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Optimal Pegs for Asian Currencies

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RÉSUMÉ

Le dollar US demeure la monnaie de référence dans les régimes de change des pays asiatiques hors Japon. A l'aide d'estimations économétriques en coupe, on montre qu'au contraire de l'ancrage des monnaies européennes au Deutschemark, la relative stabilité des monnaies asiatiques vis-à-vis du dollar (jusqu'à la crise de 1997) ne se justifie pas au regard de la théorie des zones monétaires optimales : l'intégration commerciale entre les pays asiatiques et les États-Unis n'est pas assez forte, les exportateurs de chacune des deux zones ne sont pas assez en concurrence, et les chocs qui affectent la production sont trop différents. L'ancrage au dollar s'explique donc autrement.

L'idée développée est que les pays asiatiques ne cherchent pas simplement à stabiliser la production comme le suppose la théorie des zones monétaires optimales. Parce que la croissance repose en grande partie sur le développement du secteur exportateur et sur les investissements directs étrangers, les autorités monétaires semblent mettre en avant un objectif intermédiaire de stabilité du taux de change réel effectif. Dans ce cadre, on montre que l'ancrage au dollar résulte de l'impossibilité de se coordonner au niveau régional : chaque pays choisit d'ancrer sa monnaie sur le dollar car c'est aussi le choix de ses partenaires asiatiques ; comme l'Amérique du Nord et les partenaires asiatiques hors Japon absorbent plus de la moitié des exportations de chacun, ce choix permet de limiter les fluctuations de la compétitivité. Mais les fluctuations du yen pèsent sur la valorisation de la dette externe. Avec un service de la dette de l'ordre de 10% du PIB, une dépréciation de la monnaie domestique de 10% accroît de 1 point de PIB le service de la dette. Or la dette est davantage libellée en yens qu'en dollars (sauf en Malaisie). La zone dans son ensemble aurait donc intérêt à une politique de change plus équilibrée, vis-à-vis du yen notamment, qui la rendrait moins vulnérable aux fluctuations des grandes monnaies entre elles. Mais cela nécessiterait une coopération monétaire régionale pour lesquels les pays de la zone ne sont pas prêts politiquement.

Mots-clés : zones monétaires optimales, monnaies internationales, ancrage monétaire, Asie.

Classification JEL : F31, F33, F36.

SUMMARY

It has been evidenced that the US dollar is prominent in the exchange rate regimes of Asian countries. Through cross-country estimations, we show that, in contradiction to the behaviour of European currencies vis-à-vis the Deutschemark, the relative stability of Asian currencies against the US dollar (until the 1997 crisis) cannot be justified by the theory of optimal currency areas: trade integration between Asia and the United-States is not strong enough, bilateral competition is not tough enough, and the macroeconomic shocks affecting the two areas are too asymmetric. The peg to the US dollar then must be explained in another way.

The analysis developed in the paper relies on the fact that Asian countries do not simply try to stabilise output, as assumed by the theory of optimum currency areas. Because growth heavily relies on the development of exports and on foreign direct investment, monetary authorities seem to stress the stability of the real effective exchange rate as the intermediate target. In such a framework, we show that pegging the US dollar is the result of the lack of regional monetary cooperation: each country chooses to peg the US dollar because this is the choice of its Asian partners. As North America and Asian partners other than Japan account for more than a half of foreign trade of each Asian country, this choice leads to a relatively stable external competitiveness. But yen/dollar fluctuations affect the value of the external debt. With a debt service of about 10% of GDP, a depreciation of the domestic currency by 10% increases the debt service by 1 point of GDP. Because this debt is denominated more in yen than in dollar (except in Malaysia), the countries as a whole would have an interest in weighing the yen in their basket pegs. But this would entail monetary cooperation at a regional level, which is still quite unlikely politically in the short run.

Keywords: optimum currency areas, international currencies, currency pegs, Asia.

JEL Classification: F31, F33, F36.

Optimal Pegs for Asian Currencies[1]

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1. INTRODUCTION

The emergence of a monetary bloc in Asia is often considered a natural process due to the increasing, real integration in the region. According to the literature on optimal currency areas (Mundell, 1961; McKinnon, 1963; Kenen, 1969), the incentive to maintain fixed exchange rates rises with the bilateral intensity of trade, with the mobility of the production factors (labour and capital) and with the proportion of common shocks. Eichengreen and Bayoumi (1997) show that this theory fits quite well the case of Asian countries: the relative stability of bilateral exchange rates is consistent with the real integration of the region. However, a monetary bloc cannot be reduced to a zone with stable exchange rates, since this stability may come from the domination of a foreign currency over the region. During the Bretton-Woods area, for instance, Europe did not form a monetary bloc: the Bretton Woods system as a whole formed a monetary bloc. The European monetary bloc emerged progressively in the 1970s, and more seriously in the 1980s, as a successful attempt to stabilise intra-European exchange rates without any reference to a foreign currency. Such a story did not take place in Asia where no regional, monetary arrangement has been introduced for the moment [3]. The fact that some bilateral exchange rates may be relatively stable in Asia does not imply the existence of a monetary bloc, except if the zone of stable exchange rates includes the Japanese yen, which is the major potential competitor for the USD in the region.

However, Asian countries generally do not weigh the yen in their implicit, nominal and real basket pegs (Frankel & Wei, 1993; Bénassy-Quéré, 1997). Whatever their official exchange rate regimes, their currencies are *de facto* pegged to the USD. Singapore and Thailand are two exceptions according to Bénassy-Quéré, but the weight of the yen in the implicit basket peg however does not exceed 0.1.

This paper is concerned with the optimality of pegging the USD. In Section 2, this problem is studied with reference to the theory of optimum currency areas (OCA). It is shown that the behaviour of Asian currencies against the three main international currencies does not fit the OCA literature. One interpretation is the omission of balance-sheet effects. This interpretation is examined in Section 3 through some statistics about Asian trade and debts, and an alternative framework is proposed in Section 4, which explains Asian strategies by a coordination failure. Concluding remarks are provided in Section 5.

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[1] First draft: January 1997. Revised: July 1997. This paper is based on pre 1997 data. The currency crises of 1997 do not invalidate this study which is concerned with the design of past and forthcoming exchange rate regimes.

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[3] Some cooperation have recently emerged among Asian Central Banks, first as a general agreement (*Financial Times*, 11/21/1995), and then for the defence of the baht (*Financial Times*, 05/15/1997).

2. ASIAN PEGGING STRATEGIES IN THE LIGHT OF THE THEORY OF OPTIMUM CURRENCY AREAS

According to the literature on optimum currency areas (Mundell, 1961; McKinnon, 1963; Kenen, 1969), two countries should peg their bilateral exchange rate if several conditions are fulfilled, which make the adjustment of the exchange rate either ineffective or unnecessary to stabilise output:

(i) most shocks to real output are common to both countries;

(ii) foreign trade represents a large share of GDP;

(iii) the other country is an important trade partner;

(iv) specific shocks can be adjusted by factor mobility, real wage flexibility and/or fiscal federalism.

In the light of this literature, the question is whether the *de facto* exchange rate regimes of Asian countries can be explained by the relative importance of asymmetric disturbances with respect to Japan, the United-States and Germany, by the openness of Asian countries and by the geographical pattern of their trade [4]. Following the methodology of Bayoumi and Eichengreen (1996b), we measure asymmetric output disturbances as the standard deviation of the change in the log of relative output in each pair of countries. This measure is supplemented here with a Finger index of similarity in the commodity composition of exports of the two countries. For each country i, the Finger index of export structure similarity *vis-à-vis* country j is can be written: $FING_{i,j} = 100 \sum_k Min\left[\frac{X_k^i}{X_\bullet^i}, \frac{X_k^j}{X_\bullet^j}\right]$, where X_k^i stands for country i exports of product k, and $X_\bullet^i$ is the total of country i exports. This index is computed using a 70 goods decomposition (source: CEPII-CHELEM data base). It varies from 0 (complete dissimilarity in the composition of exports) to 100 (perfect similarity). See Finger and Kreinin (1979). The Finger index catches whether industry-specific shocks may have asymmetric effects in the two countries.

Finally, the role of bilateral trade is measured by the average of the exports/GDP and the imports/GDP ratios of each country towards and from the US, Japan or the core of the European Monetary System [5]. This measure catches both the country distribution of trade, and an openness effect (i.e. the fact that small, open countries have more incentive to peg their currencies than large countries).

[4] Following Bayoumi and Eichengreen, we leave labour mobility and fiscal federalism aside given that « they have not been important factors in responding to shocks across different countries, at least over the historical period » (Bayoumi and Eichengreen (1996b), p. 14). Finally, in developing Asian countries, shocks on the labour market can be adjusted by sector migrations (between the traditional and the modern sector), which avoids both international migrations and real wage adjustment.

[5] The EMS core includes Germany, France, the Netherland, Belgium, Denmark and Luxembourg. It is prefered to just Germany, because for third countries, exchange rate variations vis-a-vis the DM will likely have similar effects on trade flows with Germany and with other members of the core.

Cross-country estimations were carried out for a range of 40 countries (including 9 Asian countries, 15 West-European countries, 4 other OECD countries and 12 non-OECD, non-Asian countries) *vis-a-vis* the US dollar, the yen and the Deutschemark. The 9 Asian countries are Korea, HongKong, Singapore, Malaysia, Philippines, Thailand, India, Indonesia and Pakistan. Other non-OECD countries include Chile, Colombia, Ecuador, Mexico, Venezuela, Israel, Egypt, Gabon, Morocco, Nigeria, Tunisia and South Africa. Statistical sources are the IMF *International Financial Statistics* for exchange rates and consumer prices (yearly averages), and the CEPII-CHELEM data bank for all other data.

Unlike Bayoumi and Eichengreen (1996b), we do not consider all bilateral exchange rates, because we are concerned with the pegging behaviour *vis-à-vis* the main international currencies. The following equations were estimated:

$$SD(s_{i,j}) = a_0 + a_1\ SD(y_{i,j}) + a_2\ FING_{i,j} + a_3\ TRADE_{i,j} \quad (1)$$

$$SD(e_{i,j}) = a_0 + a_1\ SD(y_{i,j}) + a_2\ FING_{i,j} + a_3\ TRADE_{i,j} \quad (2)$$

$SD(s_{i,j})$ is the standard deviation of the log-variation of the year nominal exchange rate between i and j, $SD(e_{i,j})$ represents the same measure for the real exchange rate. The OCA theory refers to nominal volatility. However, Asian countries broadly peg their currencies to the USD both in nominal terms and in real terms. If prices and wages are fully indexed, then the real volatility is a better indicator of the role of exchange rate flexibility in macroeconomic adjustment. Alternatively, if wages and prices are rigid in the one-year horizon, then nominal volatility equals real volatility.

$SD(y_{i,j})$ is the standard deviation of the difference in the logarithm of real output between i and j, $FING_{i,j}$ is the Finger index measuring the similarity of the structure of exports in countries i and j, and $TRADE_{i,j}$ is the share of trade between i and j in the GDP of country i.

Standard deviations are calculated over the 1986-1995 period which starts after most Asian capital markets were liberalised. Instantaneous variables are measured at year 1994. The whole sample contains 40x3=120 observations. The estimates are given in Table I.

When significant, the coefficients all have the expected sign. For OECD countries, the results for nominal and real exchange rates are similar, which can be explained by the fact that exchange rates are much more volatile than inflation differentials among OECD countries. In these countries, the exchange rate volatility depends on the asymmetry of output disturbances and on the intensity of trade, but not on the similarity of trade. The latter result can be related to the importance of intra-industry trade among OECD countries.

Table I: OCA estimates

	All countries		OECD countries		Non-OECD countries	
	Nominal volatility	Real volatility	Nominal volatility	Real volatility	Nominal volatility	Real volatility
Number of observations	120	120	57	57	63	63
Constant	11.0**	17.2**	5.77**	7.49**	11.4**	20.9**
$SD(y_{i,j})$	1.83**	0.58	2.16**	1.36 **	1.69*	0.14
$FING_{i,j}$	-0.06	-0.14	0.01	0.02	-0.02	-0.22**
$TRADE_{i,j}$	-0.36**	-0.32**	-0.42**	-0.44**	-0.38	-0.21
Adjusted R^2	0.246	0.246	0.660	0.643	0.070	0.139
F statistics	13.96**	13.91**	37.24**	34.57**	2.56	4.33**
Std error of the regression	0.068	0.065	0.027	0.034	0.090	0.085

Note: One or two asterisks indicate that the coefficient(s) is (are) significant at the 95 an 99 percent probability level respectively.

For non-OECD countries, the trade intensity index is never significant. The asymmetry of output disturbances partly explains the volatility of nominal exchange rates, while the Finger index is significant for real volatility, the overall adjustment remaining very poor in both cases.

Our results differ from Eichengreen and Bayoumi (1997) who successfully run OCA estimations on the basis of all bilateral exchange rates between 20 countries, mixing OECD and Asian countries. If we take the same country sample but still concentrate on exchange rates *vis-à-vis* the three major currencies, we obtain the following estimates:

$$SD(s_{i,j}) = \underset{(3.87)}{12.08} + \underset{(1.00)}{0.70}\ SD(y_{i,j}) - \underset{(-1.34)}{0.05}\ FING_{i,j} - \underset{(3.96)}{0.33}\ TRADE_{i,j}$$

, adj. R^2 = 0.321, F = 8.40, S.E. = 0.034. The OCA theory explains the volatility of exchange rates among Asian countries, but it does not explain their pegging behaviour *vis-à-vis* the major international currencies. This interpretation is supported by the OCA indices computed by Eichengreen and Bayoumi, which show little rationale for a dollar peg as compared to a DM, a yen or a basket peg in Asia.

In fact, the good results obtained for OECD countries may be dominated by a European integration effect: the coincidence of monetary and trade integration in Europe fits the OCA theory. In a similar way, it can be asked whether the poor results obtained for non-OECD countries come from an atypical behaviour in Asian countries.

In order to investigate this interpretation, dummies were included so as to test for a specific behaviour of Asian countries *vis-à-vis* the USD, and compare it with the specific behaviour of European countries *vis-à-vis* the DM. Thus, the following regressions were run:

$$SD(s_{i,j}) = a_0 + a_1\ SD(y_{i,j}) + a_2\ FING_{i,j} + a_3\ TRADE_{i,j} + a_4\ DUMA_{i,j} + a_5\ DUMU_{i,j} \quad (3)$$

$$SD(s_{i,j}) = a_0 + a_1\ SD(y_{i,j}) + a_2\ FING_{i,j} + a_3\ TRADE_{i,j} + a_4\ DUMA_{i,j} \quad (4)$$

$$SD(s_{i,j}) = a_0 + a_1\ SD(y_{i,j}) + a_2\ FING_{i,j} + a_3\ TRADE_{i,j} + a_5\ DUMU_{i,j} \quad (5)$$

where $DUMA_{i,j} = 1$ if i is a European country and j is Germany, 0 in other cases; and $DUMU_{i,j} = 1$ if i is an Asian country and j is the US, 0 in other cases. Equation (3) was estimated for all countries, (4) for OECD countries and (5) for non-OECD countries. Similar equations were estimated for the real exchange rates. The results are reported in Table II.

Both dummies are significant at the 1% confidence level, and they have the expected sign: compared to OCA predictions, European currencies show a specially low volatility against the DM, and Asian currencies show a specially low volatility against the USD.

Table II: OCA estimates with regional dummies

	All countries		OECD countries		Non-OECD countries	
	Nominal volatility	Real volatility	Nominal volatility	Real volatility	Nominal volatility	Real volatility
Number of observations	120	120	57	57	63	63
Constant	11.6**	17.9**	4.52*	6.20**	12.5**	21.8**
$SD(y_{i,j})$	1.47**	0.27	2.25**	1.46**	1.25	-0.20
$FING_{i,j}$	-0.03	-0.12**	0.04	0.04*	0.02	-0.19*
$TRADE_{i,j}$	-0.14	-0.15	-0.19*	-0.20**	-0.25	-0.10
$DUMA_{i,j}$	-8.53**	-4.82*	-4.56**	-4.70**	/	/
$DUMU_{i,j}$	-6.40**	-7.84**	/	/	-10.7**	-8.45**
Adjusted R^2	0.341	0.322	0.757	0.779	0.210	0.224
F statistics	13.33**	12.32**	44.50**	51.52**	5.13**	5.49**
Std error of the regression	0.064	0.061	0.023	0.018	0.083	0.080

Note: One or two asterisks indicate that the coefficient(s) is (are) significant at the 95 an 99 percent probability level respectively.

For OECD countries, the inclusion of the dummy reduces the value of the constant and of the coefficient on the trade intensity index, but it does not change the overall result which still fits the OCA theory: the European exchange rate mechanism is consistent with the OCA theory, although European exchange rates against the Deutschemark are more stable than what would suggest the theory.

For non-OECD countries, the inclusion of the dummy makes the asymmetry of output disturbances no longer significant for real volatility, and the Finger index less significant for nominal volatility. It can be concluded that, in contradiction with OECD currencies, non-OECD currencies do not move against the three reference currencies in conformity with the OCA literature. Among them, Asian countries seem to peg the USD (the coefficient on the dummy is twice as large as in the European case), with little OCA rationale. Thus it can be asked whether the pegging criteria highlighted by the OCA literature fit the case of non-OECD countries, and more specifically if they fit the case of Asian countries *vis-à-vis* the three major international currencies.

3. ALTERNATIVE CRITERIA FOR OPTIMAL PEGS

According to the OCA literature, the final objective of the public authorities is to stabilise output. Although such an assumption is generally acceptable, developing countries encounter financial restrictions which make them concentrate on external targets. This is specially the case in Asia where export-oriented development strategies have been adopted from the 1960s. Whether the Asian miracle was due to export-led growth or to domestic saving and public incentives is debated (Rodrick, 1995). However, it is widely evidenced that several Asian countries have oriented their monetary policies towards preserving external competitiveness (Benaroya and Janci, 1996; Rhee and Song, 1997). Thus it is necessary to focus on this intermediate target when dealing with the exchange rate policies of Asian countries.

The usual framework to deal with real exchange rate targeting is that of Williamson (1994). According to this approach, the monetary authorities should target a fundamental equilibrium exchange rate (FEER) which insures a current account that fits the needs for foreign investment with full employment. This approach was implemented on Asian countries by Barrell *et alii* (1996). However, the FEER is an effective exchange rate based on the distribution of foreign markets and/or competitors. Given that the FEER is relatively stable, targeting it means pegging the currency in real terms to a basket of foreign currencies corresponding to the weights of the trading partners. This is not the behaviour of Asian central banks who have been pegging the USD instead of a basket since 1974 (Bénassy-Quéré, 1997).

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 (demand effect) or if higher profitability raises the incentive to export (supply effect). However, the external debt is revalued. The net effect on the foreign account is uncertain. This argument applies especially to highly indebted countries like Indonesia or Philippines (Table III). 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 [6]. On the other

[6] The debt service ratio reported in Table III only covers the long-term debt. 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, so the UIP does not hold. In addition, the convertibility of the capital account is still restricted except in HongKong (Bensidoun *et alii*, 1997). Thus there is a country premium which can

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 exchange rate fluctuations on the balance of payments is ambiguous in highly indebted countries [7].

Table III: Some macroeconomic indicators in selected Asian countries.

	CPI inflation % in 1995 (1)	Current account % GDP, 1995 (1)	Export/GDP ratio, % in 1995(2)	Long-term debt, % of GNP, 1995 (3)	Long-term debt service, % of GDP, 1995 (3)
Hong Kong	9.0	n.a.	26.1	n.a.	n.a.
Korea	4.5	-2.0	24.9	n.a.	n.a.
Taiwan	3.7	1.6	38.6	n.a.	n.a.
Singapore	1.7	18.3	84.3	n.a.	n.a.
Indonesia	9.4	-3.7	23.7	45.1	8.0
Malaysia	3.4	-8.5	82.7	33.6	7.6
Philippines	8.1	-3.3	23.7	43.7	6.0
Thailand	5.8	-7.1	30.7	23.6	4.1
China	14.8	2.3	22.3	14.0	2.0
India	10.2	-1.5	9.3	26.0	3.3
Pakistan	12.3	-3.8	12.7	41.5	6.0
Sri Lanka	7.7	n.a.	n.a.	55.6	2.7

Sources: (1) IMF, World Economic Outlook, may 1996.

(2) CEPII-CHELEM data base, 1997.

(3) World Bank, Global Development Finance, 1997

If the debt is denominated in the same currencies as the foreign trade, then pegging a trade-weighed basket remains the optimal policy. But this is not the case in Asia where the country distribution of foreign trade does not fit the currency distribution of the external debt, as evidenced in Table IV.

differ according to each specific credit arrangement. Finally, 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 rate differentials.

[7] The trade balance is influenced by the real exchange rate, while valuation 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 domestic inflation. Hence, the debt ratio rises when the real exchange rate depreciates.

Table IV: the mismatch between the country-distribution of foreign trade and the currency-distribution of the external debt in selected Asian countries, in 1995.

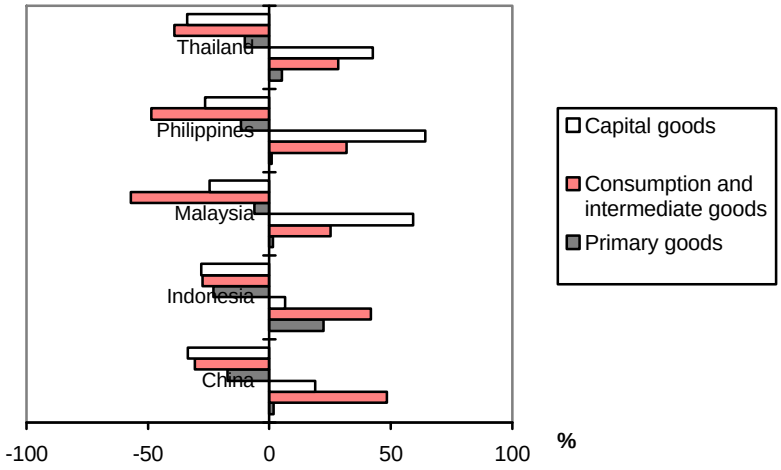
	% of exports to				% of imports from				% of the long-term debt in	
	The US	Japan	Other Asia	EU15	The US	Japan	Other Asia	EU15	USD	Yen
China	26.9	22.3	17.1	18.9	13.1	26.8	29.8	15.3	57.9	20.7
Indonesia	14.0	28.4	27.5	15.2	8.7	26.1	23.8	19.6	21.5	35.4
Malaysia	22.9	14.0	36.5	14.0	12.9	26.3	31.8	16.0	45.1	31.7
Philippines	37.2	18.6	21.3	14.7	19.0	26.8	21.1	11.2	31.5	36.9
Thailand	19.7	18.5	25.1	15.6	9.8	31.1	22.3	17.0	26.6	48.1

Sources: CEPII-CHELEM data base and The World Bank.

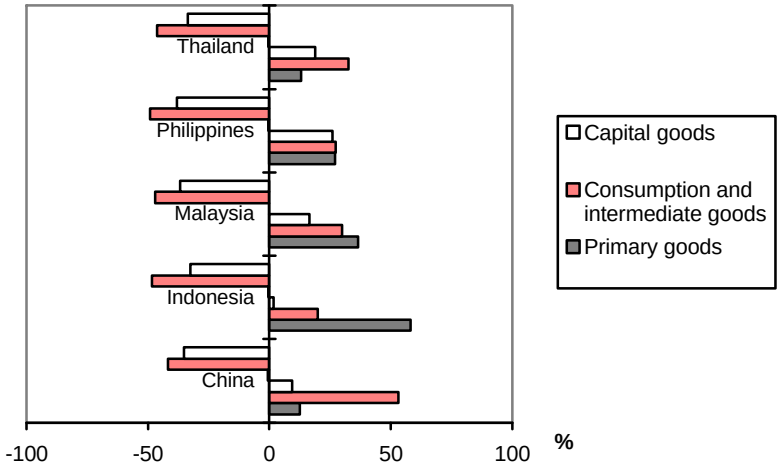
Except in China, the share of Japan as a trade partner (especially on the export side) is smaller than the share of the yen for debt denomination, and it is generally smaller than the share of other Asian trade partners which has been growing since 1973. The competition among Asian countries other than Japan is underestimated in the table since it does not include competition on third markets like in the US. Conversely, it has been argued by Kwan (1994) that for ASEAN countries, Japan is more a capital goods supplier than a competitor. A depreciation against the yen raises the competitiveness of exports, but more imported, capital goods are needed to produce the additional exports, and the net effect on the trade account is ambiguous. This is not the case for trade with the US which contains approximately the same share of capital goods in the import side as in the export side (Figure 1). In addition, primary goods account for a large share of exports to Japan. These exports scarcely compete with Japanese products, so their competitiveness is not related to the exchange rate against the yen. For Indonesia and Malaysia, this argumentation is reinforced by the fact that energy accounts for 48% and 23% respectively of exports to Japan.

Figure 1: the distribution of foreign trade in selected Asian countries in 1995

5a: distribution of exports to (+) and imports from (-) the US



5a: distribution of exports to (+) and imports from (-) Japan



It can be concluded that the exchange rate against the yen should not be prominent in the competitiveness index of Asian countries, while it is crucial for valuating the external debt. This mismatch raises the question of the definition of the basket to be pegged. This question is addressed in the next section.

4. PEGGING THE USD AS A COORDINATION FAILURE

The competition among Asian countries raises the question of monetary cooperation: because similar policies do not affect bilateral competitiveness, exchange rate movements have less impact on the overall competitiveness than expected, while they have a cost in terms of debt revaluation. In such a framework, cooperation should bring welfare improvement.

It is assumed here that the monetary authorities in two Asian countries i (i=A,B) wish to stabilise both their external competitiveness c_i and the real price of their external debt f_i:

$$\underset{e_{i\$}}{Min}\ L_i = \frac{1}{2}\left(c_i^2 + \beta\ f_i^2\right), \qquad i = A,B \tag{6}$$

This loss function can be derived from one in terms of the trade account (which depends on c_i) and the external debt burden (which is a function of f_i) [8]. Each country is assumed to control its bilateral exchange rate against the USD, $e_{i\$}$. The question is whether it is optimal to change $e_{i\$}$ when the yen moves against the USD (using the exchange rate against the yen as an instrument would lead to the same results).

Both c_i and f_i are real, effective exchange rates, but the weights used to compute them differ. We write a_j for the weight of country j as a trade partner (j=$,Y,B), and b_j for the weight of currrency j for debt denomination (for the sake of simplicity, the same subscribts refer to countries and to currencies). The fact that trade is frequently dollar-denominated in Asia does not mean that the real exchange rate of country A against country B is irrelevant: if currency A depreciates against currency B, but not against the USD, country A firms either increase the USD prices of their exports (raising their margins) or maintain constant prices in USD (improving their competitiveness against those country B competitors who do not reduce their prices in dollars, i.e. those who do not compress their margins). In both cases, exports are boosted in country A (because of increased profitability or of increased competitiveness).

The real, effective exchange rates (REER) c_A and f_A can be written:

$$\begin{cases} c_A = a_\$\ e_{A\$} + a_Y\ e_{AY} + (1 - a_\$ - a_Y)\, e_{AB} \\ f_A = b_\$\ e_{A\$} + b_Y\ e_{AY} + (1 - b_\$ - b_Y)\, e_{AB} \end{cases} \tag{7}$$

where e_{Aj} stands for the logarithm of the real exchange rate of currency A against j. Equation (7) can be re-arranged as:

[8] A similar model could be drawn from the distinction between the country distribution of exports and the country distribution of imports (adjusted for price elasticities). As highlighted by Kwan (1994) and confirmed in Table IV, the share of Japan is higher for imports than for exports. Thus, the exchange rate *vis-à-vis* Japan accounts more for the inflation target than for the competitiveness target, leading to the same type of arbitrage.

$$\begin{cases} c_A = e_{A\$} - a_Y\, e_{Y\$} - (1 - a_\$ - a_Y)\, e_{B\$} \\ f_A = e_{A\$} - b_Y\, e_{Y\$} - (1 - b_\$ - b_Y)\, e_{B\$} \end{cases} \quad (8)$$

Similar relations prevail for country B (both countries are assumed identical). If each country minimises its loss function without taking the reaction of its partner into account, we get the following Nash-equilibrium:

$$e_{A\$} = e_{B\$} = \frac{(a_Y + \beta b_Y)}{(a_\$ + a_Y) + \beta(b_\$ + b_Y)} e_{Y\$} \quad (9)$$

Equation (9) gives the reaction of each Asian exchange rate against the USD to yen/USD variations. In the special case where $a_\$ = a_Y = b_\$ = b_Y = 0.5$, i.e. when all trade and capital flows are carried out equally with the US and with Japan, then (9) becomes:

$e_{A\$} = e_{B\$} = 0.5\, e_{Y\$}$: when the yen appreciates by 1% against the dollar, each country appreciates its currency by 0.5% against the dollar, which means a 0.5% depreciation against the yen. This peg to a basket maintains the REER constant both in terms of trade weights and in terms of debt weights.

According to Section 3, however, a_Y should be rather low. Here, we assume $a_Y = 0$. According to Table IV, 21 to 35% of each Asian country's external trade (average of export and import shares) is carried out with Asian countries other than Japan. The weight of the US lies between 11 and 28%. The remaining exports are directed to Japan (20 to 27%), the European Union (13 to 17%) and the rest of the world (13 to 20%).

Here, the rest of the world is aggregated to the US because it mainly covers countries which *de facto* peg their currencies to the US dollar, namely Australia, Canada and countries from the Persian Gulf. After re-normalising, we get $a_\$ = 0.47$ (Malaysia) to 0.67 (Philippines). As an illustration, we take $a_\$ = 0.6$ (detailed results by country are provided in Table V). Concerning the currency distribution of the external debt, it can be assumed from Table IV that only the USD and the yen are used. Here, we take $b_\$ = 0.4$ and $b_Y = 0.6$. The optimal exchange rate behaviour then is:

$$e_{A\$} = e_{B\$} = \frac{0.6\beta}{0.6 + \beta} e_{Y\$} \quad (10)$$

If $\beta \to \infty$, the monetary authorities of country A (B resp.) stabilise the financial REER by pegging their currencies to a basket containing 60% of yen and 40% of USD. If $\beta = 0$, they stabilise the trade REER by pegging the USD, because they think country B(A) will not modify its exchange rate against the USD in reaction to country A(B)'s policy.

For intermediate values of β, there is an arbitrage between stabilising c_i and stabilising f_i. With β=0.5, for instance, we have $e_{A\$} = e_{B\$} = 0.27\, e_{Y\$}$. When the yen appreciates by 1% against the USD, each Asian partner appreciates its currency against the USD by 0.27%. Its effective exchange rate appreciates by 0.16% in terms of trade weights,

but it depreciates by 0.33% in terms of financial weights. The welfare loss amounts to $L_A = L_B = 0.040\, e_{Y\$}^2$.

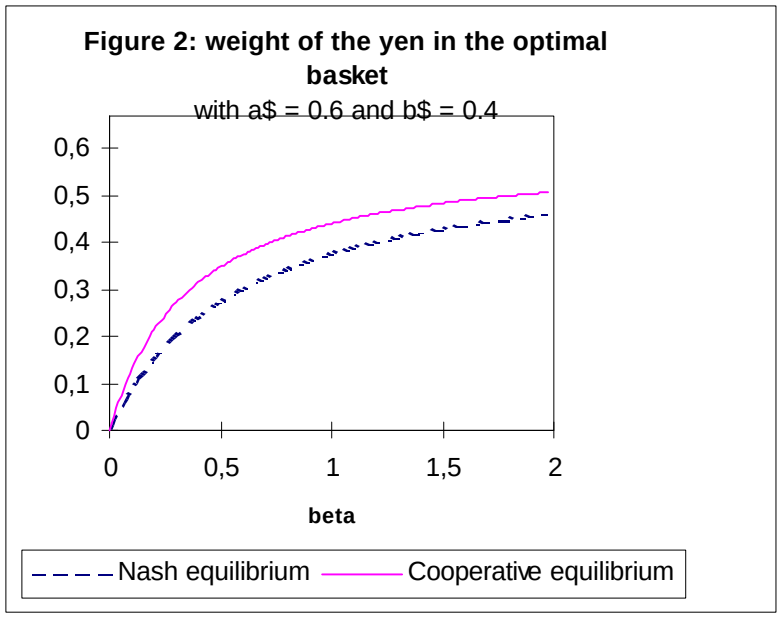
Except in the two polar cases where β=0 or $\beta \to \infty$, the two countries would have an interest in cooperating since they would stop trying to modify their bilateral competitiveness. This can be shown by deriving the co-operative equilibrium. Assuming both countries agree on the minimisation of $L = L_A + L_B$, the optimal exchange rate policy is:

$$e_{A\$} = e_{B\$} = \frac{(a_\$ + a_Y)a_Y + \beta(b_\$ + b_Y)b_Y}{(a_\$ + a_Y)^2 + \beta(b_\$ + b_Y)^2}\, e_{Y\$} \qquad (11)$$

In the special case where $a_\$ = a_Y = b_\$ = b_Y = 0.5$, i.e. when all trade and capital flows are carried out equally with the US and with Japan, (11) still leads to pegging the currency to a basket with the USD and the yen equally weighed. With $a_\$ = 0.6$; $a_Y = 0$; $b_\$ = 0.4$; $b_Y = 0.6$, we get:

$$e_{A\$} = e_{B\$} = \frac{0.6\beta}{0.36 + \beta} e_{Y\$} \qquad (12)$$

If β=0, the optimal policy again is to peg the USD since it keeps c_i stable (given that it is the policy followed by both countries). If $\beta \to \infty$, the behaviour of the Asian partner does not interfere with the choice of an exchange rate policy since the debt is not denominated in the currency of the partner. For intermediate values of β, cooperation leads to higher values of the yen weight in the optimal basket peg as compared to the Nash equilibrium (Figure 2). With β=0.5, for instance, we get $e_{A\$} = e_{B\$} = 0.35\, e_{Y\$}$: when the yen appreciates by 1% against the USD, each Asian partner appreciates its currency by 0.35% against the USD, instead of only 0.27% in the absence of cooperation. Its effective exchange rate appreciates by 0.21% (instead of 0.16%) in terms of trade weights, but it depreciates by only 0.25% (instead of 0.33%) in terms of financial weights The loss of each country shrinks to $L_A = L_B = 0.038\, s_{Y\$}^2$, which represents a 9.5% welfare improvement. Cooperation eliminates ineffective variations in bilateral exchange rates. It stabilises the effective exchange rate in terms of financial weights with little loss in terms of trade weights.



What is the likely value of β ? If monetary authorities have a foreign account target, they will be indifferent between a 1% of GDP variation in the trade account and a 1% of GDP variation in the debt service. With a debt service totalising 10% of GDP, a 1% depreciation of f_i raises the debt service by 0.1% of GDP. Taking price elasticies of 1.9 for exports and 0.5 for imports (as estimated by the Mimosa Team (1997) for the NICs), and an export/GDP ratio of 25%, a 1% depreciation in c_i increases the trade account by 0.35% of GDP. Thus, a 1% variation of c_i is equivalent to a 3.5% variation in f_i, which leads to β = 0.08. The corresponding solutions are $e_{A\$} = e_{B\$} = 0.07\ e_{Y\$}$ in the Nash equilibrium and $e_{A\$} = e_{B\$} = 0.11\ e_{Y\$}$ in the cooperative case.

Table V: Optimal basket peg for selected countries.

Country	$a_\$$	$b_\$$	Optimal weight of the yen in the basket peg			
			β = 0.5		β = 0.08	
			Nash	Cooperative	Nash	Cooperative
China	0.60	0.74	0.12	0.15	0.03	0.05
Indonesia	0.54	0.38	0.30	0.39	0.08	0.13
Malaysia	0.47	0.59	0.21	0.28	0.06	0.11
Philippines	0.67	0.46	0.23	0.28	0.06	0.08
Thailand	0.60	0.36	0.29	0.37	0.07	0.12

Sources: Table IV and author's calculations made with $a_Y = 0$ and $b_Y = 1 - b_\$$.

The results are detailed for each country in Table V. They show that cooperation would be a way of increasing the yen share in the implicit basket peg of indebted Asian countries, although the yen would remain a partial anchor. However, the extent of this phenomenon would crucially depend on the development of the Japanese currency for debt denomination: as stocks move slowly, Table V may over-value $b_{\$}$ and subsequently under-value both the optimal weight of the yen and the discrepancy between the Nash equilibrium and the cooperative equilibrium. The weight of the yen in the optimal basket is also bounded by the behaviour of trade partners other than the US, Asia and Europe. In the model, these were considered to peg their currencies to the US dollar. If such a peg was re-considered, there would be some room for an increasing role of the yen as an anchor in Asia (because $a_{\$}$ would be smaller). Finally, pegging European currencies was not considered in this paper. Introducing European currencies in the optimal baskets would lower the weights of both the dollar and the yen. More generally, pegging the USD instead of a basket gets worse as the number of USD peggers in the world gets lower. This suboptimality can stay hidden when the USD depreciates. But the dollar appreciation since the mid-1995 has weakened the implicit regional cooperation around the dollar, because each country had a growing incentive to quit the peg.

In brief, the above figures should be considered only as illustrative. The important point is that cooperation could improve the welfare of Asian monetary authorities by raising the weight of the yen in their currency basket anchors, although the size of this rise is debatable. However, such a cooperation on exchange rate management seems relatively unlikely: as pointed out by Eichengreen and Bayoumi (1996), the history of Asian countries differs substantially from that of European countries, making them quite reluctant to loosing monetary sovereignty. This feature implies that the USD will likely remain the prominent reference for exchange rate management. As argued by Frankel (1995), Asian countries may ask for more USD financings (instead of yen financings) rather than consider pegging the yen.

5. CONCLUDING REMARKS

Since the very beginning of the European construction, EC members have advocated monetary integration as a key element of real integration. This view was operationalised through the European Snake and Exchange Rate Mechanism, which tried to maintain stable exchange rates within the European Community despite the breakdown of the Bretton Woods system. The monetary union project is nothing but the completion of the European view of integration.

This paper shows that monetary integration may not be the only way of achieving real integration. In recent years, Asian countries have become increasingly integrated through trade and capital flows. Nevertheless, no currency bloc has emerged in the sense of stable exchange rates against the yen. It is shown here that the theory of optimum currency areas is not the right framework to understand the *de facto* pegging strategies in Asia: the relative stability of exchange rates against the USD is not accounted for by standard variables highlighted by the OCA literature, in contradiction to what happens in Europe *vis-à-vis* the DM. In fact, the OCA theory was designed for industrial countries with a long, common cultural history. It does not make room for debt variables and coordination failures.

This point is developed in a simple, game-theoretic model where the lack of cooperation among Asian countries leads them to broadly peg their currencies to the USD, while Asian countries may be better-off in weighing more the yen in their basket pegs given the currency distribution of their external debt. However cooperation would imply loosing some monetary sovereignty. Asian countries may prefer to re-allocate their external debt in favour of the USD rather than establish a common exchange rate policy.

By contrast, Central and Eastern European Countries will have stong incentives to peg the forthcoming euro rather than the dollar, given the very large share of their trade carried out with the European Union. They may suffer from debt revaluations if the dollar was to become the main currency of debt denomination in the region. Asian exchange rate policies should carefully be studied in Europe were similar dilemma may appear in the future.

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