial point is not how much the exchange rate fluctuates, but whether monetary authorities have a commitment concerning exchange rate fluctuations: can the exchange rate adjust in response to shocks impacting on the economy ?

a. Rules

Various exchange rate regimes entail a commitment. The important criteria are:

- whether the peg is fixed or moving according to a pre-announced schedule which depends on inflation differentials that are forecasted (*ex ante* crawling-peg) or observed (*ex post* crawling-peg);
- whether or not the exchange rate can fluctuate inside fixed margins around a central rate;
- whether the peg is defined *vis-à-vis* a single currency or *vis-a-vis* a basket of currencies.

Eight exchange rate regimes can be derived from these three criteria. Some examples are given below.

Examples of exchange rate commitments.

	No, or very low, flexibility	Pre-announced fluctuation margins
Fixed peg ◆ *vis-à-vis* a single currency ◆ *vis-à-vis* a basket of currencies	HK$/US$ (currency board) Czech Koruna (adjustable)	ERM (fixed, bilateral central rates) Cyprus Pound (vis-a-vis the ECU)
Crawling peg ◆ *vis-à-vis* a single currency ◆ *vis-à-vis* a basket of currencies	Polish Zloty	Mexican Peso (before Dec. 1994) Israel Shekel

b. Discretion

In the absence of commitment, monetary authorities still have two options:

- to let the exchange rate move according to the supply and demand of assets (free float);

- to intervene through foreign exchange reserves, interest rate management or foreign exchange restrictions in order to target some exchange rate level (a managed float). This last regime is different from a crawling-peg regime since the monetary authorities can use the exchange rate to adjust to unexpected shocks to inflation or to the balance of payments (discretionary policies).

The distinction between a fixed peg and a managed float is not easy when the fixed peg is frequently adjusted, like in Hungary for instance. Yet, a fixed exchange rate is always adjustable, except under a currency board or in a monetary union. Finally, it is possible to have a fixed, pre-announced central rate with discretionary fluctuation bands. It is the case of France, where there is a discretionary, narrow band inside the wide, +/- 15 % official fluctuation band.

In Central and Eastern European Countries (CEECs), the choice of an exchange rate regime has been highly dependent on the level of foreign exchange reserves, and of inflation at the beginning of the transition (see Krzak, 1995). After large initial devaluations, Poland, Czechoslovakia and Hungary adopted fixed exchange rates in order to provide nominal anchors for price expectations (Table 2.2). After hyperinflation was over, Poland turned to a crawling-peg regime in October 1991. Czechoslovakia and Hungary, who never experienced hyperinflation, stayed with adjustable peg regimes. But Hungary devalued frequently, while the Czech Republic took advantage of a relatively low inflation rate and of a gradual liberalisation of the foreign exchange to maintain a fixed exchange rate against a basket.

On the other hand, Slovenia, Bulgaria and Romania adopted managed floats. In Bulgaria and Romania, the managed float was not successful since the use of the exchange rate as an informal anchor was inconsistent with inflationary monetary and fiscal policies. In Bulgaria, the real appreciation of the exchange rate led to massive speculative attacks, while Romania was not able to restore the convertibility except for short periods of time.

In brief, official exchange rate regimes do not deliver the whole information about exchange rate policies. It is even more the case in Asia where most regimes are managed floats, i.e. regimes without any commitment (Table 2.2).

Table 2.2: The exchange rate regimes in selected CEECs and Asian countries (end 1994).

Czech Republic	Pegged to a basket of the DM (65%) and the US$ (35%).
Slovak Republic	Pegged to a basket of the DM (65%) and the US$ (35%).
Hungary	Adjustable peg to a basket of DM (50%) and US$ (50%); frequent devaluations.
Poland	Crawling-peg to a basket of US$ (45%), DM (35%), £ (10%), 5% (FF) and SF (5%). Decreasing pace of devaluation (1.4% monthly in 1994).
Slovenia	Active, managed float.
Bulgaria	Managed float with inefficient interventions.
Romania	Managed float, but limited convertibility.
Hong Kong	Pegged to the US$
Korea	Managed float.
Singapore	Managed float.
Taïwan	Not IMF member.
Indonesia	Managed float with US$ reference.
Malaysia	Managed float.
Philippines	Free float.
Thaïland	Pegged to a basket.
China	Managed float.
India	Free float.
Myanmar	Pegged to the SDR.
Pakistan	Managed float.
Sri-Lanka	Managed float.

Sources: Krzak (1995); IMF, *Exchange Arrangements and Exchange Restrictions*, 1995; EBRD *Transition Report*, 1994.

How is it possible to disentangle the *de facto* exchange rate regimes from the official regimes which are reported by the IMF ? Two approaches may be taken. The first one looks at official reserves as well as interest rate management, and tries to derive the preferences of the government. This approach was used by Popper and Lowell (1994) on the case of the United-States, Canada, Australia and Japan. Studying official interventions assumes that interventions matter for the evolution of exchange rates, which has been questioned [14]. The analysis of the interest rate management does not lead to clear-cut conclusions either, given the fragility of estimates for the reaction function of the monetary authorities.

The second approach looks at the results of the exchange rate policies, i.e. at the variations of exchange rates. This approach was initiated by Haldane and Hall (1991) who analysed the Sterling's transition from a dollar peg (in the mid-1970s) to a DM peg (in the

[14] On the basis of daily data, Weber (1995) shows that most interventions are sterilised and have no lasting effect on the exchange rates.

late 1980s). It was also implemented by Frankel and Wei (1992, 1993) and Frankel (1993) who evidenced an increasing influence of the yen in the nominal exchange rate policies of some Asian countries since the early 1980s. Basically, this method looks at the results of exchange rate policies, instead of studying the instruments (official reserves, monetary policy). The main problem is that the stability of the exchange rate can be obtained without any will from the monetary authorities, if most shocks are common shocks.

In brief, both methods have some drawbacks. The second one is used in this paper. The link between the short-run, nominal volatility and the long-run, real fluctuations depends on the drift of the nominal exchange rate compared to cumulated inflation differentials. Pegging a currency to an international anchor in nominal terms leads to a real appreciation if cumulated differentials are not compensated for by nominal devaluations. But in pegging their nominal rate, monetary authorities wish that the domestic inflation will converge towards the foreign rate. Hence, nominal and real pegs should be consistent in the long run. In the short run, the two pegs are consistent if the nominal exchange rate is not devalued too frequently, or if it is devalued with great regularity. In brief, a real peg is related to some long-run stability in the real exchange rate, while a nominal peg is connected to some stability in the nominal exchange rate over short periods. Sections 2.2 and 2.3 deal with both types of pegs for a large range of currencies over 1974-1993 and for a smaller range over 1974-1995.

2.2. De facto nominal pegs

Nominal exchange rate policies can be examined first by comparing the volatility of nominal exchange rate variations against the USD, the DM and the yen [15]. Three currency areas can be derived from this analysis (see Box 2.2).

The composition of the three currency areas over four sub-periods is detailed in Annex 1. The yen was never used as an anchor currency. The mark zone, while restricted to Germany, Belgium, Netherlands and Denmark over the first sub-period (1974-1978), progressively expanded, and it covered all Western Europe over the 1989-1993 sub-period.

For European and Asian currencies, the analysis was extended to 1995:05. For Europe, the 1989-1995 sub-period was split into 1989:01-1992:08 and 1992:09-1995:05. Although the relative volatility of most West-European currencies against the DM increased after the 1992 EMS crisis, only Italy and Sweden left the DM zone over the 1992:09-1995:05 sub-period (Table 2.3).

[15] The volatility is defined as the standard deviation of the first difference of the logarithmic exchange rate. With this definition, both a constant peg and a crawling peg imply a low volatility. For the choice of the sub-periods, see below.

Box 2.2: relative volatility of nominal exchange rate variations

The nominal currency zones are defined by measuring the *standard error of monthly variations* of exchange rate logarithms. This volatility of each currency i is computed against each reference currency j (j = $, DM, Y). It is called σ_{ij}. Then the relative volatility against currency j is derived in the following way:

$$\lambda_{ij} = \frac{\sigma_{ij}}{(\sigma_{i\$} + \sigma_{iY} + \sigma_{iDM})}$$

Currency i is supposed to be part of the j zone if λ_{ij} is less than 0.25. If no λ_{ij} is smaller than 0.25, it can be concluded that none of the three reference currencies was used as a nominal anchor over the sub-period considered (this does not exclude an anchor based on a currency basket).

This statistic is an adaptation of Theil's U statistic which is widely used for comparing two volatilities. The drawback of this method is that it is not possible to infer the significance of volatility gap because the distribution of the statistic is unknown. This drawback is compensated by the use of econometric estimations below.

The analysis is carried out on the monthly averages of nominal exchange rates for 112 currencies, including 16 West-European currencies, 4 East-European currencies and 15 Asian currencies, over the 1974-93 period (1974-95 for European and Asian currencies). Data come from the IMF's *International Financial Statistics*, and from the European Commission for the Czech Republic.

Table 2.3: The relative volatility of West-European, nominal exchange rates since 1989

	Against the US$ ($\lambda_{i,\$}$)		Against the DM (λ_{iDM})	
	1989:01-1992:08	1992:09-1995:05	1989:01-1992:08	1992:09-1995:05
Austria	0.51	0.47	0.02	0.02
Belgium	0.50	0.41	0.04	0.14
Denmark	0.49	0.38	0.05	0.17
Finland	0.39	0.35	0.23	0.26
France	0.49	0.41	0.06	0.12
Greece	0.46	0.38	0.12	0.15
Italy	0.46	0.30	**0.10**	**0.30**
Ireland	0.50	0.33	0.05	0.23
Netherlands	0.51	0.47	0.02	0.02
Portugal	0.45	0.38	0.17	0.20
Spain	0.45	0.36	0.14	0.22
Sweden	0.42	0.34	**0.17**	**0.27**
UK	0.43	0.33	0.22	0.25
Island	0.40	0.38	0.25	0.20
Norway	0.47	0.37	0.11	0.17
Switzerland	0.44	0.44	0.17	0.14

Source: CEPII calculation on IFS data.

East-European currencies were not part of any currency area over 1989:01-1992:08. Their volatility against the DM increased after the ERM crisis, except for the Czech koruna which joined the DM zone after the crisis (Table 2.4).

Table 2.4: The relative volatility of the nominal exchange rates of selected CEECs' currencies since 1989

	Against the US$ ($\lambda_{i,\$}$)		Against the DM (λ_{iDM})	
	1989:01-1992:08	1992:09-1995:05	1989:01-1992:08	1992:09-1995:05
Czech Rep.	0.31	0.32	**0.33**	**0.20**
Hungary	0.32	0.23	0.34	0.45
Poland	0.33	0.27	0.32	0.41
Romania	0.33	0.32	0.33	0.37

Source: CEPII calculation on IFS and EC data.

Since 1974, the dollar zone has declined in Africa and to a lesser extent in the Middle East, but it has expanded in Asia where it now comprises almost all countries. Several large countries of Latin America (Brazil, Venezuela) temporarily left the dollar zone in the 1980s, as their exchange rates became highly unstable, while Mexico joined this currency zone during 1989-1993. Finally, the zone without any nominal anchor comprises a declining number of OECD and Asian currencies, but an increasing number of African and Middle-East currencies; the behaviour of Latin American currencies being

ambiguous. In fact, all unstable currencies, whose mean volatility exceeded 5% per month, belong to the zone without any nominal anchor, while the reverse is not true: several currencies without a nominal anchor remain quite stable (with a mean volatility less than 5%).

Table 2.5: The relative volatility of selected Asian, nominal exchange rates since 1989

	Against the US$ ($\lambda_{i,\$}$)		Against the yen ($\lambda_{i,Y}$)	
	1989-1993	1994-1995(05)	1989-1993	1994-1995(05)
Korea	0.08	0.11	0.43	0.53
Singapore	0.18	0.11	0.39	0.56
Indonesia	0.05	0.02	0.44	0.60
Malaysia	0.13	0.24	0.41	0.48
Philippines	0.20	0.19	0.39	0.46
Thailand	0.09	0.08	0.42	0.57
Bhutan	0.28	0.05	0.37	0.57
China	0.24	0.34	0.34	0.34
India	0.28	0.05	0.37	0.57
Myanmar	0.30	0.38	0.37	0.30
Pakistan	0.18	0.03	0.41	0.60
Sri-Lanka	0.24	0.08	0.35	0.56

Source: CEPII calculation on IFS data.

Recent years did not witness important changes in the nominal anchoring of the Asian currencies. The crucial role of the dollar was confirmed in 1994 and in the beginning of 1995, especially in southern Asia (Table 2.5).

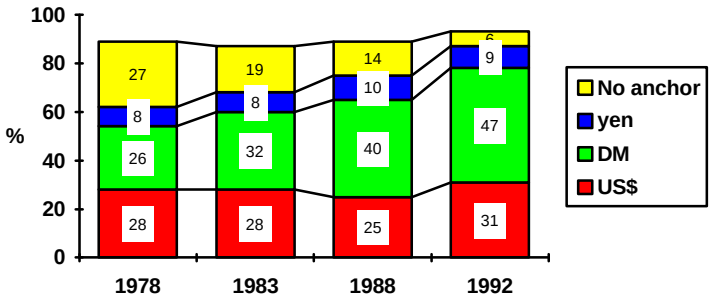
The share of each currency zone in world exports is reported in Graph 2.1. It is calculated on the basis of exports for 1978, 1983, 1988 and 1992. Each of these years is assumed to be representative of external trade during the corresponding sub-period [16]. The share of the dollar zone in world exports has remained approximately stable (around 30%) since 1978, OECD countries being replaced by Asian countries. The share of the DM zone increased from 26% in 1978 to 47% in 1992. This expansion can be attributed to the increasing number of countries in this monetary zone, rather than to the increasing share of the initial countries in world exports, as shown in Table 2.6. Lastly, the share of countries without any nominal anchor (or with a basket anchor) fell from 27% in 1978 to 6% in 1992. This is due to the progressive shift of all Western European countries to the DM zone, to the shift of Australia to the dollar zone over the last sub-period, and to the rising weight of Asian countries in world exports.

Thus, the official trend of substituting flexibility for dollar pegs is not confirmed when examining effective currency zones. On the contrary, the weight of the dollar's zone

[16] Data comes from the CEPII-CHELEM data base, which does not detail all countries considered in this study. Nevertheless, this data cover more than 90% of world exports.

seems to have been maintained in terms of world exports, while the share of countries without any anchor has fallen to the benefit of the DM zone.

Graph 2.1: The share of each nominal currency zone in world exports



Source: CEPII-CHELEM

Table 2.6: decomposition of the share of the DM zone in world exports

% of world exports	1978	1983	1988	1992
Share of the DM zone	26	32	40	47
Share of the 1978 DM zone *	26	23	26	26

* Share of exports by countries which belonged to the DM zone over the 1974-78 subperiod.

2.2.2. Implicit nominal baskets

The problem with the volatility analysis is that a low volatility against the USD or the DM does not preclude an exchange rate policy consisting in pegging a *basket* of international currencies. In the same way, it does not discriminate between countries without any anchor and those with a basket peg. Finally, it does not provide statistical tests for currency areas.

Suppose the monetary authorities want to stabilise their currency against a basket comprising the USD, European currencies (proxied by the DM) and the yen, i.e. they try to limit the variations in the nominal exchange rates against three international currencies. They minimise the following loss function [17]:

[17] A loss function is an ordinal measure the dissatisfaction, in the same way as a utility function is an ordinal measure of the satisfaction.

$$L = \alpha_0\left(a(L)\,\Delta S_{k,\$} - \sigma_0\right)^2 + \alpha_1\left(b(L)\,\Delta S_{k,DM} - \sigma_1\right)^2 + \alpha_2\left(c(L)\Delta\, S_{k,Y} - \sigma_2\right)^2, \quad \text{with}$$
$$\alpha_0,\alpha_1,\alpha_2 \geq 0 \qquad (2.1)$$

a(L), b(L) and c(L) are lagged polynomials [18]. $\Delta S_{k,i}$ stands for the monthly log-variation of the nominal exchange rate of currency k against i. $\sigma_0,\sigma_1,\sigma_2$ are the corresponding objectives ($\sigma_i = 0$ in case of a fixed peg; $\sigma_i > 0$ in case of a crawling peg). Given that $\Delta S_{k,DM} = \Delta S_{k,\$} - \Delta S_{DM,\$}$ and $\Delta S_{k,Y} = \Delta S_{k,\$} - \Delta S_{Y,\$}$, the optimal exchange rate policy is:

$$\Delta S_{k,\$} = D + A(L)\Delta S_{k,\$} + B(L)\,\Delta S_{DM,\$} + C(L)\,\Delta S_{Y,\$} + u \qquad (2.2)$$

with $$D = \frac{\alpha_0 a(0)\sigma_0 + \alpha_1 b(0)\sigma_1 + \alpha_2 c(0)\sigma_2}{\alpha_0 a(0)^2 + \alpha_1 b(0)^2 + \alpha_2 c(0)^2}, \qquad A(L) = \frac{\alpha_0 a(0)\left[a(0) - a(L)\right]}{\alpha_0 a(0)^2 + \alpha_1 b(0)^2 + \alpha_2 c(0)^2},$$

$$B(L) = \frac{\alpha_1 b(0) b(L)}{\alpha_0 a(0)^2 + \alpha_1 b(0)^2 + \alpha_2 c(0)^2}, \qquad C(L) = \frac{\alpha_2 c(0) c(L)}{\alpha_0 a(0)^2 + \alpha_1 b(0)^2 + \alpha_2 c(0)^2}$$

The regression of equation 2.2 is carried out on the monthly average of nominal exchange rates for 16 West-European currencies, 4 East-European currencies and 11 Asian currencies over 1974-1995 [19]. The behaviour of the monetary authorities may be influenced by the fluctuations in the USD exchange rate against the yen and the DM. Hence, four sub-periods are considered, which match the main turning points of the DM/USD or yen/USD exchange rate and the ERM crisis of 1992. The regressions are carried out on different sub-periods for European countries (DM/USD and ERM turning points) and for Asian countries (yen/USD turning points).

[18] $a(L) = \sum_{i=0}^{l} a_i\ L^i$, $b(L) = \sum_{i=0}^{l} b_i\ L^i$, $c(L) = \sum_{i=0}^{l} c_i\ L^i$, where L is the lag operator.

[19] Similar regressions were carried out on Asian currencies by Frankel and Wei (1992, 1993) and Frankel (1993). But Frankel and Wei (1993) defined exchange rates against the SDR while in Frankel and Wei (1992) and Frankel (1993), exchange rates are defined against a purchasing power over local goods on the numeraire. Frankel and Wei (1993) argue that under the basket-peg null hypothesis, the choice of the numeraire makes no difference for the estimates. But we shall see that the null hypothesis is frequently rejected. Hence, the numeraire matters. Specifically, Frankel (1993) recognises that choosing the SDR as the numeraire is not the best solution since the SDR itself is a basket of currencies. Instead of the SDR he takes the domestic, consumer price index as the numeraire. This measure is intermediate between a nominal exchange rate and a real exchange rate since it takes only domestic prices into account. Conversely, Haldane and Hall (1991) use both the USD and the DM as numeraires through the regression of two equations with time-varying coefficients.

Sub-period	DM/USD	Yen/USD
1. USD depreciation	1974:01-1980:01	1974:01-1978:10
2. USD appreciation	1980:02-1985:02	1978:11-1985:02
3. USD depreciation I	1985:03-1992:08	1985:03-1990:04
4. USD depreciation II	1992:09-1995:05	1990:05-1995:05

The nominal peg was defined above by the short-run stability of the nominal exchange rate, as opposed to the real peg which concerns long-term trends. Hence, only three lags are included in the regression of equation 2.2. More lags will be included for the analysis of the real pegs. The econometric results do not suffer from the small number of lags since the lagged variables are rarely significant.

It can be argued that the regression of equation 2.2 does not provide good estimates due to multicolinearity problems. In a second step, one explanatory variable is dropped, and the following regressions are carried out:

For European countries: $\Delta S_{k,\$} = D + A(L)\Delta S_{k,\$} + B(L)\,\Delta S_{DM,\$} + u$ (2.3a)

For Asian countries: $\Delta S_{k,\$} = D + A(L)\Delta S_{k,\$} + C(L)\,\Delta S_{Y,\$} + u$ (2.3b)

When significant, the « long-run » estimates of A(L) (written A(1)) always differ significantly from 1. In this case, the other « long-run » estimates are:

$$\tilde{B}(1) = \frac{B(1)}{1 - A(1)} \quad \text{and} \quad \tilde{C}(1) = \frac{C(1)}{1 - A(1)}$$

When A(1) is not significant, we have $\tilde{B}(1) = B(1)$ and $\tilde{C}(1) = C(1)$. The « long-run » estimates are computed using a Wold decomposition (see Annex 2). Long run as well as short run estimates (B(0) and C(0)) are reported in Annex 3.

In Western Europe, the coefficient B(0) is generally positive and highly significant. A DM depreciation against the USD induces a depreciation of most European currencies against the USD. The pegs to the DM have been reinforced over time. Over 1985:03-1992:08, B(0) and $\tilde{B}(1)$ are always significant at the 95% level. Since 1992:09, B(0) and/or $\tilde{B}(1)$ have not been significant in Italy, in the UK and in Sweden, but B(0) has not significantly differed from unity at 5% in all other countries but Greece.

Conversely, C(0) and $\tilde{C}(1)$ are rarely significant in Western Europe. When significant, C(0) does not exceed 0.2 (except in Sweden over 1980:02-1985:02), while

B(0) is never less than 0.4. Since 1985:03, $\widetilde{C}(1)$ has sometimes been negative, which means that the corresponding countries have opposed the yen appreciation.

The regression of equation (2.3a) confirms these results. B(0) and $\widetilde{B}(1)$ are significantly positive almost all the time, and they are increasingly close to unity, except in Italy, Sweden and the UK after the ERM crisis.

It can be concluded that the Deutschemark has become the single nominal anchor in most West-European countries: a 1% appreciation in the DM/USD exchange rate leads to a 1% appreciation in most European exchange rates against the USD. Only Greece, Italy, Sweden and the UK did not peg their currencies against the DM over the last sub-period. But the role of the DM as a partial anchor remained significant everywhere but in Italy.

In the CEECs, the DM is used as a partial anchor. This is specially the case for the Czech Republic where B(0) and $\widetilde{B}(1)$ are significant at 10% over 1990:05-1995:05 and the adjusted R^2 is high over the second sub-period. Since 1992:09, Poland and Romania have also weighed the DM in their implicit basket pegs. The case of Romania is specially interesting since this country officially follows a floating regime. Nevertheless its B(0) coefficient does not significantly differ from 1 over 1992:09-1995:05 (but $\widetilde{B}(1)$ largely exceeds 1, which means that, in the « long run », Romania has over-reacted to DM/$ fluctuations). Finally, the positive value of B(0) in Hungary is compensated by a negative C(0): the fiorint has partially followed the DM appreciation since 1992:09, but it has opposed the yen appreciation. In fact, B(0) is no longer significant for Hungary in equation 2.3a since 1992:09, while B(0) becomes highly significant in the three other countries.

In brief, whatever their official regimes, the CEECs seem to partially stabilise their currencies against the DM. But the only country where the peg to the DM correctly describes the exchange rate regime is the Czech Republic. For other countries, the adjusted R^2 appears quite low.

In Asia, surprisingly, several countries have been weighing the DM in their implicit basket pegs for a long time. This is especially the case in Bhutan, India and Singapore. Only China, Korea, Indonesia and Philippines never stabilised their exchange rates against the DM, while Thailand has only given a small weight to the DM since 1985 [20].

Conversely, the yen appears quite infrequently in the implicit basket pegs, and this sort of peg is generally short-lived. Only Singapore weighed the yen over a long period (1978:11-1995:05). But the peg concerns only the very short run ($\widetilde{C}(1)$ is not significant), and the weight falls over time: C(0) = 0.244 over 1978:11-1985:02, 0.126 over 1985:03-1990:04 and 0.096 over 1990:05-1995:05. Thailand has been weighing the yen since 1985:03, but the weight remains low (not exceeding 0.1). Finally, Pakistan and

[20] $\widetilde{B}(1)$ is negative for Korea over 1985:03-1990:04, which means that the currency depreciated against the USD when the DM appreciated. This behaviour is opposite to a DM peg.

Philippines cannot be considered as using the yen as a partial anchor over the last sub-period, since C(0) and $\widetilde{C}(1)$ are negative.

When equation 2.3b is regressed, C(0) and $\widetilde{C}(1)$ partially catch the previous DM effect. But the yen does not make for the DM, especially over the last sub-period where C(0) and $\widetilde{C}(1)$ are not significant for Bhutan, India, Pakistan and Sri Lanka, while B(0) and/or $\widetilde{B}(1)$ were significant for the corresponding countries in equation 2.2. Moreover, only Malaysia and, to a certain extent, Korea appear to weigh the yen in equation 2.3b while none of the estimates was significant for these countries in equation 2.2 (but the adjusted R^2 remain low).

The main conclusion that emerges is the absence of a yen bloc. In addition, the yen has not increased its role as a partial, nominal anchor in Asia since 1990. Our results confirm those of Frankel an Wei (1993) who found « no special role for the yen » in Korea, China, Thailand and Singapore, except on the 1988:01-1992:08 where they found a statistically significant, but low coefficient on the yen in Thailand and Singapore. But in contradiction with Frankel (1993), we cannot conclude to an increasing role of the yen in the region [21].

When B and C do not significantly differ from zero, and when the explanatory power of equations 2.2 and 2.3 is low (it is often the case over the last sub-period), the econometric analysis does not allow to say whether Asian countries follow a USD peg, or whether they do not follow any peg. But Table 2.5 shows that over the last sub-period, the volatility of the nominal exchange rate against the USD is smaller than ½ of its volatility against the yen in Korea, Indonesia, Pakistan and Sri Lanka. It can be concluded that the latter countries followed a USD peg [22]. By contrast, Bhutan, China, India and, to a lesser extent, Philippines, would follow a floating regime [23]. Finally, only Singapore, Thailand and, to a lesser extent, Malaysia, seemed to peg their currencies to a basket of international currencies over the last sub-period, although the weights of the yen and of the DM remained low.

In brief, the estimates of equations 2.2 and 2.3 confirm the fact that, in recent years, most West-European countries have pegged their currencies to the DM in nominal terms. They also show that the CEECs have partially stabilised their currencies against the DM, at least since 1992:09. Finally, the USD remains prominent in the *de facto* exchange

[21] Frankel (1993) uses a purchasing power over local goods (the inverse of the local price level) as the numeraire, while our results are based on nominal exchange rates against the USD. The difference in the results can be due to the choice of a numeraire, to the samples, or to the model specification (Frankel does not include lags in the regressions).

[22] For Indonesia, Pakistan and Sri Lanka, this conclusion is reinforced by the fact that the constant is significant in equations 2.2 and 2.3.

[23] This finding partially fits the official regimes which are a free float for India and Philippines, and a peg to the Indian rupee for Bhutan.

rate regimes of Asian countries. In all countries, the rise and fall of the USD does not appear to have been decisive for the choice of a nominal anchor.

2.3. De facto real pegs

Because the short-run volatility of prices is much lower than that of nominal exchange rates, the short-run volatility of real exchange rates is generally similar to that of nominal exchange rates. But the long run volatility of both exchange rates differ since the nominal exchange rate can adjust in order to stabilise the real exchange rate. Thus, the analysis of real pegs must rely on the long-run evolution of real exchange rates. In a first step, the volatility of the real exchange rates against the USD, the DM and the yen are compared over the four sub-periods defined above. The methodology differs from Section 2.3.1 in that the volatility is computed on the levels of the exchange rates instead of their variations. Thus, this analysis studies whether the real exchange rate is stable in the long-run, while the nominal analysis was concerned with the regularity of nominal exchange rate variations.

The problem with the volatility analysis is that it does not make any difference between noise and trends. This problem is solved in a second step through unit-root and cointegration analysis. But this analysis is excessively restrictive since it requires that the residuals of the regression be stationary, which will not be the case if some variables are omitted. Moreover, it does not allow for a long-run stabilisation of the real exchange rate against a basket of currencies. In a third step, the implicit basket pegs are measured through the estimation of a reaction function in the spirit of 2.2 and 2.3.

2.3.1. The volatility of real exchange rate levels

Real exchange rates are calculated with monthly output prices [24]. Although more reliable, consumer prices do not catch the external competitiveness, because they include the prices of imported goods and of non-traded goods. Conversely, export prices are not available for most of the countries under review. Output prices are available for most countries [25].

Box 2.5: The relative volatility of real exchange rate levels

Let $E_{i,j}$ be the logarithm of the bilateral real exchange rate of currency i against currency j (j = dollar, mark, yen). The standard error of $E_{i,j}$ represents the sum of the squared discrepancies of the real exchange rate around its average over the period considered. Thus we can define real monetary zones using the same conventions as for nominal zones, i.e. comparing relative volatilities to 0.25 (see Box 2.2). These volatilities concern the *level* of real exchange rates while nominal volatilities are calculated on the basis of nominal exchange rate *variations*. The reason for this choice is that we want to determine whether the price competitiveness is roughly stable over each sub-period, while the analysis on nominal volatility aimed at studying whether the evolution of the nominal exchange rate was regular, i.e. forecastable. In Section 3, the exchange rate policy will be viewed as a trade-off between reducing inflation and maintaining external competitiveness. The inflation target may be related to the rate of nominal exchange rate depreciation, while the real target is linked to the level of the real exchange rate.

[24] Source: IMF, *International Financial Statistics*, line 63 (wholesale prices).
[25] For France, the unit labour cost is used as a proxy.

The real currency zones based on relative volatilities are detailed in Annex 4 for the 1974-1993 period. They show approximately the same evolution as the nominal zones: the yen zone has been limited to Japan, the mark zone has progressively attracted most European currencies, the dollar zone contains all Asian countries during the last sub-period, while results are ambiguous for Latin America. The main differences between nominal and real monetary zones reflect the trade-off between lowering inflation and maintaining competitiveness. Specifically, Italy, Greece and Spain stayed in the zone without any real anchor over the whole period, while belonging to the mark nominal zone at least over the last sub-period. This is because over 1989-93, they maintained a relatively stable nominal exchange rate against the DM, while their inflation rate was still higher than that of Germany. In a similar way, Mexico left the dollar real zone during the last sub-period, when it entered the dollar nominal zone. The reverse occurred in Venezuela, which left the dollar nominal zone in the 1980s while staying in the dollar real zone. Finally, it is striking that until 1989, Northern European countries (Finland, Norway and Sweden) stayed in the dollar real zone but in the mark nominal zone.

In recent years, the real DM zone was submitted to opposite forces (Table 2.7). The three Nordic countries joined it, but Spain, the UK and maybe Italy (not available) left it after the ERM crisis. Finally, the three CEECs under review did not peg their currencies to the DM in real terms (Table 2.8), and the nine Asian countries under review remained in the USD zone in recent years (Table 2.9).

Table 2.7: The relative volatility of West-European currencies against the dollar and against the DM in real terms, since 1989.

	Against the USD		Against the DM	
	1989-1992:08	1992:09-1995:05	1989-1992:08	1992:09-1995:05
Austria	0.39	0.35	0.09	0.05
Belgium	0.35	n.a.	0.17	n.a.
Denmark	0.38	0.33	0.10	0.11
Finland	**0.24**	**0.34**	**0.34**	**0.23**
France	0.24	0.13	0.19	0.09
Greece	0.41	0.31	0.09	0.08
Italy	0.39	n.a.	0.12	n.a.
Ireland	0.35	n.a.	0.17	n.a.
Netherlands	0.42	0.36	0.04	0.03
Spain	**0.40**	**0.25**	**0.08**	**0.30**
Sweden	**0.36**	**0.29**	**0.16**	**0.19**
UK	**0.39**	**0.24**	**0.19**	**0.25**
Norway	**0.36**	**0.30**	**0.16**	**0.13**
Switzerland	0.34	n.a.	0.19	n.a.

Source: CEPII calculation on IFS data.

Table 2.8: The relative volatility of selected Central and Eastern European currencies against the dollar and against the DM in real terms, since 1989.

	Against the US$		Against the DM	
	1989-1993	1990-1995(05)	1989-1993	1990-1995(05)
Czech Rep.	n.a.	0.35	n.a.	0.38
Hungary	0.42	n.a.	0.26	n.a.
Poland	0.37	n.a.	0.36	n.a.

Source: CEPII calculation on IFS and EC data.

Table 2.9: The relative volatility of selected Asian real exchange rates against the dollar and against the yen, since 1989.

	Against the USD		Against the yen	
	1989-1993	1990:05-95:05	1989-1993	1990:05-95:05
Korea	0.14	0.12	0.45	0.55
Singapore	0.20	0.16	0.45	0.56
Indonesia	0.10	0.08	0.47	0.58
Malaysia	0.22	0.25	0.31	0.39
Philippines	0.21	0.27	0.42	0.42
Thailand	0.19	n.a.	0.41	n.a.
India	0.22	0.22	0.43	0.51
Pakistan	0.12	0.21	0.48	0.49
Sri-Lanka	0.23	0.11	0.48	0.60

Source: author's calculation on IFS data.

2.3.2. Unit roots and cointegration

The calculation of the relative volatilities of real exchange rates demonstrates whether the real exchange rate is stable against one or another international currency, during each sub-period. The problem is that it does not discriminate between noise and trends. In a second step, unit root and cointegration analysis is carried out in order to analyse long-run relationships over 1974-1993 [26].

The results of unit root tests are detailed in Annex 5. Most real exchange rates appear to be non-stationary in level, but stationary in first difference. Only in five countries is the level of the real exchange rate stationary against the USD while non-stationary against the DM and the yen [27]. This result can be interpreted as an attempt by the monetary authorities to compensate for the news in order to control the evolution of the real exchange rate against the USD in the long run. Conversely, the only two cases of stationarity against the yen are that of Philippines and Costa-Rica. But both currencies are stationary against the yen too, which does not allow to conclude on the unit root analysis.

[26] This analysis does not include CEECs currencies for which the series are too short.
[27] The five countries are Pakistan, Sri Lanka, Argentine, Venezuela and South Africa.

Finally, all European exchange rates are non-stationary against the USD, while some of them are stationary against the DM or the yen. But it is not possible to conclude either because the DM/yen real exchange rate is stationary too.

When the real exchange rate is non-stationary against the USD, there may be a cointegration relationship with the DM/USD or with the yen/USD real exchange rate (both are I(1) too). Augmented Dickey-Fuller tests were carried out in order to look for such long-run relationships [28]. Few cointegration relationships show up, the four exceptions being Austria, Belgium, Netherlands and Switzerland for which there is a long run relationship between the k/USD and the DM/USD real exchange rates, with a cointegration coefficient very close to 1 (Annex 6). Hence, these four currencies were clearly pegged to the DM in real terms over 1974-93. A cointegration relationship appears between the k/USD and the yen/USD real exchange rates for Austria, France and Switzerland, which has little meaning since the DM/$ and the yen/$ are cointegrated. Finally, no cointegration relationship was found between Asian/USD and yen/USD exchange rates.

In brief, the cointegration analysis allows to conclude that five currencies (among which 2 Asian currencies) were pegged to the USD over 1974-1993, and that five European currencies were pegged to the DM. For the other currencies, the lack of long-run relationship says that most currencies were not pegged to a single international currency. But this analysis is excessively restrictive since it requires that the residuals of the regression be stationary, which will not be the case if some variables are omitted. Moreover, it does not allow for a long-run stabilisation of the real exchange rate against a basket of currencies.

2.3.3. Implicit real basket pegs

A less-demanding test of real exchange rate policy consists in regressing equation 2.4 in order to measure the long-run impact of DM/$ and yen/$ variations on each real exchange rate against the dollar:

$$\Delta E_{k,\$} = F + G(L)\Delta E_{k,\$} + H(L)\Delta E_{DM,\$} + J(L)\Delta E_{Y,\$} + \varepsilon \qquad (2.4)$$

where $E_{k,i}$ is the logarithm of the real exchange rate of k against i, and L is the lag operator [29]. Equation 2.4 can be derived from the minimisation of a loss function similar

[28] The test consists in looking for a linear combination of both exchange rates which may be stationary.

[29] The exchange rates are first-differenciated because only their first differences are stationary. In the case of Philippines and Costa Rica, the real exchange rate is stationary both against the USD and against the yen. Thus, the following regression is carried out: $E_{k,\$} = F + G(L)E_{k,\$} + J(L)E_{k,Y} + \varepsilon$. The long-run estimate $\tilde{J}(1)$ does not significantly differ from 0 at 5%, which means that both countries do not weigh the yen in their implicit basket pegs. This can be shown by re-arranging the above equation as:

to 2.1. Additional lags are included here since monetary authorities generally adjust the nominal exchange rate with a lag when inflation differentials accumulate if they also have a nominal anchor (in this case, adjusting the nominal exchange rate in response to inflation is costly). This leads to short-run fluctuations in the real exchange rate that do not preclude the existence of a real anchor.

Following this analysis, only long-run estimates are of interest. Like in the nominal case, they are estimated using a Wold decomposition (Annex 2). The regressions are carried out over the 1974-1993 period, with seasonal dummies [30]. The sum of the auto-regressive coefficients (G(1)) is always significantly different from one, which is consistent with real exchange rates that are stationary on first difference. This allows to interpret $\tilde{H}(1) = \frac{H(1)}{1-G(1)}$ and $\tilde{J}(1) = \frac{J(1)}{1-G(1)}$ (Table 2.9).

The results are striking for West-European currencies. All of them but the Finish krona exhibit significant $\tilde{H}(1)$ coefficients. Moreover, this coefficient does not significantly differ from unity in all European countries but Finland, Norway and Sweden. Norway and Sweden follow an implicit real anchor basket containing the dollar and the Deutschemark. Finland follows a dollar anchor. All the other European countries clearly peg their currencies to the DM in real terms.

The econometric results confirm the volatility analysis for the three Nordic countries which definitely did not peg their currencies in real terms to the DM over 1974-1993. But both methods lead to opposite results over 1974-93 for Italy, Greece and Spain which belong to the DM zone according to econometric results but not according to the volatility analysis. Such divergent conclusions are easily explained by the devaluations that did not occur every month, implying high monthly volatility but no long-term drift of the real exchange rate against the DM.

Other currencies do not show significant coefficients, except Turkey where $\tilde{J}(1)$ is negative and Thailand where $\tilde{H}(1)$ is positive. Other countries do not weigh the DM and the yen in their implicit, long run basket pegs. This can be interpreted as a peg to the USD in Singapore, Colombia and Finland where the adjusted R^2 is not very low. For other countries, it is not possible to say whether there is a $ peg or no peg at all.

$E_{k,\$} = F + (G(L) + J(L))E_{k,\$} - J(L)E_{Y,\$} + \varepsilon$.

[30] The lags do not allow to carry out regressions on small sub-periods.

INSERE TAB.2.10

2.4. Conclusion

In this section, statistical and econometric methods were used in order to analyse *de facto* exchange rate regimes of a range of currencies. Several features emerge :

(i) Western Europe (including non-ERM currencies) already constitutes a strong monetary bloc that was not pulled down by the recent ERM crises. All countries follow a close, explicit or implicit nominal peg to the DM [31]. Provided lagged devaluations are taken into account, the nominal peg is supplemented with a real peg in all countries, but the Nordic countries. The consistency between the two pegs has been achieved both through inflation convergence and through correcting devaluations.

(ii) East European countries have not adopted a DM nominal peg, although they positively weigh the DM in their *de facto* basket peg. It is too early to conclude whether there is any real pegging behaviour, since the real appreciation observed in most countries is largely due to the initial over-devaluation, and to the desinflation process.

(iii) The nominal volatility of Asian currencies is smaller against the dollar than against the yen, and this feature was reinforced in recent years. Econometric results confirm that Asian countries rarely weighed the yen in their implicit basket pegs, although the peg to the USD was loser than for European currencies *vis-à-vis* the DM.

[31] The DM remains a partial nominal anchor in Italy, Greece, Sweden and the UK. It should be reminded that nominal pegs include crawling pegs.

3. THE POTENTIAL ROLE OF THE EURO AND THE YEN AS INTERNATIONAL ANCHORS

Section 2 has shown that the Deutschemark is already the official and/or *de facto* anchor for West-European countries, but only partially (as part of a basket) for the central and eastern European countries. With few exceptions, the yen is not used as an anchor (even within a basket) in Asia. In this section the rationale for the present situation and the prospects for an eventual role of the yen and of the Euro are examined.

For convenience, NICs (New Industrialised Countries) refers to the group comprising Hong Kong, South Korea, Taïwan and Singapore; and ASEAN (Association of South Eastern Asian Nations) is held as the group which includes Indonesia, Malaysia, Philippines and Thailand.

There is an extensive literature on the choice of an exchange rate regime for Europe, for developing countries and for transition countries [32]. Here, the flexible exchange rate regime is not considered. We focus on the choice of an anchor, *i.e*. on the choice between a nominal and a real anchor (Section 3.1), and on the choice of an international currency as an anchor (Section 3.2). A simple optimisation model is proposed in Section 3.3 in order to rationalise the choice of a foreign anchor. Section 3.4 concludes on the potential role of the Euro and of the yen as international anchors.

3.1. Nominal versus real anchor

The choice of an exchange rate regime in LDCs or transition countries can be viewed as a trade-off between the « real target approach » and the « nominal anchor approach » (see Corden, 1993). In principle, both approaches exclude each other. According to the former, nominal exchange rate fluctuations can affect the external competitiveness, in the Keynesian tradition. Conversely, the nominal anchor approach stipulates that a nominal exchange rate policy can help reducing inflation without any lasting effect on real variables, in the monetarist tradition. In practice, countries which peg their nominal exchange rate wish that their inflation rate will converge towards the inflation in the anchor country. In the mid-time, they allow for a real appreciation that helps reducing inflation at the expense of external competitiveness. Discretionary or pre-announced devaluations help reconciling the nominal objective with the real target during the disinflation process.

In the short run, a nominal anchor is still consistent with a real anchor if the traded goods sector is large and if it is price-taker (Box 3.1). If the non-traded goods sector is large, then a nominal anchor leads to a real appreciation in a country with some internal inflation. Finally, a real anchor means that the nominal exchange rate depreciates in order to compensate for internal inflation. Internal inflation can be magnified if the rise in the price of imported goods is passed on the non-traded goods sector.

[32] See Argy (1990), Corden (1993), Kwan (1994).

Box 3.1 : nominal versus real anchor

Suppose there are two sectors in the economy. The inflation rate p depends on the variations of both the tradable and non-tradable prices (p_T and p_N):

$$p = \eta p_T + (1-\eta) p_N, \quad 0 \le \eta \le 1$$

The inflation of tradable goods depends on the variations in the nominal exchange rate e and on the variation of non-traded goods prices:

$$p_T = \tau\, e + (1-\tau) p_N, \quad 0 \le \tau \le 1$$

If the country if price-taker, we have $\tau = 1$. If it is price-maker, we have $\tau = 0$.The inflation of non-traded goods depends on the evolution of the nominal exchange rate and on exogenous shocks ε:

$$p_N = \nu e + \varepsilon, \quad 0 \le \nu \le 1$$

Finally, the variation in the external competitiveness of traded goods is defined with constant foreign prices:

$$\pi_T = e - p_T$$

The variation in the real exchange rate is:

$$\pi = e - p$$

p, π_T and π can be re-written as functions of e and ε:

$$p = \left(\eta\tau(1-\nu) + \nu\right) e + (1-\eta\tau)\varepsilon$$

$$\pi_T = (1-\tau)\left((1-\nu)e - \varepsilon\right)$$

$$\pi = (1-\eta\tau)\left((1-\nu)e - \varepsilon\right)$$

1st case: the currency is pegged in nominal terms (e = 0)

We have:

$$\begin{cases} p = (1-\eta\tau)\varepsilon \\ \pi_T = -(1-\tau)\varepsilon \\ \pi = -(1-\eta\tau)\varepsilon \end{cases}$$

Shocks on the internal inflation ε are passed on the inflation rate p, worsening the external competitiveness π_T and appreciating the real exchange rate π. If the country is price-taker ($\tau = 1$), the nominal anchor is consistent with a constant competitiveness. But the real exchange rate still appreciates, except if the traded goods sector is very large ($\eta \approx 1$). Conversely, if the country is price-maker ($\tau = 0$), a nominal anchor means that the internal inflation is not stabilised, leading to a real appreciation and deteriorating competitiveness, whatever be the relative size of the traded-goods sector.

2nd case: the currency is pegged in real term ($\pi = 0$)

We have:

$$\begin{cases} p = e = \varepsilon / (1-\nu) \\ \pi_T = 0 \\ \pi = 0 \end{cases}$$

The nominal exchange rate depreciates in order to meet the internal inflation, but the depreciation exacerbates inflation. Thus, unless $\nu = 0$, the nominal depreciation must exceed the internal inflation.

Considering that the countries under review are broadly price-takers, the choice between a nominal and a real anchor emerges only if there is a large sector of non-traded goods. In this case, the optimal exchange rate policy will depend on the size of the non-traded goods sector, on the inflationary consequences of a depreciation, and on the policy preferences between external competitiveness and inflation.

The Asian countries and the CEECs are in very different situations *vis-à-vis* the trade-off between external competitiveness and inflation (Table 3.1).

In 1995, all Asian countries under review experienced moderate inflation. The current account was still in deficit in the ASEAN countries who needed to import foreign capitals, while NICs run external surpluses (except Korea). Thus, ASEAN countries, which both need to attrack foreign direct investment and to increase their exports, will likely oppose any appreciation in their real exchange rate, while NICs may accept a real appreciation as an increase in their living standards consistent with their growing external position.

Conversely, the CEECs tried to solve the trade-off between a real target and a nominal target by an initial, large devaluation followed by a fixed nominal exchange rate. The initial devaluation was designed to leave room for real appreciation during the disinflation process. The risk was that initial underevaluation could bring some inflation.

Due to a lack of reserves or of international support, not all countries chose a fixed peg. Wyplosz (1995) confirms the fact that the adoption of fixed exchange rates at the time of price liberalisation helped contain the initial burst of inflation. But he notes that an alternative explanation is that the initial level of inflation influenced the choice of the exchange rate regime. After the initial liberalisation, inflation was slightly better controlled in fixed exchange rate regimes than in floating regimes. Among the « fixers », the preference for nominal stabilisation was compensated by increasing deficits over the first four years. Conversely, the « floaters » experienced sudden deficits due to insufficient initial real depreciation, but afterwards they turned to quasi-equilibrium.

Still in 1995, most transition countries under review experienced double-digit inflation. Four groups of countries should be distinguished:

- The Czech Republic, Poland, the Slovak Republic and Slovenia engaged in early stabilisation, and have been quite successful in reducing inflation and restoring growth (although Slovenia chose a floating regime). Their fiscal and external accounts are close to balance, and they are only moderately indebted. Finally, these countries are candidates to join the E.U., which may biase there exchange rate policy towards nominal fixity.

- Bulgaria, Croatia, Hungary, Macedonia and Romania either started stabilisation quite recently, or were rather unsuccessful (Hungary). Except Croatia, they still suffer from high inflation rates. This is accompanied by large fiscal deficits (Bulgaria, Hungary) or external deficits (Hungary, Macedonia). Bulgaria and Hungary suffer from a large external debt ratio. Still, positive growth has been restored in all countries but Bulgaria and Macedonia.

Table 3.1: Some macroeconomic indicators in selected countries.

	CPI inflation % in 1995 (1)	Current account % GDP, 1995 (1)	Export/GDP ratio, % in 1993 (2)	Net external debt, % of GNP 1993 (3)	Long-term debt service, % of GDP, 1993 (3)
Czech Rep.	9.1	-3.3	22.6 (Czechosl.)	28	3.9
Poland	27.8	2.9	13.3	53	1.6
Slovak Rep	9.9	5 (*)	n.a.	31	5.3
Slovenia	12.1	3 (*)	n.a.	26	n.a.
Bulgaria	62.1	-2 (*)	18.7	161	2.3
Croatia	2.1	2 (*)	n.a.	21	n.a.
Hungary	28.2	-5.5	18.3	70	11.7
Macedonia	16.1	-10 (*)	n.a.	32	0.5
Romania	32.3	-1 (*)	12.0	19	0.9
Estonia	28.9	-6 (*)	n.a.	7	0.4
Latvia	25.0	-3 (*)	n.a.	-3	0.1
Lithuania	36.5	-4 (*)	n.a.	8	0.0
Hong Kong	9.0	n.a.	26.1	n.a.	n.a.
Korea	4.5	-2.0	24.9	14.4	2.5
Singapore	1.7	18.3	84.3	n.a.	n.a.
Taïwan	3.7	1.6	38.6	n.a.	n.a.
Indonesia	9.4	-3.7	25.7	65.9	8.6
Malaysia	3.4	-8.5	71.4	37.8	6.1
Philippines	8.1	-3.3	21.7	63.7	8.3
Thailand	5.8	-7.1	27.3	37.6	6.5
Bhutan	8.0	n.a.	n.a.	36.4	2.8
China	14.8	2.3	19.1	21.4	2.2
India	10.2	-1.5	8.8	37.3	3.2
Pakistan	12.3	-3.8	12.8	49.7	6.1
Sri Lanka	7.7	n.a.	n.a.	65.5	3.6

Sources: (1) IMF, *World Economic Outlook*, may 1996 and may 1995;
(2) CEPII-CHELEM data base, 1995.
(3) World Bank, *World Debt Tables*, 1994-95

(*) 1994.

- Finally, the Baltic countries are intermediate cases, with positive growth, double-digit inflation rates (although two of them have currency boards), fiscal and foreign account deficits, but very low debt ratios.

In brief, there still is a rationale for transition countries to favour the nominal target, except maybe for Hungary, Macedonia and Estonia who run large external deficits. Conversely, Asian countries which have reached single-digit inflation rates may be more aware of the external account. This would entail preserving external competitiveness (ASEAN countries) or allowing for real appreciation (NICs) [33].

It may be asked whether a constant real exchange rate is a good proxy for the real target. There should be a long run trend of the real exchange rate to appreciate in catching up countries (Balassa effect). In this view, public authorities should follow a « crawling real peg », defined on the basis of productivity growth. This type of real exchange rate policy was taken into account in the unit root tests of Section 2, where most real exchange rates were found to be non-stationary. However, the current account is not just a question of external competitiveness, when there is an external debt denominated in foreign currencies: a depreciation in real terms improves the trade account if the Marshall-Lerner condition is verified, but the external debt is revalued. The net effect on the current account is uncertain. With a 10% debt service/GDP ratio, a 10% depreciation against the currency of denomination induces a rise in the debt service ratio by 1 percentage point [34]. On the other hand, a depreciation of the currency raises external competitiveness. With an export/GNP ratio of 25%, the net effect of a depreciation on the current account is positive if the sum of the price elasticities of exports and imports exceeds 1.4 (instead of 1 if there is no external debt). Thus, the net effect of a currency depreciation on the balance of payments is ambiguous in a highly indebted country [35].

3.2. Choosing a foreign anchor

Assuming that the countries under review wish to stabilise their real exchange rates, they still have to choose between various foreign anchors. Following the above analysis, the choice of a foreign anchor depends on the country and currency breakdown of trade and capital flows.

3.2.1. Asia

[33] In fact, NICs have fighted real appreciation by official interventions, which were sterilised in order to preserve low inflation through low monetary growth (see Benaroya and Janci, 1995).

[34] In theory, indebted countries should be indifferent to the currency of denomination of their debt if the uncovered interest parity (UIP) holds, because any change in the exchange rate should be compensated by an interest differential. In fact, asset holders are risk-adverse, and the UIP does not hold. In practice, exchange rates are much more volatile than interest rates, and the cost of the external debt is more dependent on valuation effects than on interest rates differentials.

[35] In principle, the trade balance is influenced by the real exchange rate, while re-evaluation effects are due to variations in the nominal exchange rate. But a developing country considers the world inflation as exogenous. The evolution of its real exchange rate basically depends on that of its nominal exchange rate compared to domestic inflation. While the external debt is influenced by the nominal exchange rate, the nominal GDP depends on the domestic inflation. Hence, the debt ratio rises when the real exchange rate depreciates.

a. Trade flows

The breakdown of Asian external trade by country is detailed in Box 3.2 for 1973 and 1993.

For the NICs, the US market is not as important as it used to be, while Asian markets are developing. On the import side, Asian countries, including Japan, are larger suppliers than the US, even though the latter represents 20-21% of imports in Korea and Taiwan.

The US remains an important market for the ASEAN countries (especially for Philippines), but an increasing share of exports is directed to the NICs. The US is not the main exporting country both for Indonesia and Malaysia (but these two countries remain dollar-oriented because they are oil-exporters).

Lastly, the external trade of India and Pakistan is EC-oriented. Chinese exports are diversified, while its imports come mainly from Asia.

Kwan (1994) makes a clear distinction between the NICs which mainly compete in the US market and ASEAN countries, which have Japan as their main partner for imports. The analysis here shows that this distinction, while quite impressive in 1973, is now vanishing due to two trends: (i) intra-NICs trade is developing at the expense of exports to the US and to Japan, and (ii) NICs have also become major suppliers for ASEAN countries, at the expense of Japan [36].

It has become a conventional wisdom to say that, unlike Europe, Asia is not a trade bloc. Maswood (1994) argues that such a bloc should include Japan. Yet Japan's trade intensity index declined between 1980 and 1991 for East Asia, while it increased for the United States [37]. The rising share of the Asian countries in total Japanese exports was more than explained by the dynamism of Asian countries as importing countries. In a similar way, Frankel and Wei (1993) and Frankel (1993) estimate a gravitational model of trade. They test whether trade bloc dummies are significant in explaining trade flows, even when the distance or the openness are included in the regressions. They conclude that unlike Europe and the Western Hemisphere, Pacific and East Asian blocs seem to have weakened in the 1980s. The expansion of trade in these two blocs was simply in line with their economic development, their geographic proximity and their opening trend. But it is not important here to know whether intra-Asia trade expansion was due or not to a specific trade bloc effect. The important thing is that (i) there is a trade dynamism between non-Japan, Asian countries, (ii) the role of Asia as a trading partner is growing for Japan,

[36] Singapore is the only NIC whose exports to the US have expanded faster than its total exports, while Malaysia is the only ASEAN country whose imports from Japan have expanded faster than its total imports.

[37] The trade intensity index is defined as the ratio of country i exports to j (Xij) to the total of country i's exports (Xi.), divided by the ratio of target country imports (X.j) to total world imports (X..): $TII_{ij} = \frac{X_{ij} / X_{i.}}{X_{.j} / X_{..}}$. Thus, the bilateral trade is corrected for the share of each country in the world trade.

and (iii) the role of Japan as a trading partner is declining for most of the other Asian countries.

b. Capital flows

Capital flows between Asian countries are well described in Kwan (1994). Traditionally, Japan was running a trade deficit with the ASEAN countries because of large oil imports from Indonesia and Malaysia. But in recent years, the large flow of direct investment from Japan to the ASEAN countries has stimulated Japanese exports of investment goods. The trade deficit turned into surplus in 1992. The Asian NICs also provide foreign investment to the ASEAN countries (Taiwan is running a surplus *vis-à-vis* the ASEAN countries).

Box 3.2: Asian external trade

Orientation of exports by selected Asian countries (% of total exports of each country).

Exporting	To the US		To Japan		To NICs		To ASEAN		To the EU15		Elsewhere	
country	1973	1993	1973	1993	1973	1993	1973	1993	1973	1993	1973	1993
Japan	27.7	29.4	-	-	13.5	19.1	7.4	9.2	14.3	16.2	37.1	26.1
Hong Kong	35.3	22.5	5.7	4.0	5.0	8.9	2.7	3.7	32.6	21.6	18.7	39.3
Korea	33.6	21.3	37.8	14.3	5.7	11.1	2.0	7.7	10.7	12.1	10.2	33.5
Singapore	16.6	21.9	10.3	7.0	9.2	15.6	22.4	23.4	16.2	14.5	25.3	17.6
Taïwan	42.1	28.3	14.8	11.2	9.4	9.9	4.1	7.1	13.0	15.3	16.6	28.2
Indonesia	12.1	13.0	56.3	31.7	14.9	21.1	1.1	3.9	11.5	14.8	4.1	15.5
Malaysia	13.3	21.0	29.7	15.5	16.1	29.4	1.4	5.5	23.0	14.9	16.5	13.7
Philippines	35.2	38.2	40.4	18.9	4.7	12.2	1.2	3.5	13.0	16.4	5.5	10.8
Thailand	10.7	22.2	28.3	17.9	14.8	15.5	12.1	4.3	19.4	18.9	14.7	21.2
China	1.4	29.0	20.1	19.8	19.3	9.0	1.1	3.2	13.8	20.5	44.3	18.5
India	13.7	18.0	16.7	9.1	2.1	7.6	1.4	5.1	24.7	29.1	41.4	31.1
Pakistan	11.9	13.4	15.9	7.7	15.3	10.8	3.9	3.5	23.9	31.6	29.1	33.0

Source: CEPII-CHELEM data base.

Origin of imports of selected Asian countries (% of total imports of each country).

Importing	From the US		From Japan		From NICs		From ASEAN		From the EU15		Elsewhere	
country	1973	1993	1973	1993	1973	1993	1973	1993	1973	1993	1973	1993
Japan	24.6	22.1	-	-	6.5	11.8	12.1	12.3	9.2	13.8	47.6	40.0
Hong Kong	13.4	9.1	21.1	18.7	10.3	23.3	3.3	6.0	18.7	22.0	33.2	20.9
Korea	27.2	19.3	13.0	26.0	1.8	4.4	8.1	6.6	7.2	13.7	42.7	30.0
Singapore	15.5	14.3	20.6	22.6	5.9	9.6	17.1	21.5	15.9	13.1	25.0	18.9
Taïwan	22.4	20.5	38.8	32.8	4.4	7.3	4.5	6.3	13.9	14.5	16.0	18.6
Indonesia	17.4	10.8	36.5	23.6	9.4	20.5	2.6	3.0	20.5	21.6	13.6	20.5
Malaysia	8.2	16.0	22.1	26.7	13.9	26.1	7.7	5.3	22.0	14.1	26.1	11.8
Philippines	26.9	19.3	33.7	27.2	4.2	17.3	1.5	5.0	13.3	12.6	21.5	18.6
Thailand	13.1	9.1	38.3	31.2	8.1	17.2	1.3	5.7	20.4	16.6	18.8	20.2
China	13.8	11.6	20.3	26.7	3.7	27.7	1.7	3.1	16.3	14.5	44.2	16.4
India	16.5	11.3	10.5	6.5	0.9	11.0	1.0	1.9	29.4	31.3	41.7	38.0

Pakistan	29.8	8.6	13.3	15.0	1.7	8.3	0.8	6.8	26.2	27.6	28.2	33.7

Source: CEPII-CHELEM data base.

Share of oil in the external trade of selected Asian countries

Importing country	% of total imports	Exporting country	% of total exports
South Korea	11.7	Indonesia	15.5
Singapore	10.0	Malaysia	9.0
Philippines	10.2		
India	15.8		

Source: CEPII-CHELEM data base.

There is a long tradition of trade surpluses of Japan *vis-à-vis* the Asian NICs, and this surplus has increased in recent years. As a whole, in 1994, the surplus of Japan *vis-à-vis* Asia was of \$63 bn while its surplus *vis-à-vis* the US was of \$61 bn [38]. But Japanese investment in ASEAN countries is being caught up by the NICs, which are increasingly investing in the region. In fact, every stage of the balance of payment cycle is represented in Asia. Thus, there are good grounds for further development of capital flows between Asian countries.

The role of Japan as a direct investor in Asia has been widely documented. In 1994, the stock of direct investment of Japan in Asia was \$51 bn, while that of the US amounted only to \$46 bn [39]. However, Japanese direct investments to the NICs have been decreasing since 1989, while those to ASEAN countries have increased steadily since 1986 (see MITI, 1994). NICs have also begun to invest massively in ASEAN countries, and the stock of direct investment amounted to \$88 bn in 1994 (see Footnote 8).

The role of banks located in Japan is shown in Table 3.2. The share of Japan as a creditor is always much larger than that of the United States, except in Thailand. Pakistan is a second exception, with credits coming mainly from Europe. Finally, the yen is already the major currency for long-run debts in the ASEAN countries (Table 3.3).

Table 3.2: International bank liabilities by creditor country, at end-1994 (% of total external bank debt)

	United States	Japan		United States	Japan
South Korea	9.7	30.9	Indonesia	7.2	53.7
Taiwan	12.1	25.7	Malaysia	10.2	43.3
China	2.3	34.5	Philippines	14.7	39.3
India	8.1	28.7	Thailand	61.0	6.2
Pakistan	6.0	7.8			

Source: BIS, *Ventilation par Echéance, Secteur et Nationalité des Prêts Bancaires Internationaux*, juillet 1995.

Table 3.3: Currency composition of the long-term debt in selected Asian countries in 1993

	US dollar	Yen	Multiple currency		US dollar	Yen	Multiple currency
China	54.2	21.0	20.6	Indonesia	13.2	40.7	30.6
India	55.0	12.8	14.6	Malaysia	25.1	37.5	21.8
Pakistan	34.5	14.2	32.4	Philippines	30.2	38.3	25.3
Sri Lanka	36.4	27.4	18.1	Thailand	21.8	52.1	18.6

[38] Source: CEPII-CHELEM data base.

[39] Source: CEPII calculations based on *World Investment Report*, *Survey of Current Business* and MITI data. In fact, Asia is not the main destination of Japanese direct investments (on this point, see De Laubier, 1995).

Source: The World Bank, *World Debt Tables*, 1994-95.

To summarise, three stylised facts emerge from the above analysis of the Asian economies:

- First, there is an intra-regional trade dynamism among Asian countries other than Japan. Asia as a whole has also become a major partner for Japan, also the reverse is not true: the role of Japan as a trade partner has diminished for Asian countries since 1973.

- Secondly, Japan is the main foreign investor in Asia, although Asia is not the main destination for Japanese direct investments. The NICs play an increasing role in financing the ASEAN countries.

- Finally, the yen already plays a major role in the external debt of Asian countries. This feature is likely to be important for the exchange rate policy in countries which have a large debt/GNP ratio, i.e. in Indonesia and Philippines.

Given the increasing weight of the yen-denominated debt, and the development of intra-regional flows of trade and capital, there should be an rising incentive for Asian countries to use the yen instead of the US dollar as a foreign anchor. But the key point is that Japan is not the centre of their trade strategies. Each Asian country faces numerous, small Asian partners, and a single, very large, American partner. Their trade strategy will likely continue to be defined in relation to this large partner, unless some form of monetary coordination emerges in Asia [40]. Section 3.3 provides a simple model in order to infer the optimal foreign anchor for an Asian currency.

3.2.2. Central and Eastern Europe

a. Trade flows

Most of CEECs' exports are directed to Western Europe, as shown in Table 3.4. The share of the US does not exceed 4.1 %, except in Bulgaria (7.5%). It is very low in Baltic countries (less than 2%). The share of intra-CEECs trade is low too, except in

[40] Monetary coordination may be initiated by another country than Japan. In November 1995, for instance, the Governor of the Australian central bank proposed the creation of an institution for regional coordination. However, Japan may recognise the needs for regional coordination. For this purpose, it could use the existing EMEAP (Executive Meeting of East Asia and Pacific Central Banks), which broadly covers non-American members of the APEC and was created by the Bank of Japan in 1991.

Baltic countries where it exceeds 10% [41]. The high figure for the Czech Republic and for Slovakia stems from previous national trade inside Czechoslovakia.

[41] This feature can be explained by the size of Baltic countries.

Table 3.4: The country breakdown of CEECs exports, in 1994

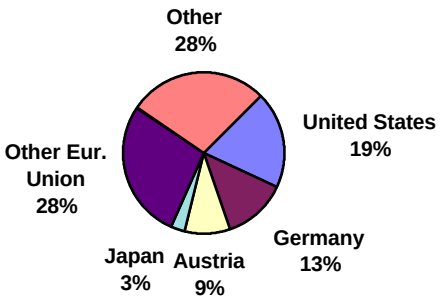
	% of exports		
	West Eur.	CEECs	USA
Bulgaria	61.1	2.3	7.5
Czech Republic	65.7	25.1	2.4
Hungary	82.1	7.4	4.1
Poland	80.3	5.4	3.5
Romania	57.8	6.4	3.2
Slovakia	52.2	43.5	2.6
Slovenia	86.9	3.3	3.7
Estonia	80.4	13.8	1.9
Latvia	84.1	11.0	1.2
Lithuania	77.8	18.4	0.6

Source: European Commission.

b. Capital flows

Foreign direct investment in transition countries is concentrated on a small number of countries: over the 1992-94 period, 34% of total flows were directed to Hungary, 14% to the Czech Republic, 8% to Poland and 16% to Russia. Thus the origin of total foreign investment projects in transition countries (reported on Chart 3.1) should be quite representative of the situation in these four countries. It shows that 59% of the projects come from the European Union, the major investors being Germany and Austria. The origin of direct investments to Baltic countries is quite different. In Estonia, for instance, 53% of direct investment comes from Finland and 11.1% from Sweden. The share of the United States is only 3.8% (see IMF, 1995).

Chart 3.1: Foreign investment projects in countries in transition by origin (1990-93)
Share of total number of announced projects



Source: IMF, *World Economic Outlook*, may 1995.

The role of the European Union is even greater concerning bank loans, as shown in Table 3.5.

Table 3.5: International bank liabilities by creditor country, at end-Dec. 1994 (% of total external bank debt).

	United States	EU *		United States	EU *
Bulgaria	3.4	72.9	Poland	5.2	80.0
Former Czechosl	9.7	69.2	Romania	2.3	88.2
Hungary	3.7	69.2	Former Sov. U	1.8	85.5

* including Austria.
Source: BIS, *Ventilation par Echéance, Secteur et Nationalité des Prêts Bancaires Internationaux,* juillet 1995.

Although the EU is the main supplier of capital, the long-term debt of East-European countries continues to be mainly denominated in dollars in all countries but Hungary (Table 3.6). In all cases but Bulgaria and Poland, debts repayable in multiple currencies, which include ECU-denominated debts, are significant. But ECU debts are not equivalent to forthcoming Euro-debts since the present ECU is a basket that provides a smaller risk for investors than the forthcoming Euro.

Table 3.6: Currency composition of long-term external debt (% at end-December 1993)

	US dollar	DM+FF	Multiple currency		US dollar	DM	Multiple currency
Bulgaria	48.6	30.0	1.7	Slovak Rep.	25.3	20.0	34.4
Czech Rep.	27.8	15.6	27.2	Slovenia	32.8	19.3	12.1
Hungary	12.9	30.3	13.7	Estonia	42.0	3.6	23.1
Poland	36.1	30.4	2.6	Latvia	67.2	3.2	17.6
Romania	27.6	15.1	24.0	Lithuania	40.1	0.2	25.4

Source: The World Bank, *World Debt Tables*, 1994-95.

In brief, the regional integration of Central and Eastern Europe is different from that of the Asian countries in two ways:

- Unlike the Asian countries, there is little trade between these countries, and virtually no capital flows;

- The CEECs are much more dependent on the European Union for both trade and capital flows than are the Asian countries *vis-à-vis* Japan. But except in Poland and in the Slovak republic, the DM only represents a minor share of the external debt, while the yen is the first currency of denomination for the debt of all ASEAN countries.

3.3. Rationale for exchange rate policies in Asia and in the CEECs

In this section, the *de facto* exchange rate policies of the CEECs and of Asian countries evidenced in Section 2 are rationalised in the light of empirical features studied in Section 3.2. It has been argued above that pegging the currency to a foreign anchor in real terms must be related to some external account target, while a nominal peg aims at some inflation target. The choice of a real anchor is first analysed through a simple optimisation model where the public authorities are supposed to target the external account (Section 3.3.1). A real anchor is consistent with a nominal anchor in the long run, but it may be contradictory in the short run when there is a positive inflation differential with the rest of the world. The choice of a nominal anchor is examined in Section 3.3.2.

3.3.1 The choice of a real anchor

A simple optimisation model is proposed here to analyse the choice between various international currencies as real anchors. Targeting the external competitiveness is a non-cooperative policy which can lead to inefficiencies if other countries adopt the same policy. This problem is delt with through studying the choice of a real anchor first in the small country case, and then in the two-country case. Some final remarks are subsequently proposed on the strategic relationships between each small country and its OECD partners.

a. The small country case

Suppose the public authorities of a small country wish to minimise the squared discrepancies between the external account b and an objective $\bar{b}$ (both as percentages of the nominal GDP):

$$Min\ \Omega = \frac{1}{2}(b - \bar{b})^2 \qquad (3.1)$$

For simplicity, we assume that the monetary authorities optimise over a single period. The external account considered here is the sum of the trade balance and of the debt service (interests + principal repayments). Thus, the external account represents the needs for additional foreign financings:

$$b = \eta\delta\ e - \sigma\ f + b_0 \qquad (3.2)$$

e stands for the logarithm of the real, effective exchange rate corresponding to the country distribution of external trade [42]. *f* is the logarithm of the real, effective exchange

[42] The trade balance can be extended so as to include direct investment which responds to exchange rate variations in a similar way to trade flows.

rate corresponding to the currency breakdown of the external debt. η is the export/GDP ratio, δ is the sum of the price elasticities of exports less one ($\delta > 0$ if the Marshall-Lerner condition is satisfied), σ is the debt service/GDP ratio, and b_0 covers omitted variables.

The effective exchange rates can be defined as follows:

$$\begin{cases} e = \varepsilon_{\$} s_{\$} + \varepsilon_k s_k & (3.3) \\ f = \varphi_{\$} s_{\$} + \varphi_k s_k & (3.4) \end{cases}$$

where k stands either for the DM (CEECs) or for the yen (Asian countries), s_i is the bilateral, real exchange rate against currency i (i=$,k), ε_i is the weight of currency i-country as a trade partner and ϕ_i is the weight of currency i in the denomination of the external debt. At this stage, we assume $\varepsilon_{\$} + \varepsilon_k = 1$ and $\varphi_{\$} + \varphi_k = 1$ [43]

With $s_{k\$}$ standing for the real exchange rate of currency k against the dollar, the minimisation of the loss function leads to the optimal reaction to k/USD fluctuations:

$$\frac{\partial s_{\$}}{\partial s_{k\$}} = \frac{\eta\delta\varepsilon_k - \sigma\varphi_k}{\eta\delta - \sigma} \qquad (3.5)$$

- With no external debt (σ=0), the above solution simply becomes $\frac{\partial s_{\$}}{\partial s_{k\$}} = \varepsilon_k$: when currency k appreciates by 1% against the USD, the currency of the small country appreciates by ε_k% against the USD, so that its effective exchange rate *e* stays constant.

- If the currency breakdown of the external debt fits the country distribution of trade ($\varphi_k = \varepsilon_k$), we also have $\frac{\partial s_{\$}}{\partial s_{k\$}} = \varepsilon_k$, because keeping *e* constant leads to a constant *f* too. In the special case where $\varepsilon_k = 1$(100% of trade is done with country k), pegging currency k becomes optimal.

- If $\sigma \approx \eta\delta$, the optimal exchange rate policy is undetermined since an exchange rate variation has no net effect on the external account.

[43] More specifically, all trade with countries outside Western Europe (for CEECs) or outside Japan (for Asian countries) is supposed to be carried out with the US, and the external debt that is not denominated in currency k is assumed denominated in US dollar. These assumptions are relaxed in the two-country framework.

The previous section has shown that in Asia, we have: $\varepsilon_Y < \varphi_Y$, while in CEECs, $\varepsilon_{DM} > \varphi_{DM}$. The following orders of magnitude can be derived:

k=DM, Y	CEECs	ASEAN
Share of k in external trade	$\varepsilon_{DM} = 0.8$	$\varepsilon_Y = 0.2$
Share of k in the external debt	$\varphi_{DM} = 0.2$	$\varphi_Y = 0.4$
Openess ratio	$\eta = 0.25$	$\eta = 0.25$
Debt service ratio	$\sigma = 0.05$	$\sigma = 0.08$

Source: orders of magnitude based on Section 3.2.

Finally, the price elasticities of external trade have been estimated by Mimosa (1996) for the NICs, implying $\delta = 1.4$ [44]. Estimates of the price elasticities are still very uncertain for CEECs. There is no reason why the price elasticities of CEECs should differ from those of ASEAN countries. Therefore, we take $\delta = 1.4$ for all of them.

With this calibration, the optimal exchange rate policies are:

For the CEECs: $\dfrac{\partial s_{\$}}{\partial s_{DM\$}} = 0.9$

For ASEAN countries: $\dfrac{\partial s_{\$}}{\partial s_{Y\$}} = 0.14$

The optimal regime for the CEECs is a almost a peg to the DM. This result comes from the fact that most trade flows are carried out with the European Union. Conversely, when the yen appreciates by 1% against the USD, the currencies of Asian countries should appreciate by 0.14% against the USD in order to keep the external account constant. This small weight attributed to the yen in the optimal basket peg comes from the fact that (i) exchange rate fluctuations have a greater impact on the external account through trade flows than through the valorisation of the external debt service ($\eta\delta > \sigma$); (ii) Japan plays a smaller role as a trade partner than the yen does as a creditor currency ($\varepsilon_Y < \varphi_Y$). This result fits quite well the policies evidenced in Section 2 for Asia, but not for the CEECs. However, the small country framework hides the fact that some trade is carried out with countries other than the US, the E.U. and Japan.

b. The two-country case

Suppose now that there are two, identical countries, called A and B. Both countries have trade relations between each other, and they compete on the same foreign markets (country k and the US). The bilateral trade between both countries represents

[44] The estimates of the price-elasticities are 1.9 for exports and 0.5 for imports. δ is the sum of the elasticities less one. This estimate is applied to ASEAN countries due to the lack of estimates for the latters.

$(1-\varepsilon_{\$}-\varepsilon_k)=(1-\varepsilon)\%$ of the total trade of each country [45]. Neither currency is used for the denomination of the debt of the other country. The effective exchange rates of currency A must be re-defined as:

$$\begin{cases} e^A=\varepsilon_{\$}s_{\$}^A+\varepsilon_k s_k^A+(1-\varepsilon)s_B^A & (3.6) \\ f^A=\varphi_{\$}s_{\$}^A+\varphi_k s_k^A & (3.7) \end{cases}$$

where s_{Aj} stands for the exchange rate of currency A against currency j (j=$,k,B). Similar relations prevail for currency B. Like in the small country case, each country minimises the squared discrepancies of its external account from a target. If country A takes for given the exchange rate of its partner against the USD, its optimal exchange rate policy does not change compared to the small country case (equation 3.5). But if it knows that country B will follow the same exchange rate policy, then its reactions to k/$ fluctuations are modified:

$$\frac{\partial s_{\$}^A}{\partial s_{k\$}}=\frac{\eta\delta\varepsilon_k-\sigma\varphi_k}{\eta\delta\varepsilon-\sigma} \qquad (3.8)$$

Now, when currency A depreciates against the USD, the effect on the trade account is reduced because currency B also depreciates. Thus, the optimal policy is rebalanced in favour of currency k. With ε€= 0.85 in the CEECs and 0.5 in ASEAN countries [46], the optimal exchange rate policies become:

For the CEECs: $\dfrac{\partial s_{\$}}{\partial s_{Y\$}}=1.09$

For ASEAN countries: $\dfrac{\partial s_{\$}}{\partial s_{Y\$}}=0.4$

Now, CEECs currencies overshoot DM/USD fluctuations. When the yen appreciates by 1% against the dollar, the optimal policy for ASEAN countries now is to appreciate the currency against the dollar by 0.4%. But the solution of the optimisation problem becomes unstable for small values of ε. With ε€= 0.2, we have $\eta\delta\varepsilon-\sigma\approx 0$: the variations in the exchange rate have little impact on the external account since the valuation effects make for the competitiveness effects. In this case, there may be no optimal basket peg, i.e. the floating regime may be optimal [47].

In brief, the development of trade between Asian countries other than Japan may rebalance the exchange rate strategies in favour of more stability against the yen, or push

[45] Hence, all trade of country A (resp. B) is assumed to be carried out with the US and with countries k and B (resp. A).

[46] This figures correspond to the share of exports that are directed to the US or Western Europe (for the CEECs) or Japan (for the ASEAN countries).

[47] The share of bilateral trade between A and B under-estimates the extent of the competition between both countries, because it does not consider competition on third markets. Considering the whole competition between both countries would lower ε.

Asian countries towards more flexible regimes. Conversely, the optimal policy for the CEECs will be a peg to the DM, provided (i) the EU stays the main partner in the region, and (ii) the debt-service does not increase, or if it does, it is mostly denominated in European currencies.

Of course, this very simple model does not cover the whole rationale for the exchange rate policies. More specifically, this model does not describe trade-off made by the monetary authorities between various objectives. Here, pegging the currency to the optimal basket allows to reach the single objective. An interesting extension would be to introduce a second objective in the model. For instance, the monetary authorities may wish a real appreciation in order to reduce the inflation rate. Then, targeting the external account would have a cost in terms of the second objective. Such an enriched model would probably show that Asian countries may be better off in coordinating their exchange rate policies, because such a coordination would eliminate ineffective exchange rate fluctuations. Conversely, there is little to expect from coordination among the CEECs, because the trade between CEECs is small compared to trade flows with the EU. But because most of their external trade is done with the EU, the CEECs more than the ASEAN countries may not choose their real exchange rate policy without taking the reaction of their main partner into account.

c. Strategic interactions with the US, Japan or the EU

Strategic interactions emerge because the country whose currency is depreciating in real terms faces threats of increasing trade barriers from importing countries. This argument applied in the past to trade relations between the Asian NICs and the United States (see Kwan, 1994). The yen appreciation against the US dollar in 1985-86 was not followed by the Asian NICs whose export competitiveness improved sharply. By 1987, their trade account surplus reached $30.6 billion (10.2% of GDP). As a result, trade frictions arose, and the United States announced that by January 1989 the four countries would be deprived of their special tariff treatment under the General System of Preferences. Simultaneously the US put pressure on them to revalue their currencies and open their markets to US goods and services. As a response, Taïwan and Korea revalued their currencies by 54% and (respectively), between mid-1986 and mid-1989. Hong Kong and Singapore, which had few restrictions on imports, were submitted to less pressure and their currencies remained stable (Hong Kong) or appreciated at a slower pace (Singapore).

This sort of strategic interactions will likely be even more relevant for the CEECs for which 80% of the external trade is done with the EU [48]. This means that the real exchange rate policy of a country is constrained by possible retaliations that prevent the country from adopting any mercantilist behaviour. The importing country can put upward pressure on the real exchange rate directly (through tariffs) or indirectly (through threats).

[48] Although in 1994, the EU trade account was in surplus with CEECs while the US trade account was in deficit with Asian countries.

3.3.2 The choice of a nominal anchor

Section 3.1 showed that a nominal anchor is consistent with a real anchor in a country with a large traded goods sector (provided this sector be price-taker). This will likely be the case for small countries like Baltic countries, Slovania, Slovakia in Europe, or Singapore, Malaysia in Asia. Other countries need to make a trade-off in the short run between their nominal target and their real target.

The choice of an international nominal anchor is influenced by the country breakdown of imports, like for the real anchor. But several other criteria may interfere. First, pegging a single currency is more credible than pegging a basket of currencies since it is more visible and it cannot be manipulated by public authorities who might rearrange the weights inside the basket. Second, the nominal anchor should be a currency with a solid reputation, i.e. with a low inflation record. Lastly, the domestic currency should be pegged to that of a main exporting partner, in order to take advantage of the stability of import prices, and to avoid distortions in the terms of trade.

Following this framework, the Asian countries should be indifferent in the choice of a dollar peg or a yen peg. Thus, they will not question the historical policy which is to peg the dollar.

Conversely, transition countries should prefer the Deutschemark to the dollar as a nominal peg. But the ERM crises disqualified the ECU as a stable nominal anchor, and several countries increased the dollar weight in their basket peg. The European Monetary Unification may encourage the use of the Euro as a nominal anchor in central and eastern Europe, since the European System of Central Banks will guarantee its stability. Alternatively, the monetary policy of the Union may prevent central and eastern European countries from pegging the Ecu in case there is a bias towards an appreciation of the European currency.

3.4. Conclusion

The above analysis suggests that the emergence of the Euro and of the yen as international anchors will rely on four key variables: (i) the orientation of third countries external trade, (ii) the size and currency-denomination of their external debts, (iii) monetary coordination and (iv) size effects. On these grounds, we can list the conditions for a simultaneous emergence of the Euro and the yen as international anchors (scenario I).

Scenario I: the Euro and the yen emerge as international currencies.

(i) The EU stays the main partner of CEECs for trade and direct investment, while intra-Asian trade (including trade with Japan) further develops.

(ii) The external debt service does not increase in the CEECs. If it does, most of the debt should be denominated in European currencies. In Asia, on the contrary, the share of the yen should be reduced in order to match that of Japan in external trade.

(iii) A coordination emerges among Asian countries, which enables them to choose a cooperative exchange rate policy [49]. Such a coordination is not necessary in the CEECs given their small share of intra-CEECs trade, and given their common will to join the EU in some future.

(iv) Relative transaction and information costs for Euro and yen transactions are reduced because of the enlargening of both markets and because exchange rates against both currencies are more stable. Thus, private agents start using the Euro and the yen as units of account and as means of payment.

The four conditions are dependent one from another. For instance, if the perspective of an integration into the EU vanishes for several CEECs, then the EU may see its role reduced in those countries. The transactions with the Euro would be reduced, which would prevent the Euro transaction costs from declining.

Scenario II: only the Euro emerges.

One problem with the scenario I is that the development of intra-Asian trade actually may lead to more flexible exchange rate regimes in Asia, as shown in Section 3.3.1. Furthermore, the simultaneous rise in the share of Japan as a trade partner, and decline in the yen as a debt-denomination currency, is quite unlikely, given the stylised facts presented in Section 3.2.1. Conversely, the DM is already the optimal peg for the CEECs, according to our theoritical framework. Some additional arguments suggest that a scenario where only the European currency becomes an international anchor is more likely than the scenario I:

(i) The unification of European capital markets should increase the role of the Euro as a currency of denomination for foreign financing.

(ii) The CEECs still need a solid nominal anchor, which may be provided by the forthcoming Euro since the European Central Bank will guarantee a low inflation record. Conversely, the Japanese central bank is not independent from the government, which will not guarantee a low inflation anchor (no more than presently the Federal Reserve).

[49] Such an eventuality was raised after the Mexican peso crisis of December 1994, when the crisis was passed on Asian financial markets, and when, consequently, Asian central banks met in HongKong in January as a first attempt of informal cooperation. The first agreement for monetary cooperation emerged in November 1995, when five governors of central banks agreed to give participants access to immediate cash (against securities of US Treasury bonds) to help them defend their currencies in times of market stress. Yet, this first agreement concerned small amounts (each central bank can mobilise between US$500m and US$1bn, which is small compared to the total reserves of the participants (US$403bn), see *Financial Times*, 11/21/1995). See also footnote 9.

(iii) The CEECs are willing to take part in the European Union. Thus, they will endorse the European preference for low intra-European exchange rate volatility. This is not the case in Asia where the economic integration will not resemble that of the E.U.

(iv) West-European countries will not accept competitive devaluations from CEECs. The threat of EU retaliation may encourage them to keep a stable, real exchange rate against the Euro. This argument is in favor of pegging the USD in Asia.

(v) Exchange rate policies are relatively new in Eastern Europe, while there is a long tradition of pegging currencies to the USD in Asia.

In case the yen does not emerge as an international currency, the dollar would keep an advantage in terms of transaction costs. Nevertheless, the merging of European capital markets will reduce transaction an information costs on the European currency. The ESCB and the European Commission may also have a role in encouraging trade and capital flows denominated in European currencies. The Euro may still emerge as an international anchor.

Scenario III: the Euro and the yen do not emerge as international currencies.

According to our analysis, the emergence of the Euro as an international anchor for the CEECs will be dependent on the whether the EU will maitain its position in the region, on the development of financings in DM, and later in Euro, and on the merge of European capital markets. In case the EMU is delayed, then the Euro may never emerge because the CEECs will have accumulated a large debt in USD. In addition, the European trade-off between deepening and enlargening will be crucial: if the CEECs do not consider they will not be accepted in the EU (and later on, in the EMU), if they do not receive financial support from the EU, or if they suffer from tariffs in the EU, then they may have an incentive for another exchange rate policy.

To sum up, the scenario II, which entails a regional emergence of the Euro as an international anchor, seems the most likely. But it will be dependent on the completion of the EMU agenda and on the will of the EU to enlarge the union in a near future. Conversely, the emergence of the yen as an international anchor in Asia seems quite unlikely, unless some monetary coordination emerges on a regional basis.

4. COSTS AND BENEFITS OF THE EURO AS AN INTERNATIONAL CURRENCY

Since de Gaulle's denunciation of the « huge privilege » of the US dollar, it has become common wisdom to say that the US has taken advantage of the international status of its currency. Could an internationalised Euro transfer this advantage, at least partially, to the European Union? What would be the consequences for the international monetary system? This last section deals with both questions.

4.1. Costs and benefits for the European Union

Like for the EMU, the debate on the costs and benefits from having an international currency becomes more clear-cut if microeconomic and macroeconomic arguments are disentangled. When speaking of a « huge privilege » of having an international currency, De Gaulle referred to macroeconomic arguments. Conversely, the advocates of the EMU have stressed the microeconomic benefits from making the forthcoming Euro an international currency.

4.1.1. Microeconomic benefits

The most straightforward benefit from having an international currency is the microeconomic benefit due to the suppression of foreign exchange transaction costs and hedging costs for European importers and exporters. In fact, it is necessary to disentangle the benefits for intra-EU transactions from the benefits for EU relationships with the rest of the world.

- Intra-EU transactions will benefit mainly from the EMU which will make unnecessary foreign exchange transactions between EU members. The emergence of the Euro as an international currency would provide some additional benefits in terms of transaction costs and hedging costs, because the market for the European currency will be larger and deeper. But this benefit will be of second order compared to the EMU effect.

- In the same way, transaction costs and hedging costs will be reduced for transactions with the rest of the world, since the Euro will be exchanged for the USD or for other currencies on a larger and deeper market. It has been further argued that with an international Euro, EU traders will more easily pass the exchange risk to foreign traders. In fact, this argument does not apply if EU traders are price-makers, because they already pass their hedging costs on export prices. It does not apply to price-takers either, because price-takers must reduce their export prices when importers have to pay for hedging [50] (see Box 4.1).

Another microeconomic benefit from an international Euro would be the development of EU banking activities and financial cities, although it is not clear whether

[50] However, the price-taking situation is rather theoretical since price-takers will unlikely invoice their exports in their own currency.

the development of banking activities should be a cause or a consequence of the emergence of the Euro.

Box 4.1: who pays for hedging ?

Consider the case of an exporter in the European Union. Its export price can be written in the domestic currency as:

$$P_X = \left(\frac{SP^*}{(1+t^*)} \right)^n \left(P(1+t) \right)^{1-n}, \qquad \text{with } 0 \le n \le 1$$

S: nominal exchange rate; P: domestic price; t: hedging cost supported by the exporter (t=0 if the exports are Euro-denominated); t*: hedging cost supported by the importer (t*=0 if the exports are USD-denominated). Suppose the exporter does not make any profit on the domestic market (this assumption is equivalent to a constant mark-up). The cost per exported unit is:

$$C_X = P(1+t)$$

First case: the exporter is price-maker (n = 0). The profit rate is:

$$\frac{P_X}{C_X} = 1$$

It does not depend on hedging costs because the exporter has the opportunity to pass the hedging cost on its export price paid by the importer.

Second case: the exporter is price-taker (n = 1). The profit rate is:

$$\frac{P_X}{C_X} = \frac{SP^*}{P(1+t)(1+t^*)}$$

It does not depend on who pays for hedging: if the importer pays for hedging, then the exporter must reduce its export price in order to meet the foreign price SP*.

4.1.2. Macroeconomic benefits and costs

The most popular macroeconomic benefit from having an international currency is seignioriage. Seignoriage comes from the fact that foreigners are willing to hold the international currency without any interest (transaction balances), or with an interest that includes a negative premium due to the international status of the currency (liquidity premium). According to Frankel (1995), approximately 60% of total dollar currency in circulation is held by foreigners. But the seignoriage revenue is low: around 0.1% of the US' GDP according to Emerson *et alii* (1990) and Frankel (1995). Given that the dollar will likely remain the international currency at least for the Latin American countries, the seignoriage revenue would not exceed 0.05% of the European Union's GDP.

Conversely, the fact that a large part of money will be held by non EU countries will make it more difficult to control of the money supply. The United States encountered this problem with the development of Euro-markets in the 1960s and 1970s, but the monetary growth was largely accepted because the US had no exchange rate policy, and because this monetary growth met the dollar preference of OPEC countries. The European

central bank may have a different view due to its inflation target. It may weigh the loss of control on the money supply negatively in its implicit loss function.

The implications of an international Euro for the current account and for the Euro/USD exchange rate are unclear. It has been argued that, in order to provide enough liquidity for the international monetary system, the EU current account would have to move from surplus to deficit, unless the EU members accept an appreciation of the Euro (see Ranki, 1995). In fact, Section 3 showed that the emergence of the Euro as an international currency will be dependent on the use of the European currency for denominating the debt of third currencies. These financings will increase the liquidity of the Euro market, and the EU current account could stay in surplus [51]. But this liquidity should not be sterilised by the ESCB. A conflict may emerge between the ESCB (in charge of maintaining a low inflation record) and the ministers of finance who will be aware of the Euro/USD exchange rate [52].

Finally, the impact of the international status of the Euro on its volatility is unclear. On the one hand, a deeper Euro market should entail less volatility in the exchange rate because a given capital flow will have less effect on the stocks. However this argument is controversial since it does not take into account the fact that portfolio movements are highly dependent one from another, which may give rise to surges into, or out of the European currency. These surges may be very costly for the European central bank if it tries to keep the Euro under control. The volatility of the Euro/USD is further examined in the next section.

4.2. Benefits and costs for the International Monetary System

The great volatility and apparent misalignments of exchange rates since the breakdown of the Bretton Woods system has recently raised the question of reforming the International Monetary System. Nevertheless, the emergence of the Euro as an international currency would enforce a deep transformation in the functioning of the IMS. This section studies whether a bipolar monetary system would improve the functioning of exchange rate flexibility and make the exchange rates more stable. The first to sections deal with mechanical implications of a multipolar IMS, while the last section raises the question of the G7 coordination.

4.2.1 The current account argument

The present instability of the IMS may be related to the fact that flexible exchange rates do not play their role in adjusting current accounts. Specifically, about 48% of US trade is carried out with countries that *de facto* do not have a flexible exchange rate with the US dollar (see Section 2). Thus, a 19% depreciation of the dollar against the DM and the yen is needed to induce a 10% depreciation of the dollar's effective exchange rate

[51] Ranki (1995) agrees on this point: « Given the functionning of the modern and integrated international capital markets, the need for the issuer country of an international currency to provide liquidity is not as pronounced as in the past » (p. 28).
[52] See Bénassy, Italianer and Pisani-Ferry (1994).

(Aglietta *et alii*, 1994). This inefficiency of the international monetary system would disappear if the Asian countries switched to a yen peg (Collignon, 1995). However, the internationalisation of the Euro would not have the same impact since it would first concern the CEECs who are minor partners for the US (see Table 4.1).

Table 4.1: Country breakdown of US external trade in 1994

in %	Exports	Imports
Western Europe	25	20
Canada	20	20
Japan	11	19
Latin America	17	13
Asian NICs	10	10
Other Asia	8	11
OPEC	5	6
Australia	2	1
Eastern Europe *	1	0
Other	1	0
Total	100	100

* ex-USSR, Belarus, Ukraine, Albania, Bulgaria, Czech Rep., Slovak Rep., East Germany, Hungary, Poland, Romania.
Source: CEPII-CHELEM data base.

4.2.2 The capital account argument

It has been argued above that a deeper market for the Euro would not necessary induce more stability in the Euro exchange rates since (i) the decision of asset holders are highly correlated, and (ii) in a world of perfect capital mobility, official interventions have little impact on the exchange rate. However, a given current account imbalance should have a different impact on exchange rates according to currency breakdown of the financings. This argument is analysed here with the help of a simple portfolio choice model derived from Branson and Henderson (1985). This model describes the determination of exchange rates in a world with one or two international currencies, but it does not describe the transition between the two situations (see Annex 8). The model assumes a world composed of two countries called A and B (for the US and the EU). Both countries have the same size. In a first step, there is only one international currency (the USD). The United-States is running a current account deficit. Subsequently, the USD depreciates. In order to meet their fixed, optimal portfolio allocation, EU agents increase their holdings in USD, which stabilises the balance of payments. The magnitude of the currency depreciation depends on the initial net external positions. Whether exchange rate volatility is greater with one or two international currencies thus depends on the initial net external position of the two countries: the least volatility is obtained with two currencies if the initial situation is close to balance, but with only one currency if there is an initial imbalance. Given that the initial external position of the US is strongly negative, it can be concluded that dollar fluctuations would be even greater if the international status was

shared with another currency. Issuing US bonds denominated in Euro would have a stabilising effect on the dollar during the transition towards the multi-polar system. But once optimal portfolio allocations have been reached, this stock of bonds would have a destabilising effect, since it would be revalued should the dollar depreciate.

However, the model does not take portfolio reallocations into account (k_a and k_b are constant in the model). Whatever the level of net external positions, the coexistence of several international currencies as reserve currencies is likely to induce large swings in portfolio choices, when expected yield differentials or expected risks are moving (Bourguinat, 1992). This is because asset holders have a preferred habitat for (i) their domestic currency and (ii) the international currency. In case there are several international currencies, the arbitrage between the international currencies is consistent with keeping a large share of their holdings in their preferred habitats.

In brief, the capital account argument says that sharing the international currency status may actually magnify the instability of exchange rates. However, this is a mechanical effect with exogenous expected returns. The monetary authorities of both the US and the EU will likely react in the fluctuations of their exchange rates.

4.2.3. G7 coordination

Would G7 coordination be easier in a multi-polar monetary system? The first argument is that the United States would be obliged to take the dollar fluctuations more seriously, since a part of its foreign trade and capital net earnings would be denominated in Euro or in yen. But the monetary union (which is a necessary condition for the emergence of the European currency as an international currency) may reduce the motivation of EU countries to participate in G-7 coordination, as shown by Bénassy, Italianer and Pisani-Ferry (1994).

This study has shown that whether the Euro (and the yen) will become an international currency will depend on the behaviour of third currencies. Specifically, the emergence of the Euro and maybe, of the yen, as international anchors will be consistent with increasing official reserves held by third countries in both currencies. Hence, the G7 will no longer be the correct framework to coordinate interventions.

One might think of an extreme scenario of complete regionalism, with three blocs with regional trade flows, regional capital flows, and regional anchors. In this case, a small share of world transactions would be carried out between the three regions, and exchange rate fluctuations between the Euro, the yen and the USD would be unimportant. But such a scenario is rather unlikely: in 1994, trade flows between the three blocs amounted to 23% of world exports, while the share of intra-regional trade was 32% [53]. Hence, a reform of the IMS will likely become even more important than it is today.

[53] Source: CEPII. Intra-regional trade includes intra-EU trade and transactions between Asian countries including Japan.

4.2. Conclusion

The possible emergence of the Euro as an international currency has often been underlined as an advantage of the European Monetary Unification. It is shown here that the benefits for the EU may not be as large as they are for the US with the dollar, because the dollar will likely remain an international currency too, because European exporting firms will not take advantage from reduced hedging costs, and because European monetary authorities will likely have different preferences from the Federal Reserve. Whether the international monetary system will beneficiate from the emergence of the Euro is unclear too. The volatility of exchange rates may be larger in a multipolar system than in the present, hegemonic system, given the large initial imbalances. But the volatility of exchange rates will greatly depend on the evolution of G7 cooperation, and on the way third countries are associated to international cooperation.

ANNEXES

Annex 1: Nominal monetary zones

US dollar zone

	1974-78	1979-83	1984-88	1989-93
OECD	United-States Canada Greece Yugoslavia	United-States Canada New-Zealand	United-States Canada	United-States Canada Australia
LATIN AMERICA	Colombia Bolivia Paraguay Venezuela Brazil Ecuador Guyana Panama Haïti Honduras Guatemala El Salvador Dominican Rep	Colombia Paraguay Venezuela Peru Panama Haïti Honduras Guatemala El Salvador Dominican Rep Dominica	Colombia Uruguay Panama Haïti Honduras Dominica Costa-Rica	Colombia Bolivia Uruguay Chile Panama Dominica Costa-Rica Mexico
ASIA	Korea Philippines Thaïland Pakistan Afghanistan Nepal	Korea Philippines Thaïland Pakistan Afghanistan Nepal Singapore Malaysia Sri-Lanka Bhutan India Myanmar	Korea Philippines Thaïland Pakistan Afghanistan Nepal Singapore Malaysia Sri-Lanka Bhutan India Bangladesh China	Korea Philippines Thaïland Pakistan Afghanistan Nepal Singapore Malaysia Sri-Lanka Bangladesh China Indonesia

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AFRICA	Djibouti Ethiopia Mauritania Kenya Burundi Malawi Nigeria Sudan	Djibouti Ethiopia Mauritania Mozambique	Djibouti Ethiopia Kenya	Djibouti Ghana
MIDDLE EAST	Saudi Arabia Bahrain United Arab Emir. Kuwait Oman Qatar Jordan Syria Iran Libya	Saudi Arabia Bahrain United Arab Emir. Kuwait Oman Qatar Jordan Syria Iran Libya Egypt	Saudi Arabia Bahrain United Arab Emir. Kuwait Oman Qatar Egypt	Saudi Arabia Bahrain United Arab Emir. Kuwait Oman Qatar Jordan Syria

DM zone

	1975-78	1979-83	1984-88	1989-93
E.C.	Germany Belgium Denmark Netherlands	Germany Belgium Denmark Netherlands France Italy Ireland	Germany Belgium Denmark Netherlands France Italy Ireland Portugal Spain	Germany Belgium Denmark Netherlands France Italy Ireland Portugal Spain United-Kingdom Greece
OTHER EUR.	Austria Norway Switzerland Sweden	Austria Norway Switzerland Finland	Austria Norway Switzerland Sweden Finland	Austria Norway Switzerland Sweden Finland Iceland
AFRICA	Cape Verde Tunisia	FF zone Cape Verde Tunisia Morocco	FF zone Cape Verde Mauritius	FF zone Cape Verde Tunisia Morocco Mauritius

				Madagascar

Yen zone

	1975-78	1979-83	1984-88	1989-93
	Japan	Japan	Japan	Japan

Zone without a single anchor

	1975-78	1979-83	1984-88	1989-93
E.C.	United-Kingdom Spain Portugal France Italy Ireland	United-Kingdom Spain Portugal Greece	United-Kingdom Greece	
OTHER OECD	Turkey Australia New-Zealand Iceland Finland	Turkey Australia Iceland Yugoslavia Sweden	Turkey Australia New-Zealand Iceland Yugoslavia	Turkey New-Zealand Yugoslavia
LATIN AMERICA	Argentina Chile Uruguay Peru Jamaïca Mexico Costa-Rica Dominica	Argentina Chile Uruguay Brazil Ecuador Guyana Bolivia Jamaïca Mexico Costa-Rica	Argentina Chile Brazil Ecuador Guyana Bolivia Paraguay Peru Venezuela Jamaïca Mexico Guatemala Dominican Rep. El Salvador	Argentina Brazil Ecuador Guyana Paraguay Peru Venezuela Jamaïca Guatemala Dominican Rep. El Salvador Haïti Honduras
ASIA	Indonesia China Bangladesh India Malaysia	Indonesia China Bangladesh	Indonesia	India

	Myanmar Sri Lanka Bhutan		Myanmar	Myanmar Bhutan

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AFRICA	South Africa Algeria Botswana Gambia Lesotho Liberia Tanzania Zaïre Madagascar Mauritius Morocco FF zone Mozambique Zimbabwe Ghana	South Africa Algeria Botswana Gambia Lesotho Liberia Tanzania Zaïre Madagascar Mauritius Ghana Burundi Malawi Nigeria Sudan Kenya	South Africa Algeria Botswana Gambia Lesotho Liberia Tanzania Zaïre Madagascar Morocco Mozambique Zimbabwe Ghana Burundi Malawi Nigeria Sudan Mauritania Tunisia	South Africa Algeria Botswana Gambia Lesotho Liberia Tanzania Zaïre Mozambique Zimbabwe Burundi Malawi Nigeria Sudan Kenya Mauritania Ethiopia
MIDDLE-EAST	Israël Lebanon Egypt	Israël Lebanon	Israël Lebanon Iran Libya Syria	Israël Lebanon Egypt Iran Libya
Cent. & East EUR				Hungary Poland Romania

Annex 2: computing long-run estimates

The long-run estimates are computed using the Wold lag formula, which makes it possible to test with a Student t for the significance of the sum of the coefficients estimated for the lags of each explanatory variable. Consider equation 2.2:

$$\Delta S_{k,\$} = D + A(L)\Delta S_{k,\$} + B(L)\Delta S_{DM,\$} + C(L)\Delta S_{Y,\$} + \varepsilon \qquad (2.2)$$

This relation can be re-written as:

$$\Delta S_{k,\$}(t) = D + A(1)\Delta S_{k,\$}(t-1) + \sum_{i=1}^{11} A_i^* \Delta^2 S_{k,\$}(t-i) + B(1)\Delta S_{DM,\$}(t) + \sum_{i=0}^{11} B_i^* \Delta^2 S_{DM,\$}(t-i)$$
$$+ C(1)\Delta S_{Y,\$}(t) + \sum_{i=0}^{11} C_i^* \Delta^2 S_{Y,\$}(t-i) + \varepsilon$$

with $A_i^* = -\sum_{l=i+1}^{12} a_l$, $B_i^* = -\sum_{l=i+1}^{12} b_l$, $C_i^* = -\sum_{l=k+1}^{12} c_l$.

The same methodology is applied to the estimation of the implicit real basket pegs.

Annex 3: Estimates of the implicit, nominal basket pegs

WESTERN EUROPE

Equation 2.2

1974:05-1980:01						
Country	B(0)	$\widetilde{B}(1)$	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	$k^{(1)}$
Austria	0.962**	1.082**	-0.012	-0.053	0.962	0
Belgium	0.918**	1.227**	-0.015	-0.003	0.937	0
Denmark	0.900**	1.093**	-0.108	0.104	0.794	0
Finland	0.527**	0.703**	-0.001	-0.147	0.455	0
France	0.599**	0.925**	0.116	-0.049	0.480	0
Greece	0.405**	0.487**	-0.049	0.024	0.430	4
Italy	0.434**	0.541**	-0.013	-0.022	0.431	0
Ireland	0.423**	0.555**	0.074	-0.021	0.367	0
Netherl.	0.925**	0.930**	0.004	-0.020	0.918	6
Portugal	0.686**	0.722**	-0.017	-0.271	0.212	0
Spain	0.096	0.230	0.085	0.063	0.070	0
Sweden	0.788**	1.110**	-0.045	-0.214	0.583	0
UK	0.436**	0.567**	0.105	-0.112	0.363	0
Iceland	0.355	0.072	-0.052	-0.194	-0.054	7
Norway	0.822**	0.852**	-0.054	-0.084	0.744	0
Switzerland	0.806**	0.533	0.167*	0.321	0.700	0
1980:02-1985:02						
Country	B(0)	$\widetilde{B}(1)$	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	$k^{(1)}$
Austria	1.000**	0.662**	-0.013	0.002	0.997	0
Belgium	0.851**	0.850**	0.091	0.129	0.873	0
Denmark	0.878**	0.841**	0.072*	0.042	0.950	0
Finland	0.500**	0.335*	0.231**	0.306*	0.629	0
France	0.879**	0.616**	0.118*	0.204*	0.883	0
Greece	0.838**	0.780**	-0.237	-0.178	0.388	0
Italy	0.732**	0.735**	0.172**	0.139*	0.911	10
Ireland	0.883**	0.566**	0.019	0.020	0.933	0
Netherl.	0.964**	1.064**	-0.000	-0.082	0.984	0
Portugal	0.641**	0.676	0.145	0.191	0.589	0
Spain	0.647**	0.574	-0.106	0.008	0.508	0
Sweden	0.240*	0.187	0.426**	0.782**	0.429	0
UK	0.533**	1.375**	0.072	-0.019	0.472	9
Iceland	0.231	-0.521	0.035	0.317	0.095	0
Norway	0.535**	0.454**	0.156**	0.413**	0.785	12
Switzerland	0.904**	0.998**	0.146*	0.040	0.842	0

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1985:03-1992:08						
Country	B(0)	$\widetilde{B}(1)$	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	$k^{(1)}$
Austria	0.999**	1.005**	-0.002	-0.003	0.999	12
Belgium	0.968**	1.106**	-0.001	-.088**	0.994	0
Denmark	0.970**	0.974**	-0.013	-.087**	0.988	0
Finland	0.683**	0.823**	0.112**	-0.142	0.878	0
France	0.929**	0.827**	-0.001	-0.079*	0.973	0
Greece	0.827**	0.578**	-0.096	0.028	0.762	0
Italy	0.849**	0.709**	0.016	-0.019	0.960	0
Ireland	0.866**	1.099**	0.044	-0.124	0.812	0
Netherl.	0.997**	1.128**	-0.003	-0.005	0.998	0
Portugal	0.752**	0.746**	0.070*	-0.040	0.912	0
Spain	0.809**	0.860**	0.049	-0.065	0.863	0
Sweden	0.689**	0.777**	0.044	0.109*	0.940	0
UK	0.694**	0.783**	0.184*	-0.123	0.663	0
Iceland	0.569**	0.879**	0.025	-0.266	0.660	0
Norway	0.760**	0.944**	0.014	-0.198	0.862	0
Switzerland	0.925**	0.804**	0.126**	-0.052	0.909	12
1992:09-1995:05						
Country	B(0)	$\widetilde{B}(1)$	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	$k^{(1)}$
Austria	1.007**	1.628**	-0.004	-0.008	0.999	0
Belgium	0.975**	1.065**	-0.058	-0.323*	0.854	0
Denmark	0.861**	1.161**	-0.040	-0.285	0.747	0
Finland	0.821**	1.096**	0.136	0.047	0.642	8
France	0.903**	0.972**	-0.018	-0.175	0.861	0
Greece	0.770**	0.898**	0.006	-0.009	0.867	0
Italy	0.266	0.190	0.026	0.436	0.164	0
Ireland	0.759**	1.432**	-0.107	-0.127	0.602	0
Netherl.	0.980**	0.997**	0.009	0.000	0.997	0
Portugal	0.949**	1.070**	-0.087	-0.424	0.667	0
Spain	0.853**	1.237*	-0.113	-0.201	0.453	0
Sweden	0.576**	0.964	-0.138	-0.177	0.344	4
UK	0.665**	0.065	-0.128	0.548	0.530	7
Iceland	0.800**	1.213**	-0.062	0.330	0.640	7
Norway	0.897**	1.258**	-0.127	-0.235	0.712	0
Switzerland	1.123**	1.012**	0.051	0.036	0.881	6

* Significantly ≠ 0 at 10%.
** Significantly ≠ 0 at 5%.
Underlined: not significantly ≠ 1 at 5% (for B(0) only).
(1) highest order of autocorrelation of residuals (k = 0 to 12) at 5% (Breusch-Godfrey test).
Source: author's calculations based on IFS data

Equation 2.3a

1974:05-1980:01					1980:02-1985:02				
Country	B(0)	$\widetilde{B}(1)$	$\overline{R}^2$	$k^{(1)}$	Country	B(0)	$\widetilde{B}(1)$	$\overline{R}^2$	$k^{(1)}$
Austria	0.947**	0.963**	0.976	0	Austria	0.991**	0.733**	0.997	0
Belgium	0.928**	1.242**	0.947	0	Belgium	0.913**	0.949**	0.873	0
Denmark	0.842**	0.733**	0.774	0	Denmark	0.926**	0.881**	0.947	0
Finland	0.547**	0.552**	0.481	0	Finland	0.645**	0.568**	0.606	0
France	0.685**	0.932**	0.528	0	France	0.952**	0.621**	0.873	0
Greece	0.401**	0.471**	0.466	0	Greece	0.666**	0.692**	0.325	0
Italy	0.429**	0.565**	0.461	0	Italy	0.842**	0.856**	0.895	0
Ireland	0.470**	0.536**	0.393	0	Ireland	0.895**	0.588**	0.937	0
Netherl.	0.930**	0.907**	0.926	0	Netherl.	0.966**	1.014**	0.984	7
Portugal	0.689**	0.515*	0.224	0	Portugal	0.748**	0.725**	0.644	0
Spain	0.194	0.234	0.048	0	Spain	0.572**	0.362**	0.533	0
Sweden	0.725**	0.494**	0.571	0	Sweden	0.520**	0.449**	0.329	0
UK	0.477**	0.473**	0.375	0	UK	0.584**	1.331**	0.493	9
Iceland	0.322	-0.150	-0.018	10	Iceland	0.252	-0.317	0.039	0
Norway	0.782**	0.784**	0.743	0	Norway	0.645**	0.869**	0.767	0
Switzerland	0.856**	0.412	0.691	0	Switzerland	1.015**	0.727**	0.842	0

Equation 2.3a (continued)

1985:03-1992:08					1992:09-1995:05				
Country	B(0)	$\widetilde{B}(1)$	$\overline{R}^2$	$k^{(1)}$	Country	B(0)	$\widetilde{B}(1)$	$\overline{R}^2$	$k^{(1)}$
Austria	0.997**	1.004**	0.999	12	Austria	1.002**	1.002**	0.999	0
Belgium	0.970**	0.784**	0.992	0	Belgium	0.994**	0.954**	0.836	10
Denmark	0.966**	0.812**	0.985	1	Denmark	0.899**	1.021**	0.762	0
Finland	0.763**	0.724**	0.868	0	Finland	0.889**	1.041**	0.631	10
France	0.933**	0.683**	0.971	0	France	0.924**	0.907**	0.874	0
Greece	0.757**	0.596**	0.766	6	Greece	0.779**	0.916**	0.883	0
Italy	0.867**	0.717**	0.960	0	Italy	0.230	0.321	0.238	10
Ireland	0.890**	0.991**	0.810	8	Ireland	0.691**	1.248**	0.634	0
Netherl.	0.996**	1.119**	0.998	0	Netherl.	0.988**	0.997**	0.997	10
Portugal	0.808**	0.718**	0.900	0	Portugal	0.914**	0.912**	0.623	0
Spain	0.847**	0.815**	0.866	0	Spain	0.803**	1.068**	0.536	10
Sweden	0.721**	1.007**	0.938	0	Sweden	0.463**	0.781	0.421	10
UK	0.819**	0.706**	0.648	0	UK	0.582**	0.255	0.553	7
Iceland	0.595**	0.694**	0.668	0	Iceland	0.777**	0.900**	0.665	0
Norway	0.768**	0.811**	0.860	0	Norway	0.826**	1.179**	0.738	0
Switzerland	1.019**	0.819**	0.902	12	Switzerland	1.137**	0.998**	0.890	0

* Significantly ≠ 0 at 10%.

** Significantly ≠ 0 at 5%.

Underlined: not significantly ≠ 1 at 5% (for B(0) only).

(1) highest order of autocorrelation of residuals (k = 0 to 12) at 5% (Breusch-Godfrey test).

Source: author's calculations based on IFS data

CEECs

Equation 2.2

1989:05-1992:08 (2)						
Country	B(0)	$\widetilde{B}(1)$	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	k(1)
Czech Rep.	0.964*	1.568*	-1.149	-3.677	0.292	0
Hungary	0.387*	0.213	0.211	0.310	0.248	11
Poland	-0.462	-1.869	1.259	3.799	0.432	0
Romania	-1.144	-0.339	0.308	-2.961	0.008	0
1992:09-1995:05						
Country	B(0)	$\widetilde{B}(1)$	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	k(1)
Czech Rep.	0.615**	0.863**	0.025**	-0.016	0.990	8
Hungary	0.349*	0.281	-.321**	-0.300	0.110	0
Poland	0.272*	0.507*	0.125	-0.260	0.319	0
Romania	0.995**	2.670*	-0.122	0.284	0.276	0

* Significantly ≠ 0 at 10%.
** Significantly ≠ 0 at 5%.
Underlined: not significantly ≠ 1 at 5% (for B(0) only).
(1) highest order of autocorrelation of residuals (k = 0 to 12) at 5% (Breusch-Godfrey test).
(2) 1990:05-1992:08 for the Czech Republic.
Source: author's calculations based on IFS data

Equation 2.3a

1989:05-1992:08 (2)					1992:09-1995:05				
Country	B(0)	$\widetilde{B}(1)$	$\overline{R}^2$	k(1)	Country	B(0)	$\widetilde{B}(1)$	$\overline{R}^2$	k(1)
Czech Rep.	0.372	-0.390	-0.009	9	Czech Rep.	0.626**	0.958**	0.988	
Hungary	0.471**	0.290	0.221	0	Hungary	0.161	0.167	0.034	10
Poland	0.324	0.344	0.473	0	Poland	0.344**	0.416	0.284	10
Romania	-0.716	-1.953	-0.065	0	Romania	0.898**	2.721**	0.394	0

* Significantly ≠ 0 at 10%.
** Significantly ≠ 0 at 5%.
Underlined: not significantly ≠ 1 at 5% (for B(0) only).
(1) highest order of autocorrelation of residuals (k = 0 to 12) at 5% (Breusch-Godfrey test).
(2) 1990:05-1992:08 for the Czech Republic.
Source: author's calculations based on IFS data

<INS table Asia equation 2.2>

<INS table Asia equation 2.2 continued>

Equation 2.3b

1974:05-1978:10					1978:11-1985:02				
Country	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	k(1)	Country	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	k(1)
Bhutan	0.096	0.407**	0.283	0	Bhutan	0.203**	0.035	0.248	0
China	0.283	0.435	0.081	0	China	0.371**	0.014	0.472	0
Korea	Constant USD peg 1975:01 to 1979:12				Korea	0.073	0.032	0.245	12
India	0.096	0.407	0.283	0	India	0.179**	0.085	0.345	0
Indonesia	USD peg until 1978:10				Indonesia	0.037	-0.159	0.044	3
Malaysia	0.323**	0.281	0.112	9	Malaysia	0.315	0.229	0.592	0
Pakistan	USD peg until 1981:12				Pakistan	0.153**	0.180	0.363	0
Philippines	0.013	0.189**	0.238	11	Philippines	-0.262	-0.326	-0.035	0
Singapore	0.256**	0.214	0.160	12	Singapore	0.350**	0.346**	0.742	0
Sri Lanka	-0.154	-0.220	0.301	0	Sri Lanka	0.040	-0.115	0.185	0
Thailand	0.015**	0.026**	0.317	3	Thailand	-0.009	0.059	-0.059	0

1985:03-1990:04					1990:05-1995:05				
Country	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	k(1)	Country	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	k(1)
Bhutan	0.198**	0.131	0.283	0	Bhutan	-0.059	0.227	-0.084	0
China	-0.197	-0.063	0.134	0	China	0.272	0.705	-0.086	0
Korea	0.071**	0.653**	0.757	0	Korea	0.050**	0.158	0.224	0
India	0.174**	0.160	0.361	0	India	-0.070	0.292	-0.082	0
Indonesia	0.096	0.100	0.157	0	Indonesia	0.019	-0.005	-0.006	0
Malaysia	0.131**	0.030	0.356	8	Malaysia	0.090*	0.411**	0.256	0
Pakistan	0.127**	0.094	0.278	0	Pakistan	0.024	0.100	0.294	0
Philippines	-0.076*	-0.042	0.019	1	Philippines	-0.095	-0.477	0.146	0
Singapore	0.211**	0.066	0.410	0	Singapore	0.207**	0.170*	0.388	0
Sri Lanka	0.064	0.165**	0.347	0	Sri Lanka	0.107	0.105	0.224	0
Thailand	0.166**	0.109*	0.777	11	Thailand	0.137**	0.115**	0.795	0

* Significantly ≠ 0 at 10%.

** Significantly ≠ 0 at 5%.

Source: author's calculations based on IFS data.

(1) highest order of autocorrelation of residuals (k = 0 to 12) at 5% (Breusch-Godfrey test).

Annex 4: Real monetary zones

US dollar zone

	1974-78	1979-83	1984-88	1989-93
OECD	United-States Canada Finland Norway Sweden Australia	United-States Canada Finland Norway Sweden Australia	United-States Canada Finland Norway Sweden Turkey Australia	United-States Canada Finland Norway Sweden France Australia
LATIN AMERICA	 Brazil Venezuela Costa Rica	 Colombia Paraguay Venezuela El Salvador	Argentina Chile Colombia Ecuador Paraguay Venezuela Costa-Rica Mexico El Salvador	 Colombia Venezuela Costa-Rica El Salvador
ASIA	 Philippines Singapore Thailand	 Indonesia Philippines Singapore Sri-Lanka Thailand	Korea India Indonesia Malaysia Pakistan Philippines Singapore Sri-Lanka Thailand	Korea India Indonesia Malaysia Pakistan Philippines Singapore Sri-Lanka Thailand
AFRICA			Ghana	Ghana Marocco
MIDDLE-EAST	 Israel Kuwait	Egypt Iran Israel	 Kuwait	 Israel Kuwait

DM zone

	1974-78	1979-83	1984-88	1989-93
E.C.	Germany Belgium Denmark Ireland Netherlands	Germany Belgium Denmark France Ireland Netherlands	Germany Belgium Denmark France Ireland Netherlands United-Kingdom	Germany Belgium Denmark France Ireland Netherlands United-Kingdom
OTHER WEST-EUR	Austria	Austria	Austria	Austria
AFRICA		 Marocco		South Africa
MIDDLE-EAST			Egypt Iran	
Centr. and East. EUR.				Hungary

Yen zone

	1974-78	1979-83	1984-88	1989-93
OECD	Japan	Japan United Kingdom	Japan United Kingdom	Japan
ASIA		Pakistan		
AFRICA		South Africa		
MIDDLE-EAST		 Kuwait	Egypt Iran	

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Zone without a single anchor

	1974-78	1979-83	1984-88	1989-93
EC	United Kingdom Spain France Greece Italy Switzerland	Spain Greece Italy Switzerland	Spain Greece Italy Switzerland	Spain Greece Italy Switzerland
OTHER OECD				Turkey
LATIN AMERICA	Argentina Chile Colombia Ecuador Paraguay Uruguay Mexico El Salvador	Argentina Brazil Chile Ecuador Uruguay Costa-Rica Mexico	Brazil Uruguay	Argentina Brazil Chile Ecuador Paraguay Uruguay Mexico
ASIA	Korea India Indonesia Pakistan Sri Lanka	Korea India		
AFRICA	South Africa Ghana Marocco	Ghana	South Africa Marocco	
MIDDLE-EAST	Egypt Iran Syria		Israel	Egypt Iran
Centr. and East. EUR.				Poland Romania

Annex 5: Unit root analysis
1973-1993

Three equations are estimated:

$$(1) \qquad \Delta E_{i,j}(t) = \rho E_{i,j}(t-1) + \sum_{h=1}^{p} \gamma_h \Delta E_{i,j}(t-h) + u_t$$

$$(2) \qquad \Delta E_{i,j}(t) = c + \rho E_{i,j}(t-1) + \sum_{h=1}^{p} \gamma_h \Delta E_{i,j}(t-h) + v_t$$

$$(3) \qquad \Delta E_{i,j}(t) = c + \beta t + \rho E_{i,j}(t-1) + \sum_{h=1}^{p} \gamma_h \Delta E_{i,j}(t-h) + w_t$$

where p stands for the last significant lag ($p \leq 12$) which is chosen by an optimising procedure; c is a constant and u_t, v_t, w_t are the residuals. We test whether ρ differs significantly from zero using the augmented Dickey-Fuller test. If it does, than $E_{i,j}$ is stationary (I(0)), i.e. it tends in the long run to return to its past level (equation 1), to a constant (equation 2), or to an exogenous trend (equation 3). In all three cases, currency i can be said to use j as a real anchor.

Country	Real exchange rate /US$			Real exchange rate /DM			Real exchange rate /yen		
	Equation	Lags p	Concl.*	Equation	Lags p	Concl.*	Equation	Lags p	Concl.*
Germany	3	0	I(1)	/	/	/	/	/	/
Japan	3	1	I(1)	1	8	I(0)	/	/	/
Austria	3	0	I(1)	3	12	I(1)**	3	9	I(0)
Belgium (1)	3	0	I(1)	3	10	I(1)	3	11	I(1)
Denmark	3	0	I(1)	3	12	I(0)	3	5	I(0)
Finland	3	9	I(1)	3	4	I(1)	3	3	I(1)
France (3)	3	2	I(1)	3	12	I(1)	3	5	I(0)
Ireland (1)	3	0	I(1)	3	3	I(1)	3	8	I(0)
Italy	3	0	I(1)	3	1	I(1)	3	9	I(0)
Greece	3	11	I(1)	3	6	I(1)	3	8	I(0)**
Netherl.	3	0	I(1)	3	0	I(0)	3	0	I(1)
Norway	3	0	I(1)	3	2	I(1)	3	5	I(0)
Spain	3	0	I(1)	3	0	I(1)	3	8	I(0)**
Sweden	3	9	I(1)	3	4	I(1)	3	11	I(1)
Switzerland	3	0	I(1)	3	1	I(0)	3	3	I(0)
UK	3	1	I(1)	3	0	I(1)	2	10	I(0)**
Australia	3	3	I(1)	3	0	I(1)	3	1	I(1)
Canada	3	10	I(1)	3	0	I(1)	3	12	I(1)
Turkey (2)	1	11	I(1)	3	9	I(1)			I(>1)

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India	3	0	I(1)	3	9	I(1)	2	12	I(1)**
Indonesia	3	3	I(1)	3	0	I(1)	3	9	I(1)
Korea	3	6	I(1)	3	0	I(1)	3	12	I(1)
Pakistan	3	2	I(0)	3	1	I(1)	3	5	I(1)
Philippines	3	10	I(0)	3	10	I(1)	3	5	I(0)
SriLanka (4)	2	8	I(0)	3	12	I(1)	3	11	I(1)
Thailand	3	2	I(1)	3	7	I(1)	3	5	I(1)

*at 10%.
** Residuals auto-correlated.
(1) until 1992:12. (2) from 1986:01. (3) Computed with unit labor costs.
(4) From 1976:01. (5) Until 1990:12. (6) From 1975:01 to 1993:10. (8) From 1989:01.
(9) From 1990:05.

Country	Real exchange rate /US$			Real exchange rate /DM			Real exchange rate /yen		
	Equation	Lags p	Concl.*	Equation	Lags p	Concl.*	Equation	Lags p	Concl.*
Argent. (5)	3	12	I(0)	3	11	I(1)	3	11	I(1)
Brazil (5)	3	6	I(1)	3	6	I(0)	3	12	I(0)
Chile	3	5	I(1)	3	0	I(1)	3	8	I(1)**
Colombia	3	8	I(1)	3	0	I(1)	3	12	I(1)
Costa-Rica	3	9	I(0)	3	6	I(1)	3	9	I(0)
Ecuador (6)	3	7	I(1)	3	0	I(1)	3	0	I(1)
El Salvador	3	0	I(1)	3	0	I(1)	3	0	I(1)
Mexico	3	4	I(1)	3	6	I(0)	3	4	I(1)
Venezuela	3	0	I(0)	3	1	I(1)	3	1	I(1)
South-Afr.	2	12	I(0)**	3	8	I(1)	3	8	I(1)
Poland (8)	3	1	I(1)	3	1	I(1)	3	0	I(1)**
Romania (9)	3	0	I(1)	3	0	I(1)	3	0	I(1)

*at 10%.
** Residuals auto-correlated.
(1) until 1992:12. (2) from 1986:01. (3) Computed with unit labor costs.
(4) From 1976:01. (5) Until 1990:12. (6) From 1975:01 to 1993:10. (8) From 1989:01.
(9) From 1990:05.

Annex 7: Cointégration analysis, 1974-1993

Cointegration tests are carried out in order to find long-run relationships between each i/$ real exchange rate ($E_{i,\$}$) and the DM/$ real exchange rate ($E_{DM\$}$) or the yen/$ real exchange rate ($E_{Y\$}$). DM/$ and Y/$ real exchange rates are I(1), so this test is run only for I(1) i/$ real exchange rates. The test consists in looking whether a linear combination of $E_{i,\$}$ and $E_{DM,\$}$ (resp. $E_{Y,\$}$) is stationary, i.e. I(0). Using the Engle-Granger (1987) method, we regress:

$$E_{i,\$}(t) = c + \lambda E_{DM,\$}(t) + z(t)$$

Then, the stationarity of the residuals z(t) is tested using an augmented Dickey-Fuller unit root test like the one presented in annex 4. If z(t) is stationary, then $E_{i,\$}$ and $E_{DM,\$}$ are cointegrated and λ is the cointegrating coefficient. The same method is used for cointegration between $E_{i,\$}$ and $E_{Y,\$}$.

Cointegration tests are carried out over the whole 1973-1993 period for I(1) curencies [54].

Country i	Cointegration between $E_{i,\$}$ and $E_{DM,\$}$			Cointegration between $E_{i,\$}$ and $E_{Y,\$}$		
	Lags p	ADF	λ	Lags p	ADF	λ
Germany				6	-3.47*	1.135
Japan	6	-3.79*	0.626			
Austria	8	-3.63*	0.924	5	-3.71*	1.041
Belgium (1)	9	-3.47*	0.929	11	-2.78	1.046
Denmark	3	-3.37	0.895	7	-3.17	0.995
Finland	12	-3.08	0.610	6	-2.40	0.628
France (3)	11	-2.37	0.803	7	-3.48*	0.868
Ireland (1)	7	-2.58	0.749	3	-3.34	0.888
Italy	3	-1.98	0.918	6	-3.08	0.979
Greece	3	-2.48	0.718	6	-2.66	0.771
Netherl.	3	-3.54*	1.039	6	-3.15	1.183
Norway	3	-2.57	0.771	6	-2.98	0.847
Spain	3	-2.04	0.910	7	-2.99	0.950
Sweden	3	-2.29	0.829	5	-2.78	0.883
Switzerland	5	-3.72*	0.909	5	-3.87*	1.100
UK	3	-2.67	0.592	5	-2.68	0.661

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[54] CEECs are not concerned since the corresponding series are too short and submitted to the large initial shock.

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India	3	-2.71	-0.050	3	-2.55	0.040
Indonesia	2	-2.58	-0.213	2	-2.70	0.301
Korea	2	-1.86	0.199	2	-1.62	0.199
Thailand	3	-2.37	0.292	3	-3.03	0.313
Singapore	3	-2.58	0.063	3	-2.65	-0.004
Australia	3	-2.82	0.321	3	-2.40	0.348
Canada	12	-2.55	0.167	12	-2.53	0.172
Turkey (2)	4	-1.85	0.402	3	-3.60	-0.521
Brazil (5)	8	-2.97	0.608	7	-2.70	0.571
Chile	3	-2.46	0.013	3	-2.44	-0.028
Colombia	3	-1.68	-0.323	12	-2.69	-0.389
Ecuador (6)	2	-1.94	-0.082	2	-1.91	-0.144
El Salvador	3	-2.83	-0.671	4	-2.67	-0.739
Mexico	8	-2.90	0.338	8	-2.47	0.360

* 10% rejection of the nul hypothesis of no cointegration.
(1) until 1992:12. (2) from 1986:01.
(3) Computed with unit labor costs. (4) From 1976:01.
(5) until 1990:12. (6) From 1975:01 to 1993:10.
(8) From 1989:01. (9) From 1990:05.

Annex 8: A simple portfolio approach to exchange rate fluctuations

Let there be two countries called A and B. Let $F_A(t)$ be the currency A value of net holdings of country A denominated in currency B at time t, and $F_B(t)$ the currency B value of net holdings of country B in currency A at time t. S(t) is the nominal, bilateral exchange rate, defined as the price of currency B in terms of currency A. $B_A(t)$ is the bilateral current account of country A. The bilateral balance of payments can be written in terms of country A's currency:

$$F_A(t) - \frac{S(t)}{S(t-1)} F_A(t-1) = B_A(t) + S(t)F_B(t) - S(t-1)F_B(t-1) \quad (4.1)$$

The exchange rate is normalised so as S(t-1)=1. Taking the bilateral expected yield differential and expected risk as constant, the optimal share of foreign assets in the net wealth of each country is also constant:

$$F_A(t) = k_A\, W_A(t) \text{ and } F_B(t) = k_B\, W_B(t) \quad (4.2)$$

with W_i: net wealth of country i (i=A,B). In the short run, the net wealth is constant. The balance of payments can be re-written (dropping time arguments):

$$k_A\, W_A(1-S) = B_A + k_B\, W_B(S-1) \quad (4.3)$$

Thus we have:

$$S = 1 - \frac{B_A}{k_A W_A + k_B W_B} \quad (4.4)$$

Currency A depreciates (S rises) when country A runs a current account deficit ($B_A < 0$). This depreciation makes B-denominated assets more valuable. Assuming that the optimal allocation of net wealth remains constant, country A asset-holders sell B-denominated assets, and country B asset-holders buy A-denominated assets. Both movements are stabilising since they entail an inflow of capital to country A. Nevertheless, the stabilising effect depends on whether there are one or two international currencies, and it also depends on the net initial positions of both countries.

First case: only A has an international currency (k_A=0, $k_B \neq 0$).

All net foreign assets of country A are denominated in its own currency. Thus they are aggregated in F_B as net liabilities of country B in A's currency, and all net foreign assets of country B are A-denominated. Equation (4.4) becomes (4.5):

$$S = 1 - \frac{B_A}{k_B W_B} \qquad (4.5)$$

Suppose the net external positions are initially close to balance. Because there is only one international currency, the net holdings of country B in A's currency are close to zero ($k_B \approx 0$). In case country A runs a deficit, the depreciation of its currency has a very low stabilising effect, because it hardly affects the net position of country B in currency A: the exchange rate fluctuations will be very large.

Now if the net external position of country A is strongly negative, the net holdings of country B in currency A are strongly positive, and the exchange rate fluctuations will be small ($k_B >> 0$).

Lastly, if the net external position of country A is positive, that of country B is negative, and the exchange rate adjustment is destabilising ($k_B < 0$): if A runs a deficit, its currency must *appreciate* in order to equilibrate the balance of payments.

Second case: both countries are international ($k_A, k_B \neq 0$).

The net external position of each country can now be different from its net holdings in the foreign currency.

Suppose the net external positions are initially close to balance. k_A and k_B can be both positive or both negative. Generally they will be both positive, meaning that the currency diversification is larger for assets than for liabilities. Thus exchange rate fluctuations will be relatively small.

Now if the initial net external position of country A is strongly negative, k_A will be negative while k_B will be positive, meaning that country B has a positive external position in both currencies. In case country A runs a current account deficit, the depreciation of currency A has two opposite effects:

(i) country B's holdings in currency A depreciate, which leads to a stabilising inflow of capital into currency A;

(ii) country A's debt in currency B is re-valued, which leads to a destabilising flow of capital out of country A, asset holders of B wanting to reduce the share of currency B in their portfolios.

This second effect increases exchange rate instability.

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Table 2.10: Implicit real basket pegs (equation 2.4), 1974-1993.

Country	G(1)	$\tilde{H}(1)$	$\tilde{J}(1)$	$\overline{R}^2$	k (1)	Country	G(1)	$\tilde{H}(1)$	$\tilde{J}(1)$	$\overline{R}^2$	k (1)
Austria	-0.558*	0.978**	-0.054	0.928	1	Turkey	-0.250	0.203	-.968**	0.515	0
Belgium	-0.270	0.994**	0.041	0.845	0	Australia	-0.057	0.044	0.325	0.091	0
Denmark	0.031	0.842**	0.003	0.892	0	Canada	0.378	0.104	-0.033	0.126	2
France	0.409**	1.157**	-0.239	0.835	1	India	0.105	0.287	0.064	0.145	0
Italy	0.098	0.933**	-0.189	0.739	0	Indon.	-0.221	-0.127	-0.278	0.139	0
Ireland	-0.112	0.909**	0.019	0.728	0	Korea	0.256	0.088	0.148	0.101	0
Spain	0.163	0.731**	-0.035	0.536	0	Singap.	0.265	0.188	-0.027	0.375	0
UK	0.234	0.679**	-0.135	0.543	0	Thaïland	0.103	0.372**	-0.088	0.098	0
Greece	-0.263	1.016**	-0.064	0.637	0	Brazil	-0.038	-0.367	0.573	-0.016	0
Finland	0.534**	0.427	0.089	0.599	0	Chile	0.417**	-0.136	0.386	0.136	0
Norway	0.263	0.503**	0.026	0.773	0	Colomb.	0.718**	0.181	0.050	0.363	0
Sweden	0.491**	0.635**	0.234	0.713	0	Ecuador	-0.147	-0.523	0.301	-0.007	0
Switzerl.	-0.011	0.848**	0.202	0.851	0	El Salv.	-0.045	-0.562	-0.180	0.024	0
						Mexico	-0.088	-0.422	0.228	0.099	12

* Significantly ≠ 0 at 10%.
** Significantly ≠ 0 at 5%
Underlined: not significantly ≠ 1 at 5%.

The trend is significant only in Denmark.
Source: CEPII calculations based on IFS data.

ASIA

Equation 2.2

1974:05-1978:10							1978:11-1985:02						
Country	B(0)	$\widetilde{B}(1)$	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	$k^{(1)}$	Country	B(0)	$\widetilde{B}(1)$	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	$k^{(1)}$
Bhutan	0.419**	0.545**	-0.046	0.133	0.532	0	Bhutan	0.278**	0.526**	0.039	-0.115	0.454	0
China	1.037**	0.890	-0.196	0.191	0.444	0	China	0.369**	0.483	0.147**	-0.073	0.615	0
Korea	Constant USD peg from 1975:01 to 1979:12						Korea	0.066	-0.132	0.026	0.066	0.174	12
India	0.419**	0.545**	-0.046	0.134	0.632	0	India	0.284**	0.640**	0.007	0.121	0.511	0
Indonesia	Constant USD peg until 1978:10						Indonesia	0.118	-0.060	-0.046	-0.134	-0.118	4
Malaysia	0.385**	0.541**	0.180*	-0.012	0.428	12	Malaysia	0.178**	0.358**	0.211**	0.115*	0.681	0
Pakistan	Constant USD peg until 1981:12						Pakistan	0.110*	0.144	0.082	0.144	0.366	0
Philippines	0.081	0.126	-0.016	-0.148	0.092	10	Philippines	-0.254	-0.009	-0.117	-0.322	-0.041	0
Singapore	0.554**	0.559**	0.038	-0.065	0.639	12	Singapore	0.162**	0.182**	0.244**	0.242	0.821	7
Sri Lanka	0.127	0.420	-0.186	-0.286	0.278	0	Sri Lanka	0.111*	0.238**	-0.023	-0.214	0.230	0
Thailand	0.003	-0.007	0.013	0.029	0.282	12	Thailand	-0.064	0.211	0.040	-0.005	0.124	0

Equation 2.2 (continued)

1985:03-1990:04							1990:05-1995:05						
Country	B(0)	$\widetilde{B}(1)$	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	$k^{(1)}$	Country	B(0)	$\widetilde{B}(1)$	C(0)	$\widetilde{C}(1)$	$\overline{R}^2$	$k^{(1)}$
Bhutan	0.246**	0.022**	0.026	-0.077	0.502	0	Bhutan	0.095	0.809**	-0.125	-0.310	-0.011	5
China	-0.229	-0.543	-0.018	0.334	0.135	0	China	0.184	0.234	0.072	0.344	-0.139	0
Korea	-0.038	-0.453*	0.092	0.519**	0.758	0	Korea	-0.00	0.179	0.061	0.102	0.213	9
India	0.184**	0.432**	0.053	-0.054	0.525	0	India	0.085	0.787**	-0.117	-0.265	-0.023	7
Indonesia	-0.049	-0.115	0.122	-0.024	0.120	3	Indonesia	0.014	0.018	0.016	-0.015	0.143	0
Malaysia	0.111*	0.124	0.056	-0.078	0.369	8	Malaysia	0.081	0.122	0.026	0.132	0.250	0
Pakistan	0.106*	0.135	0.055	-0.012	0.294	0	Pakistan	0.155**	0.543**	-.106**	-.399**	0.540	0
Philippines	-0.004	-0.052	-0.064	-0.019	0.035	0	Philippines	0.043	0.313	-0.210*	-.678**	0.203	0
Singapore	0.119*	0.158	0.126**	-0.014	0.409	0	Singapore	0.211**	0.183**	0.096**	0.084	0.658	0
Sri Lanka	0.098	0.252	0.004	0.097	0.355	0	Sri Lanka	0.058	0.129*	0.020	-0.080	0.320	0
Thailand	0.057**	0.073*	0.125**	0.028	0.760	0	Thailand	0.075**	0.048**	0.103**	.070**	0.946	0

* Significantly ≠ 0 at 10%.

** Significantly ≠ 0 at 5%.

Source: author's calculations based on IFS data.

(1) highest order of autocorrelation of residuals (k = 0 to 12) at 5% (Breusch-Godfrey test).