NBER WORKING PAPER SERIES

TRADE AND FINANCIAL INTERDEPENDENCE UNDER FLEXIBLE EXCHANGE RATES: THE PACIFIC AREA

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Working Paper No. 1517

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
December 1984

An earlier version was presented at the 14th PAFTAD Conference in Singapore, the Institute of Developing Economies in Tokyo, Taiwan National University in Taipei, and Bank Negara Malaysia in Kuala Lumpur. Comments from participants are gratefully acknowledged. Thanks are also due to C.T. Hu for help with the computations. The research reported here is part of the NBER's research program in International Studies and project in Productivity (World Economy). Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

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ABSTRACT

This paper analyses policy interdependence under flexible exchange rates and its implications for middle-income countries in the Pacific area. In the first part of the paper, the consequences of strategic behavior among industrial countries are illustrated by means of a simple diagram. It is argued that in the absence of incentives to coordinate macroeconomic policies among major countries, exchange rates will tend to be volatile. Evidence on the world value of the dollar in the flexible rate period is then presented and interpreted.

The second part describes exchange rate policies in the Pacific area. It is found that the widespread policy of pegging to the U.S. dollar has implied occasional large devaluations against the numeraire (Korea, Taiwan, Thailand, Philippines and Indonesia). An alternative, which requires higher Pacific trade and financial interdependence than the one prevailing during the last decade, would be a joint float along the lines of the policies seemingly pursued by Malaysia and Singapore.

The two-country macroeconomic model presented in the Appendix can be used to assess the costs and benefits of policy coordination both at the world and at the regional level.

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SUMMARY

INTRODUCTION

The performance of the world economy in the last ten years has been very uneven. In industrial countries, growth was much slower than expected: it fell from 5% per annum in 1960-73 to about 2% in 1973-82. The slowdown was less brutal in developing countries, where the rate fell from 6% to 4½% between the two periods. Among those, the ones in the Pacific area managed to sustain an annual rate of growth of 7½%, close to the high rate of 8% they recorded in the previous period. Nevertheless, if policies in industrial countries continue to be contractionary, or if major exchange rates continue to be volatile, it will be harder to sustain Pacific growth without a substantial increase in trade and financial interdependence among the middle-income countries of the region.[1]

Expectations of self-sustained fast and stable growth in the OECD area had been formed during the so-called the post-war "belle epoque". For twenty-five years, macroeconomic policies preserved full employment and reasonable price inflation at home while allowing for a rapid expansion of international trade and capital movements. Judged by this standard, the performance of the last decade has generated the belief that Atlantic prosperity is over. In the process, skepticism about the effectiveness of national macroeconomic policies in restoring full employment without inflation, or in reducing inflation without unemployment, became widespread.

The volatile policy environment of recent years reflects this skepticism: high trade and financial interdependence implies conflicts

between national policy objectives and gives rise to strategic behavior by national actors, whose outcome may be inefficient. In the seventies, these conflicts were exacerbated by the oil shocks. In the early eighties, the rise of the dollar also had the effect of a global shock. Moreover, when there are shared instruments, such as the exchange rate, which are very sensitive to expectations about the future, signals of the lack of credibility of a particular macroeconomic policy package become evident in the foreign exchange market. To offset these signals requires a high degree of international policy coordination.

In the absence of conflicts among national policy objectives, expectations about the future would be less volatile. Intentions of international policy coordination would then become credible and, as a consequence, a fixed exchange rate regime, such as the one which prevailed during the post-war "belle epoque", could be enforced. If the exchange rate between major currencies were fixed, on the other hand, macroeconomic policy in smaller countries might be facilitated.

Even though international policy coordination would support a fixed exchange rate system, there is no incentive to coordinate. Because each one of the countries would be better-off if the other country initiated monetary expansion, an explicit agreement, monitored by an international organization, would be required to enforce the coordinated expansion in the two countries. The task would clearly be more difficult if the coordination was to be achieved among a large number of countries, or if the two countries were not similar.

The design and implementation of a comprehensive recovery program among industrial countries would also have to imply that expectations of future changes in exchange rates settle at some "equilibrium" value.

Otherwise expectations would remain volatile and so would exchange rates and competitiveness. Credible government intervention in the foreign exchange market to limit exchange rate volatility would surely be desirable. However, it would involve operations of a scale which does not seem viable under the present international order. The degree of international monitoring required may even raise fundamental value judgements about the sovereignty of nation-states.

The slowdown of inflation cannot induce a worldwide recovery of private economic activity which is expected to last, as it did during the post-war "belle epoque", until macroeconomic policies of major countries are not better coordinated, both internally and internationally.[2] Furthermore, the substantial fiscal inbalance between the United States and other OECD countries is likely to call for a serious macroeconomic adjustment in the years to come, and this will be reflected in the world value of the dollar.

In the meantime, the skepticism about the effectiveness of central bank intervention policies need not be a reason for undue pessimism about the sustainability of world economic recovery. Indeed, the rise of stock market prices in major industrial countries in early 1983, the concerted steps to deal with the "external debt problem" without a major financial crisis, and the strong recovery of the United States allow for some optimism.

The paper is organized into two Sections. First, a theoretical assessment of the different outcomes of a policy interdependence game between two similar (industrial) countries linked by international trade and high capital mobility is presented. The results are expressed as deviations from a long run equilibrium where expectations are fully

realized. They are followed by a quantitative explanation of the world value of the U.S. dollar in the last ten years, which, instead, gives a large weight to the volatility of expectations about the long run fundamental determinants of the international competitiveness of U.S. products.

The implications of the contractionary bias implied by strategic behavior in industrial countries and of the volatility in major exchange rates for the middle-income countries in the Pacific area are assessed in Section II. Exchange rate policies in several of these countries reveal a benign pegging to the U.S. dollar, which contrasts both with the fervent experimentation prevailing in the Southern Cone of America and with the tradition of currency unions encountered in West Africa. This neglect of the volatility of the dollar explains why, in the last few years, some countries changed the peg by means of sharp devaluations. These have hindered regional trade and financial interdependence, thereby increasing the vulnerability of the Pacific area to policy games played elsewhere. The consequences of policy coordination in the area along the lines of a "joint float" are taken up in the conclusion.

I. POLICY INTERDEPENDENCE UNDER FLEXIBLE RATES

The idea that macroeconomic policies would become increasingly ineffective if they did not recognize the increased interdependence among nation-states was put forth in the late sixties, in the context of the North Atlantic area. It has been widely discussed among economists and political scientists since then, and the world "interdependence" has also been prominent in national and international policy debates.[3] Furthermore, historians have used the notion of a "world-system" in discussions not only of the 19th century but also of earlier periods. A "world-system" is based on a network of channels of trade and financial interdependence among countries and implies reciprocal constraints on the attainment of their domestic macroeconomic policy objectives. These constraints, which might be codified into explicit international rules or agreements, also apply to the periphery of the system where the reciprocity of interdependence is absent.

The very popularity of the term interdependence suggests several meanings. The most relevant for macroeconomic policy pertains to the leakage abroad of a particular measure. One country's policy has effects on another country which in turn have repercussions on the first country and vice-versa. If interdependence increases, the effect of the policy on the output of the initiating country tends to be smaller and the output effect abroad tends to be larger.[4]

When prices are allowed to vary, macroeconomic disturbances will change not only output but also the terms of trade. Since these refer both to the competitiveness of domestic versus foreign goods - measured

by the real exchange rate - and to the relative price of consumption and saving - measured by the real interest rate - , trade and financial interdependence crucially affect the transmission mechanism. Capital flows ensure that the return on foreign assets (in domestic currency) equals the return on domestic assets, at least in the absence of exchange controls as well as of risk-aversion on the part of international investors. By assuming that this arbitrage condition holds, we overstate the constraints implied by financial interdependence. This is appropriate for a discussion of Atlantic policy interdependence, where financial flows are hardly controled, but should be qualified in discussing Pacific issues. In any event, the relative strength of the effects of monetary policy on exchange rates and interest rates is crucial for the outcome of the policy game analyzed below.

In the late sixties, international economists were virtually unanimous in claiming that exchange rate flexibility would insulate national economies from each other, thus allowing greater macroeconomic control of interdependence. With volatility of major exchange rates becoming a central feature of world financial markets in the last ten years, unanimity disappeared. Certainly, volatility has not been as detrimental to international trade and payments as some feared but, because of slower adjustment in goods markets, it has generated far more variation in the relative price of national outputs than would be called for by underlying demand and supply disturbances.

The prevailing skepticism about the effectiveness of central bank intervention in large, well organized foreign exchange markets suggests that exchange rate volatility in the last ten years has derived from problems of credibility of national government policy.[5] The stance of

the U.S. administration, on the other hand, may be related to the special role of the U.S. dollar in the international monetary system.

1. Strategic Behavior in Industrial Countries

Even in a theoretical world of two symmetric interdependent economies, conflicts of national policy objectives imply a flexible exchange rate system. The reason is that these conflicts tend to be solved by non-cooperative methods.[6] If the monetary authorities were to cooperate, they would jointly try to reduce inflation and unemployment and the solution would be efficient for both countries. Because there is no reason for either country to believe that the other country will cooperate, this solution will not arise spontaneously. A credible rule or agreement monitored by an international agency, will be necessary to enforce cooperation. If the two countries are identical, this cooperative solution will support a fixed exchange rate.

In the absence of an international monitoring agency, the two monetary authorities will not behave cooperatively. Instead, they each will try to attain the domestic objective, based on an anticipation of the other country's policy response. This outcome will be inferior to the cooperative outcome, as it involves a social loss arising from the inefficient allocation of resources.

If only one country - the leader - correctly anticipates the other country's response, however, the outcome will be asymmetric. Even if the two countries gain, the leader gains proportionately less than the follower. Furthermore, if the two countries are identical, there is no economic reason for either one to act as leader and therefore the

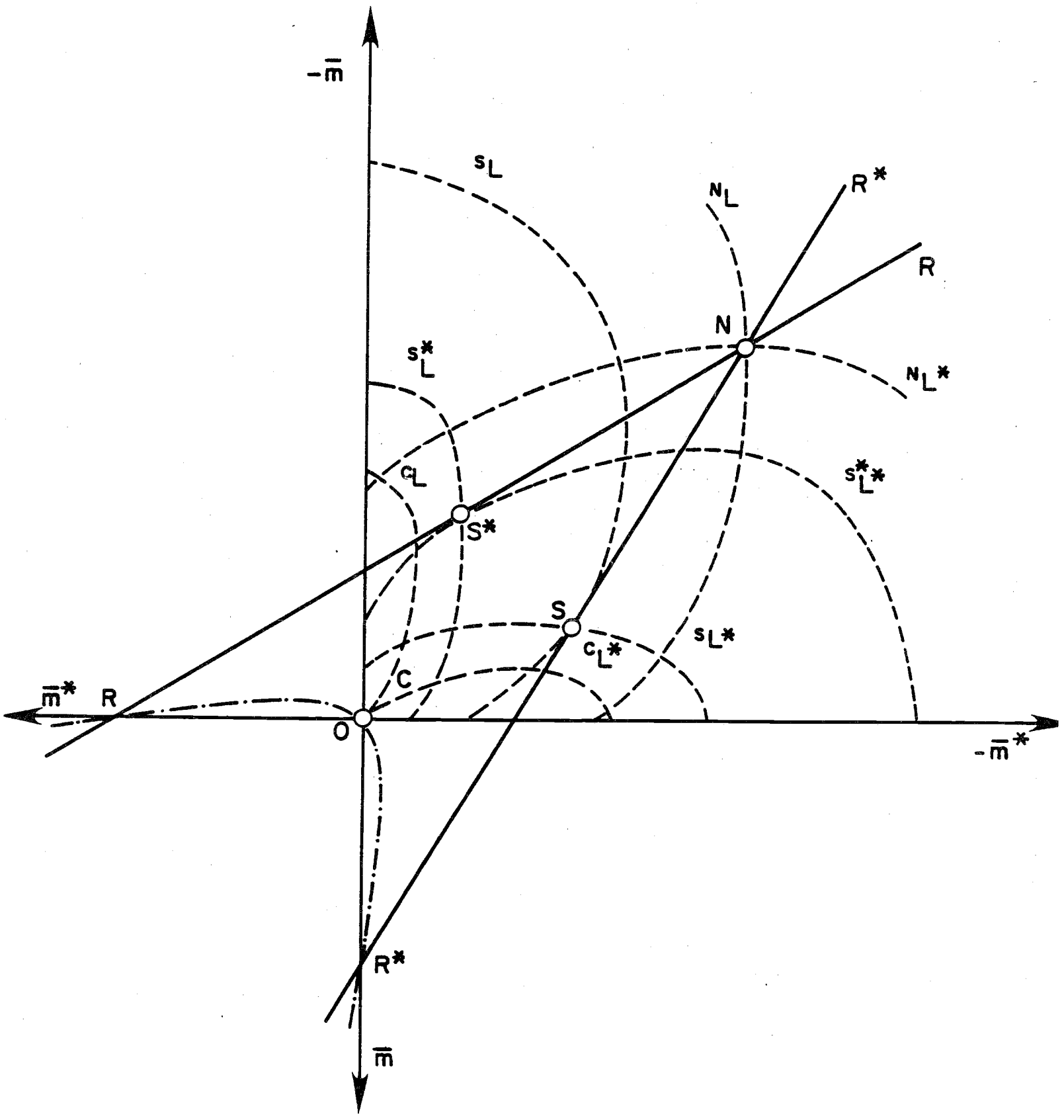
spontaneous outcome will be the symmetric non-cooperative solution, which is the one where both countries are worse-off. These theoretical possibilities are consistent with the observed reluctance of major industrial countries to act as leaders, or "locomotives", even though they advocate cooperation.

To illustrate the framework, consider the case where the price of domestic output is rigid in both countries. Then the cooperative solution succeeds in eliminating unemployment, while monetary expansion sustains a fixed exchange rate and the same inflation in both countries. If each country tries to lower inflation by appreciating the currency, neither one succeeds in eliminating unemployment. This outcome hinges on the dominance of interest rate effects on money demand rather than on investment as well as on large trade elasticities. It is therefore the appropriate one to focus on when the consequences of trade and financial interdependence must be assessed. Furthermore, in this setup, the leader will overexpand knowing that the follower will appreciate the currency. This appreciation lowers inflation while the leader's expansion reduces unemployment, so that the gains of the follower are greater than the gains of the leader. Therefore, both will be reluctant to take initiative and remain at the relatively less desirable symmetric non-cooperative point.

This example is illustrated in Figure 1. Taking the log-linear two-country macromodel described in the Appendix and assuming that the authorities are minimizing the deviations of output and the price level from their steady-state values, we can define the loss contours in the space of the single instrument available in each country, the money stock, m and m*. By normalization, we choose as the origin the

Figure 1

Strategic Responses to a Price Rigidity



cooperative solution where the monetary expansion accomodates the price rigidity (point C in Figure 1). This yields a common loss ${}^{C}L = {}^{C}L^*$. Since all other solutions shown involve lower money stock, the direction of the axis is reversed. The straight lines RR and R*R* are the loci of the reaction functions of the domestic and foreign country, respectively. Their intersection denotes the non-cooperative outcome, labelled N, where loss is greatest ${}^{N}L = {}^{N}L^*$. At that point, though, the money stocks remain equal so that the exchange rate does not move. If the home country acts as a leader, the outcome is preferable for both ${}^{S}L > {}^{N}L$ and ${}^{S}L^* > {}^{N}L^*$. However, the home country would prefer to be a follower since ${}^{S}L > {}^{S^*}L^*$ and similarly for the foreign country ${}^{S^*}L^* > {}^{S}L^*$.

A fixed exchange rate agreement, forcing the solution to be on the 45° line, would prevent the two countries from reaching N or, for that matter, S or S*, since at those points the exchange rate will have to change. The problem is how to make a commitment to fix the exchange rate credible, since there would be incentives for each country to wait for the other country to expand and be the "locomotive". An international agreement such as the one underlying the Bretton-Woods system, monitored by an international organization, would be needed to solve the problem, even in a two-country world. Even if such agreement existed, though, the mere expectation of exchange rate changes would generate incentives to depreciate or appreciate the currency and undermine the credibility of the system.

Note finally that the unemployment which is associated with the non-cooperative solution would, in the absence of other shocks, imply over time a lower rate of inflation so that, in the long run, it might be preferable to the more inflationary cooperative solution.[7] This is

related to the neglect of internal cooperation, and requires a dynamic analysis where expectations adjust, like the one underlying the discussion to follow.

Nevertheless, it can be said that the qualitative analysis of the prospects for world recovery based on the strategic interaction of two symmetric economies is consistent with the protracted stagflation in the OECD area, to the extent that the interest rate effects of monetary policy have dominated. This has constrained recovery in industrial countries and, as mentioned, a sustainable OECD recovery is necessary - but perhaps not sufficient - for sustainable growth in the Pacific as well as for economic recovery in the world at large.

2. The volatility of expectations and the world value of the dollar

As shown in Table 1 below, the dollar exchange rates of major currencies have been quite volatile. To obtain an indicator of the world value of the dollar, we average major bilateral exchange rates in proportion to the country's gross domestic product in dollars (multilateral weights).[8] In the last ten years, this indicator shows a phase of relative stability prevailing from 1973 to early 1976; a phase of devaluation extending until mid-1980; and a phase of steep appreciation continuing until the present.

Due to the stability of relative inflation rates, the variations in the nominal effective exchange rate of the U.S. dollar have been matched almost exactly by variations in its real exchange rate. Goods price arbitrage was therefore very weak.

In a large well-organized speculative market, asset price or intertemporal arbitrage ensures that actual exchange rates equal their discounted expected equilibrium values. For example, in the presence of inflationary expectations, a positive real differential of 5 per cent per annum in the U.S. will be associated with an equal expected real appreciation of the dollar. Unlike relative goods prices, real interest differentials do seem to be correlated with the exchange rate. Nevertheless, only one fourth of the quarterly volatility of the nominal exchange rate of the dollar from 1973 to 1982 can be explained by intertemporal arbitrage.

In sum, the real exchange rate today will differ from the real exchange rate yesterday due to the change in the real interest differential and to the change in expectations about the equilibrium real exchange rate. If these are taken as given, exchange rate movements can be captured by arbitrage conditions.[9]

But expectations about the equilibrium real exchange rate cannot be taken as given. Information on which they are based varies, sometimes dramatically, from day to day. These changes are not only due to changes in the fundamental determinants, but also to the existence, recognized by market participants, of some probability of a sudden return to the equilibrium value. Similarly, the belief in a change in policy regime, even if it is erroneous, can be a source of changes in expectations, which will be all the more important in an unstable environment.[10] A rough way of embodying the influences of changes in expectations, or "news", about the long-run equilibrium real exchange rate is to take the residuals from an equilibrium model of the real exchange rate. This is conditional upon specifying the correct equilibrium model.

With financial markets of major industrial countries highly integrated, capital is free to move across different currencies. If international investors compare risk and return characteristics of assets, so that they exhibit risk-aversion, equilibrium exchange rates will be influenced by portfolio considerations.[11] Take a simplified setting in which the change in the equilibrium real exchange rate can be expressed as a function of the accumulation of foreign currency deposits by the U.S. residents (current account) and of the relative monetary and growth conditions in the U.S. and abroad (velocity). An empirical application of this equilibrium model over the floating period shows that, on average, a unit fall in the normalized relative current account surplus of the U.S. induces a depreciation of real effective exchange rate of the dollar by one fourth whereas the average effect of a fall in velocity is a one-to-one real depreciation.[12] Changes in fundamentals explain 40 per cent of the actual volatility of the real exchange rate.

The difference between actual changes and equilibrium changes is then used as a proxy for "news". The explanation of the changes in the nominal exchange rate also includes the arbitrage variables: relative inflation rates and changes in real interest differentials. A special effect due to the change in the U.S. Administration is allowed for. All variables except the "news" become insignificant and the regression explains over 60 per cent of the variance of the nominal exchange rate.[13]

The importance of "news" shows the difficulty in anticipating exchange rates changes. This also reduces the ability of central banks to dampen volatility by intervention. Bearing in mind the simplicity of the estimation methods used, the results confirm the advantage of relying on a portfolio equilibrium framework rather than exclusively on arbitrage

conditions. Since it only allows for currency diversification, this simplified equilibrium model cannot capture the U.S. fiscal-monetary mix after 1982. Renewed expectations of a fiscal deficit raising U.S. real interest rates are required for the equilibrium real exchange rate to continue appreciating in spite of a widening current account deficit.

II. PACIFIC TRADE AND FINANCIAL INTERDEPENDENCE

Rather than attempting to estimate the measures of trade and financial interdependence emphasized earlier, we assess interdependence among the middle-income countries of the Pacific area by an investigation of their exchange rate regime, an analysis of regional trade patterns, and an overview of trade in relative prices -- as measured by trade-weighted effective exchange rates deflated by relative consumer prices (subsection 1). It will become apparent that trade and financial interdependence is channeled through the two entrepots of the region, Singapore and Hong-Kong. Furthermore, the analysis of Section 1.1 is relevant to Singapore and Malaysia, where most of the ingredients of trade and financial interdependence can be found (subsection 2).

Nevertheless, as stated in the conclusion, trade and financial interdependence in the middle-income countries of the Pacific as a group is still quite low by North Atlantic standards.

1. Exchange rate regimes in Pacific middle-income countries

As mentioned, both the nominal and the real effective exchange rates of the U.S. dollar depreciated from 1977 to 1980 and appreciated since then. This remarkable medium-term swing followed a period of relative stability with a mild depreciation in 1975. As a rule, the Pacific middle-income countries followed this pattern closely. Except for 1983, when they let the dollar appreciate in nominal and real terms, the trade-weighted exchange rates of most Pacific middle-income countries have depreciated and appreciated with the dollar, in what may be called

an exchange rate policy of "benign neglect". While a distinction can be made between "peggers" and "floaters", it does not necessarily coincide with the official exchange rate regime, as described, say, in the Fund's Annual Report on Exchange Restrictions.

Indeed, no country is explicitly pegged to the U.S. dollar. Rather the peg is an undisclosed basket of trading partners' currencies. On the other side, the two floaters, Malaysia and Singapore, are to a large extent bilaterally pegged despite the absence of a formal commitment to that effect.

Consider the five (unofficial) dollar peggers. During 1975-82, their effective exchange rates followed the dollar's, with some anticipating it. Thus Philippines and Korea deprecitaed in 1976 and 1982, while Indonesia and Thailand appreciated in 1979 and the Philippines in 1980. Changes in effective exchange rates were also brought about by discrete devaluations against the dollar. This was the case in 1983 for Indonesia and Philippines (both by about 150%), in 1982 for Taiwan (13%), in 1981 for Thailand and Taiwan (38% and 17% respectively), in 1980 for Korea (about 120%), in 1978 for Indonesia (200%), in 1975 for the Philippines (30%) and in 1974 for Korea (85%). Singapore and Malaysia also let their currencies depreciate against the dollar in 1975, by 50% and 30% respectively.

Since these devaluations are not synchronized, the correlation between the (end-of-period) dollar rates of the peggers is very weak over the period from the second quarter of 1973 to the second quarter of 1984. Indeed, the only value higher than .5 is between Thailand and Taiwan. In contrast, among the main industrial partners of the United States except Canada the correlation among dollar rates is generally higher than .5

(the only lower values are .4, between Japan and the United Kingdom and Italy). The correlation of the dollar rates of the Pacific peggers with the yen-dollar rate is also quite weak, the highest being Taiwan (.32).

The two joint floaters, however, exhibit a correlation of about .9 between themselves and also with the mark-dollar rate. The correlation with the yen-dollar rate is about .5, slightly lower than the one between the yen-dollar and the mark-dollar rates. Table 1 shows the variability of the Pacific peggers relative to the floaters and to the currencies used in the computation of the effective rate of the dollar described above. Despite the crude measures used, it is clear that variability is lowest for the dollar peggers.

To analyse the trends in trade-weighted exchange rates, some indication of trade shares and elasticities is needed. Since trade elasticity estimates discriminating between the imports of various origins are not easily available, the network of trade interdependence has to rely on measures of average openness.[14] But, in the model of Section I.1, a large multiplier or a high elasticity substantially increases the degree of trade interdependence and leads to a strong negative feedback of monetary policy. A merchandise trade matrix, while it neglects invisibles and smuggling, provides a rough approximation to the trade channel of structural interdependence. In Table 2, the Pacific middle-income countries are arranged as the four NICs and the so-called New NICs which include ASEAN countries less Singapore. To make the role of the overlapping country more apparent, shares less than 1.5% were set to zero. As a consequence, rows and columns do not add up to the numbers reported under total. The last row and column refer to the share of the country's trade accounted for by other Pacific middle-income countries.

Table 1
Volatility of Dollar Exchange Rates (% p.a.)

	Mean	Coefficient of variation	Range
Major currencies			
Canada	2.6	3	38
France	6.3	4	100
Germany	0.6	42	113
Italy	10.3	2	118
Japan	-0.4	53	100
United Kingdom	6.1	3	94
Pacific Floaters			
Malaysia	-0.4	31	72
Singapore	-1.2	10	66
Pacific Peggers			
Indonesia	9.4	4	204
Korea	6.6	3	87
Philippines	9.4	3	117
Thailand	0.9	7	49
Taiwan	0.4	12	38

Note: Exchange rates defined as U.S. dollars per unit of currency of country in stub at end of quarter from 1973;2 to 1984;2 (positive number indicates depreciation relative to the dollar).

Sources: International Monetary Fund, International Financial Statistics and Central Bank of China, Financial Statistics (for Taiwan).

Table 2
Pacific Trade Matrix
1979 (%)

Importer / Exporter	TW	KR	HK	SG	ML	TH	PL	ID	Total	% World
Taiwan	-	*	6	2	*	*	*	2	15	16
Korea	*	-	3	*	*	*	*	*	8	9
Hong-Kong	*	*	-	2	*	*	*	*	5	7
Singapore	*	*	6	-	12	3	*	3	27	33
Malaysia	*	*	*	11	-	*	*	*	17	27
Thailand	*	*	*	2	*	-	*	*	7	24
Philippines	*	*	*	*	*	*	-	*	3	12
Indonesia	2	2	*	11	*	*	*	-	18	20
Total	7	7	19	30	15	7	6	9	100	
% World	9	7	20	31	33	17	15	22		

Note: * less than $260 million (1.5% of total).

Source: Computed from data in Yamazawa (1984).

The largest values are for Singapore, Malaysia and Indonesia, even though Thailand on the export side and Hong Kong on the import side are also above the average of 19%.

Using the set of trade weights reported in Appendix Tables 1 and 2, nominal and effective exchange rates for our seven Pacific countries were computed (see Appendix Tables 3-9). The real rates presented are very crude proxies for relative traded goods prices due to the existence of several export incentives, but they give an idea of the evolution of the purchasing power of the domestic currency over a foreign basket of goods in relation to a domestic one.[15] We will focus on their annual average value using import weights. These tend to overstate the weight of the United States and Japan because the European Community is not aggregated. Better estimates of the weights of the EC are thus reported in the last row. Similarly, trade of Singapore and Indonesia is not reflected in the table. Using the Indonesia export shares from Table 2, the "other" category is as reported in parentheses in Appendix Table 1. This figure was used to compute a set of import weights for Singapore which may be a better approximation to reality.

According to Table 3, the nominal effective exchange rate of the dollar peggers did not on average change by more under floating than it had during most of the Bretton-Woods period. The opposite is true of the floaters. Again, a decline in the absolute value of the mean rate of change from the fixed to the flexible rate period is evident in virtually all countries. The exception is the rate of Singapore when some imports from Indonesia are allowed for. There is a real appreciation instead of a depreciation and its magnitude increases with the sharp devaluations of

Table 3

Nominal and Real Import-Weighted

Effective Exchange Rates

(% p.a.)

	Nominal mean		Real mean		Real coefficient of variation	
	1958-72	'73-83	'58-72	'73-83	'58-72	'73-83
Singapore	-0.2	-1.1	1.5	0.2	1	50
SGa	-1.3	-2.4	-1.0	-3.5	5	3
Malaysia	-0.0	-0.8	2.4	1.0	1	5
Indonesia	9.4	10.3	h	0.8	1	17
Thailand	0.6	2.6	1.9	0.7	2	8
Philippines	10.9	6.3	8.2	1.8	3	5
Korea	17.6	8.1	8.8	1.9	3	4
Taiwan	2.4	1.4	1.3	-0.5	20	21

Notes: Weights as in Appendix table 1.

a: Includes imports from Indonesia.

h: Due to the hyperinflation of the early sixties, comparable figures are not available.

Sources: Consumer prices from line 64 of IFS and FS (for Taiwan).

the Indonesian currency since 1978. The coefficients of variation (standard deviation over mean) convey the same message.

We observed in Section I.2 that the nominal and real effective exchange rates of the US dollar (using multilateral weights) were almost perfectly correlated during the floating rate period. This is not the case in the Pacific middle-income countries, as seen in Table 4: the higher correlation, .9, is for Indonesia, where the policy was one of sharp nominal devaluations. Interestingly, over the longer period, Philippines and Korea are the ones closer to relative purchasing power parity (1 and .9 respectively from 1958 to 1983). Relative inflation rates are very weakly correlated with nominal exchange rate changes. The correlation is higher with real exchange rates precisely because of the lower variability of nominal exchange rates: the lowest values are for devaluation-prone Indonesia and Korea.[16]

The cross-country correlations shown in Table 5 confirm the pattern of dollar rates discussed above: low correlations of nominal and real effective rates for most pairs of countries. Taiwan does display high real correlation with Philippines and Thailand, and the same is true between the two joint floaters, to which we now turn.

2. The Malayan joint float

The development of Singapore as an entrepot for international trade and finance has been a major factor in the trade and financial interdependence of the middle income countries of the Pacific. The economic proximity to Malaysia -- with which it once was federated -- has also been noted. It is possible to recast the policy games of Section

Table 4

Prices and Import-Weighted Exchange Rates:

Correlations

	Nominal and Real Effective Exchange Rates		Nominal EER and Relative Consumer Prices (P*/P)		Real EER and Relative Consumer Prices	
	1958-72	'73-83	'58-72	'73-83	'58-72	'73-83
Singapore	.7	.7	*	.5	.8	1.0
SGa	1.0	.8	.9	.6	1.0	1.0
Malaysia	.5	.8	.2	*	.9	.6
Indonesia	h	.9	h	-.2	h	.1
Thailand	.5	.6	-.2	-.1	.8	.7
Philippines	1.0	.8	-.3	*	-.2	.6
Korea	1.0	.6	-.3	-.4	*	5
Taiwan	.6	.6	-.2	.3	.6	.9

*less than .05 in absolute value

Annual average changes, statistics rounded to nearest decimal.

Sources: Same as table 3.

Table 5

Cross-Country Correlation

(1973-83)

	ID	ML	SG	SGa	PL	TL	TW
ML	-.1 (.1)						
SG	* (*)	.7 (.8)					
SGa	-.6 (-.3)	.6 (.8)					
PL	.6 (.4)	.1 (.4)	.2 (.4)	-.2 (.3)			
TL	.2 (.2)	.4 (.5)	.2 (.3)	.1).3)	.2 (.7)		
KR	-.2 (-.1)	.3 (.1)	.2 (-.2)	* (-.1)	.2 (.6)	.2 (.5)	
TW	.2 (.4)	.6 (.4)	.6 (.4)	.3 (.3)	.5 (.8)	.8 (.9)	.2 (.5)

*Less than .05 in absolute value.

Numbers refer to percentage changes in annual averages of nominal effective exchange rates (real in parentheses) rounded to nearest digit.

Source: Same as table 3.

I.1 in a broader set-up which allows two small countries to act on their money stocks given domestic shocks and the outcome of the policy game of large countries, as captured by their bilateral exchange rate.[17] If there are no differences in the trade pattern of the small countries with the large ones, the bilateral rate of the small countries will be fixed unless one of them acts as a leader. Otherwise, the bilateral rate of the small countries may move in the cooperative solution.

If the most relevant policy game of industrial countries is between the United States and Japan, trade patterns of Malaysia and Singapore are roughly symmetric. If, instead, the game is between the United States and Europe, Malaysia would be more sensitive to European shocks, given the weights in Appendix Tables 1 and 2.

Even in the case of a symmetric sensitivity the bilateral rate between Malaysia and Singapore could move if one of the countries acted as a leader. Due to its role as a financial center, Singapore may have performed that role in the early eighties, thereby allowing Malaysia to be less contractionary. Needless to say, a Malayan cooperative agreement would be less contractionary still.[18]

Recalling that interest rate movements are an important channel of policy interdependence, we report some evidence on the deposit rate differentials between Singapore and Malaysia in Table 6.[19] While annual averages hide a lot of information and should be used with caution, the volatility of expectations about the world value of the U.S. dollar can certainly account for the observed variations in the realized real interest differential. It seems therefore consistent with the expectation of a Malayan joint float.[20]

Table 6

Realized Interest Rate Differentials

Between Singapore and Malaysia

(% p.a.)

	(1)	(2)	(3)	(4)	(5)
	3 mo. deposit rate (period average)		consumer prices		real differential
	SG	ML	SG	ML	(+ in favor of SG)
1975	4.3	5.7	3.3	5.1	0.4
1976	3.8	5.0	-2.4	2.4	3.6
1977	4.5	5.0	3.3	4.8	1.0
1978	5.3	5.0	4.7	4.5	0.1
1979	7.2	6.2	4.5	3.6	0.1
1980	11.2	8.8	7.9	7.0	1.5
1981	7.4	10.5	8.7	9.8	-2.0
1982	6.2	10.5	3.7	6.0	-2.0
1983	6.5	8.8	1.2	3.4	-0.1

Sources: (1) Lee (1984), Table 2.5, p. 43.

(2) Bank Negara (1984), p. 464, p. 968; end-of-period averaged using quarterly averages of interbank rates.

(3), (4) Same as Table 3.

(5) = (1) - (3) - (2) + (4).

CONCLUSION

Over the last ten years, flexible exchange rates among industrial countries generated an erratic pattern in relative prices and made basic signals of resource allocation very noisy. Growth declined worldwide, but mostly in industrial countries. In the Pacific area, exchange rates were not as volatile and growth continued. Policy interdependence under flexible exchange rates may thus be partly responsible for the slowdown of growth.

Due to the erratic pattern of real exchange rates, it is very difficult to assess, let alone correct, the misalignment of the major world currencies. The preferred explanation of exchange rate volatility stressed changes in the fundamental determinants of the real exchange rate, identified as monetary velocities and current accounts. National governments can stabilize expectations about fundamentals by designing credible macroeconomic policies. The overwhelming influence of "news" and the size of world financial markets relative to central bank reserves strains the credibility of uncoordinated intervention in the foreign exchange market.

The realization that, even when the analysis is restricted to major industrial countries, intervention in foreign exchange markets cannot reduce volatility, has generated proposals designed to lessen trade and financial interdependence among the major industrial countries. The large size and efficient organization of the foreign exchange market makes the effectiveness of trade and exchange restrictions temporary at best.

An international monetary system where greater stability in exchange rates could again be expected requires a credible commitment to coordinated macroeconomic policies, and therefore the existence of incentives for policy coordination. Given the contractionary bias of the flexible exchange rate system, additional monetary expansion in the U.S. and other industrial countries could rekindle inflationary expectations and hurt the ongoing recovery.

In the absence of incentives for coordination among industrial countries, higher trade and financial interdependence among the middle-income countries of the Pacific could help preserve the growth potential of the region. The widespread policy of pegging to the U.S. dollar, while making exchange rates less volatile, has often been accompanied by sharp devaluation against the numeraire. An alternative, which requires higher Pacific interdependence than the one prevailing during the last decade, would be a joint float along the lines of the policies seemingly pursued by Malaysia and Singapore. To manage this float, monetary policy would adjust to accomodate changes in import-weighted exchange rates such as the ones presented in this paper. As financial interdependence increases, the indicators for the change in this basket peg become the fundamental determinants of the equilibrium real exchange rate, as discussed in connection with the world value of the dollar.

NOTES

1. Branson (1984) classifies the Pacific middle-income countries into Asian NICs (Hong-Kong, Korea and Singapore) and new NICs (Indonesia, Malaysia, Philippines and Thailand). He includes India as a low-income NIC, and so does Aghevli (1981). We exclude India, include Taiwan (the fourth Asian NIC) and make passing reference to Hong-Kong.

2. The interaction of internal and external coordination weakens the case for cooperation among central banks, as recently shown by Rogoff (1983). We do not incorporate these issues in the analysis, even though they are important ingredients of the skepticism about the effectiveness of macroeconomic policies mentioned at the outset. In fact, when the incentive of central banks to inflate is somehow ruled out, the presumption for cooperation re-emerges. We thus come back to the direct link between the lack of credibility of macroeconomic policies and the volatility of expectations.

3. The debate between economists and political scientists is discussed in Cooper (1984). Bressand (1982) claims that "economic security" has been declining, an idea close to the vulnerability - interdependence put forth by political scientists but also consistent with the volatility of expectations stressed below in the text.

4. For example, consider a world economy composed of two identical countries where prices are fixed. If the (common) marginal propensity to save is 10%, we know that a unit increase in world autonomous expenditure will increase world output by ten. Assume

now a marginal propensity to import of one half in both countries. A unit increase in expenditure in one of them will increase domestic output by a multiplier of 5.5 and foreign output by a multiplier of 4.5. If the marginal propensities to import increase to 75%, however, the domestic effect will decrease to 53% of the world output increase of ten units and the foreign effect will increase to 47%. Higher propensities would of course reduce the multiplier.

5. See Feldstein (1983).

6. Simple game-theoretic macro models are in Hamada (1979) and Canzoneri and Gray (1983). Also Macedo (1984b) and references therein.

7. The point is made by Cooper (1984).

8. A trade-weighted index, such as the one used in Section II for Asian countries, would tend to be more stable in the case of the U.S. because it assigns a large weight to a low-variance currency, the Canadian dollar. From 1973 to 1979, for example, the bilateral index depreciated by slightly over one half of the multilateral index (5.4% vs. 8.6% p.a.).

9. See Frenkel (1984).

10. Then a positive interest rate differential in favor of the home country can sustain an overvaluation which will be larger the higher the probability of the crash. For example, if this probability is as high as ½, an annualized interest differential of 5% will support an overevaluation of 10% per annum. A similar problem (which has received more attention in the exchange rate literature) is called "peso problem" and refers to the effect of an expected change in policy on the current exchange rate, thus increasing its volaitlity

as well as the volatility of the real exchange rate. Finally, the exchange rate might move "too much" because of fads or extraneous beliefs. To the extent that these are autocorrelated, the forecast error will be difficult to detect empirically. See further discussion in Dornbusch (1982) and references therein.

11. For an exposition of the so-called "portfolio view" see Tobin and Macedo (1981). Tobin (1982) notes, however, that the question of whether the volatility of asset prices leads to increasing divergence from the path of their fundamental determinants has not been as actively researched in the context of exchange rates as in the context of stock market prices.

12. The normalized relative current account goes from a U.S. surplus until end-1976 to a substantial relative U.S. deficit in 1977-79, a surplus in 1980-81 and a deficit in 1982. Thus, before 1982, relative deficits in the U.S. coincided with the depreciating dollar. We can also identify a period of increasing U.S. velocity through 1978 (even though velocity had decreased in 1977), followed by a steep ascent in 1979 and again following the second quarter of 1981. See Macedo (1983a).

13. See Macedo (1983a) for a description of the theoretical model used in the estimation and for econometric results.

14. This is also true of the measure of trade interdependence used by Lin (1984).

15. See Macedo (1981) for an interpretation of the real exchange rate along these lines.

16. This point was noted by Aghevli (1981) for the period of the weak

dollar, 1973-78.

17. The model is in Macedo (1984a).

18. Essential differences with the Currency Board experience are of course monetary sovereignty and "generalized floating". See Bank Negara (1984, p. 31). Nevertheless, the tradition of the Straits dollar or the Malayan dollar cannot be altogether ignored. Lin (1984, p. 30) mentions a "striking" "close relationship ... throughout the period 1965-82".

19. Khan (1980) warns of the possibly important role of interest rates in the money demand functions of Southeast Asian countries. Lin (1984, p. 27) gives lending rates in these countries for selected years and notes their lack of simultaneity.

20. Whether it is joint or not, the float of the Singapore currency will certainly be managed, to an extent that makes it difficult to distinguish from a (passive) crawling peg. Branson (1981) proposed an import-weighted basket adjusted with roughly equal weights to current account and reserve targets. As in the model of Section I.1, monetary policy adjusts to accomodate that exchange rate. Higher financial interdependence would make the indicators close to the fundamental determinants in the model of Section I.2.

APPENDIX

A TWO-COUNTRY MODEL OF POLICY INTERDEPENDENCE

1. The analysis of policy interdependence described in the text is based on a conventional two-country macro model, with several features borrowed from Kouri and Macedo (1978). We use a log-linear formulation, where variables are measured relative to their steady-state values. The two IS curves are given by:

$$(1) \quad y = a\,\theta - b'r - b''r^*$$

$$(2) \quad y^* = -a\,\theta - b''r - b'r^*$$

where y (y^*) is (the log of) domestic (foreign) real output

r (r^*) is the domestic (foreign) real interest rate

$\theta = e + w^* - w$ is the (log of the) real exchange rate

e is the (log of the) domestic currency price of foreign currency

w (w^*) is (the log of) the price of domestic (foreign) goods

a is the elasticity of output relative to the real exchange rate

b' (b'') is the intertemporal substitution semi-elasticity relative to the domestic (foreign) real interest rate

As shown in Macedo (1983), equations (1) and (2) are derived from the open-economy income identity in the two countries, where domestic absorption is a function of domestic output and (through investment) of the domestic real interest rate and the current account is a function of domestic and foreign outputs and the terms of trade (inverse of the real exchange rate). Thus the parameter a is given by the average propensity to import evaluated at the steady-state, the open-economy multiplier with repercussion and the sum of the trade elasticities subtracted from one. Similarly, the parameter b' is given by the investment share in output evaluated at the steady-state, the multiplier and the real interest elasticity of domestic investment divided by the real domestic interest rate. The parameter b" is given by the share of the domestic currency value of investment abroad in domestic output times the multiplier times the foreign elasticity divided by the foreign real rate. To illustrate, suppose the values for the savings and import propensities are, respectively, .1 and .5, so that the multipliers of domestic and foreign expenditure are like in note 3 in the text. They are now to be applied to changes in domestic investment induced by changes in the domestic and foreign real interest rates. Domestic and foreign investment as shares of domestic output are 20% and interest elasticities are .1 at home and abroad. Then, at interest-rates of 10%, the semi-elasticities of aggregate demand will be b' = 1.1 and b" = .9. Under these conditions, the foreign trade multiplier will be .9. If the average propensity to import is also 20% and the trade elasticities are unity, we will get a = .18.

The two LM curves are given by:

$$(3) \qquad m - p = \zeta(y + w - p) - c\, i$$

$$(4) \qquad m^* - p^* = \zeta(y^* + w^* - p^*) - c\, i^*$$

where m (m^*) is the (log of the) domestic (foreign) money stock;

i (i^*) is the domestic (foreign) nominal interest rate;

p (p^*) is the domestic (foreign) price levels;

ζ is the income elasticity of money demand

and c is the interest semi-elasticity of money demand.

Equations (3) and (4) are obtained from a variable-velocity money demand function, where the level of the exchange rate enters through the price index used to deflate money balances and transactions demand is a function of national income rather than output. Also, exchange rate depreciation raises money demand by less, unlike the one-to-one effect implied by purchasing power parity, but the size is given by the share of the foreign good in consumption rather than by the share of foreign assets in wealth. This is clear from the definition of the price indices.

$$(3') \qquad p = (1 - \beta)w + \beta\,(w^* + e) = w + \beta\theta$$

$$(4') \qquad p^* = (1 - \beta^*)w^* + \beta^*\,(w - e) = w^* - \beta^*\theta$$

Price and exchange rate expectations are introduced by three crucial arbitrage conditions, which, under perfect foresight, are written as:

$$(5) \qquad i = i^* + \dot{e}$$

$$(6) \qquad r = i - \dot{p}$$

$$(7) \qquad r^* = i^* - \dot{p}^*$$

While there is substantial evidence against the risk-neutral behavior underlying (5), we use it to keep the model tractable. On the other hand, nominal interest rates are deflated by the price index used to deflate nominal money balances, so that terms of trade changes also have a less than one-to-one effect on the real interest differential. Taking as a benchmark the case where $\beta=\beta^*$, we see that, if consumption is biased toward the domestic good ($\beta<\frac{1}{2}$), a faster real depreciation will raise the real interest rate differential:

$$(8) \qquad r = r^* + (1 - 2\beta)\dot{\theta}$$

This is the channel through which changes in the real exchange rate have an effect on relative outputs, with sign depending on the consumption bias. Subtracting (2) from (1) and using (8), we can express the cyclical position of the two countries in terms of the real exchange rate and its rate of change:

$$(9) \qquad y - y^* = 2a\theta - (b' - b'')(1 - 2\beta)\dot{\theta}$$

On the other hand, subtracting (4) from (3) and using (5), we see that the nominal exchange rate will change so as to offset changes in the relative velocities of money. These can be expressed in terms of relative real money balances (deflated by domestic prices), the real exchange rate and the cyclical position of the two countries:

$$(10) \qquad \dot{e} = -\frac{1}{c}\,[\bar{m} - \bar{m}^* - 2(1 - \zeta)\beta\Theta - \zeta(y - y^*)];$$

where $\bar{m} = m - w$

and $\bar{m}^* = m^* - w^*$

Suppose that the prices of domestic output are exogenously fixed at $w = w^* = \bar{w}$. Then $\Theta = e$ and the dynamics of the system reduce to:

$$(11) \qquad [c + (b' - b'')\zeta(1 - 2\beta)]\dot{e} = 2[a\zeta + \beta(1-\zeta)]e - (m - m^*)$$

In steady-state, the exchange rate is proportional to relative money balances:

$$(12) \qquad e = \frac{1}{2}\,\frac{m - m^*}{a\zeta + \beta(1 - \zeta)}$$

The role of the parameter β hinges on the existence of a terms of trade effect on money demand and it vanishes when $\zeta = 1$.

Substituting for the interest rate in (3) from (1), we get another steady-state relationship:

$$(13) \qquad y = \frac{1}{\zeta+\rho}\,[\bar{m} + a(\rho - \tilde{\beta})e]$$

where $\rho = c/(b' + b'')$

and $\tilde{\beta} = \beta(1 - \zeta)/a$

A similar expression holds for foreign output. While the effect of own expansionary monetary policy is always positive, the effect of depreciation - and, via (12), of contractionary monetary policy abroad - on domestic output will hinge on the relative size of ρ and $\tilde{\beta}$. A low interest rate elasticity of aggregate demand, or an income elasticity of

money demand equal to or larger than unity imply $\rho > \tilde{\beta}$, and the effect will be positive.

For concreteness, suppose that the nominal interest-elasticity of money demand is .1. Then, at nominal interest rates of 10%, the semi-elasticity of money demand will be one. Using the values indicated earlier, we get $b' + b'' = 2$, so that the ratio will be $\rho = .5$. Note that, as long as there is no expected inflation, the level of interest rates cancels, so that ρ would not decrease at higher interest rates. On the other hand, a nominal elasticity of .4 will make $\rho = 2$.

Suppose now that the share of foreign goods in the consumer price index and the income elasticity are both one half. Then we will have $\tilde{\beta} = 1.4$ so that it will be less than ρ. If the trade elasticities double, we get $\tilde{\beta} = .46$, less than the first value of ρ. With unit trade elasticities and $\zeta = .82$, we get $\tilde{\beta} = .5$, so that it exactly equals ρ.

2. To analyze strategic behavior in response to the fixed price $\bar{w}$, it is convenient to work with the real money stocks in both countries, e.g., $\bar{m} = m - \bar{w}$. We will henceforth drop the bar from the real money stocks, to avoid cluttering. Substituting (12) into (13) and (3'), we express the two targets in the home country as:

$$y = \mu m - \mu^* m^* \tag{14}$$

$$p = \bar{w} + \nu(m - m^*) \tag{15}$$

where $\mu = \dfrac{2\zeta + \rho + \tilde{\beta}}{2(\zeta + \tilde{\beta})(\zeta + \rho)}$

$$\mu^* = \frac{\rho - \tilde{\beta}}{2(\zeta + \tilde{\beta})(\zeta + \rho)}$$

and $$\nu = \frac{\beta/a}{2(\zeta + \tilde{\beta})}$$

Note that $1 > \mu > \mu^*$ and that $\mu > \nu > 0$ while the sign of μ^* hinges on the relative size of ρ and $\tilde{\beta}$. When $\mu^* > 0$, we will have $\mu^* > \nu$ as long as $\beta < a$, since the condition $\rho > (\beta/a)/(1 - \beta/a)$ is then weaker than $\rho > \tilde{\beta}$. The expressions for foreign output and the foreign price level are like (14) and (15), with the instruments reversed.

Suppose now the monetary authorities in both countries wish to minimize a quadratic loss function expressed in terms of y and p, the deviation of output and the consumer price index from their steady-state values:

$$(16) \qquad L = y^2 + \eta p^2$$

where η is the weight attached to the price objective.

We will focus here on the case where $\mu^* > 0$, so that an expansionary monetary policy abroad creates unemployment at home. We can see from equations (14) and (15) that, if both countries jointly set $m = m^* = 0$, that is, if they increase their money stock in proportion to the given change in the price of their domestic output, then $y = y^* = 0$ and $p = p^* = \bar{w}$. This cooperative solution yields a loss given by:

$$(17) \qquad C_L = C_{L^*} = \eta \bar{w}^2$$

Each country may try to increase the money stock by less, however, in order to appreciate its currency and reduce inflation. If both try to

do so, in the mistaken belief that the other country does not react against the correpsonding depreciation, we will have a non-cooperative solution. To characterize it, substitute from (14) and (15) into (16), to obtain the loss function in terms of the instruments. It defines the loss contours as the ellipses shown by broken lines in Figure 1 in the text. Then differentiate totally and set to zero, to yield:

$$(18) \qquad gm - g^*m^* + \eta\nu\bar{w} + (\tilde{g}m^* - g^*m - \eta\nu w)\frac{dm^*}{dm} = 0$$

$$(18') \qquad gm^* - g^*m + \mu\nu\bar{w} + (\tilde{g}m - g^*m^* - \eta\nu w)\frac{dm}{dm^*} = 0$$

where $g = \mu^2 + \eta\nu^2$

$\tilde{g} = \mu^{*2} + \eta\nu^2$

and $g^* = \mu\mu^* + \eta\nu^2$

To find the Cournot-Nash solution, set both conjectural variations to zero, to yield:

$$(19) \qquad gm - g^*m^* = -\eta\nu\bar{w}$$

$$(19') \qquad gm^* - g^*m = -\eta\nu\bar{w}$$

Solving, the Cournot-Nash solution is again given by equal money stocks but a lower level of output and less inflation than at the cooperative point:

$$(20) \qquad N_m = N_{m^*} = -\eta\,\frac{(\nu/\mu)}{\mu - \mu^*}\,\bar{w}$$

Substituting from (19) into (14) and (15), and then into (16), we get the (common) loss as. Using (17), we express it as a proportion of the cooperative solution:

$$(21) \qquad N_L = [1 + \eta\,(\nu/\mu)^2]C_L$$

If the home country assumes that the foreign country will play the non-cooperative solution just described and minimizes loss subject to the other country's Cournot reaction function, then, if this assumption is correct, we will have a Stackelberger solution, where the conjectural variations will be $dm^*/dm^* = g^*/g$ and $dm/dm^* = 0$.

Using these results in (18) and (18'), we get a real money stock that is higher than at N, even though it is still negative:

$$(22) \qquad S_m = S^*_{m^*} = N_m A$$

$$(22') \qquad S_{m^*} = S^*_m = N_m A^*$$

$$\text{where } A = (g^2 - g^*\tilde{g})/\Delta$$

$$A^* = (g^2 - 2g^{*2} + gg^*)/\Delta$$

$$\text{and} \quad \Delta = g(g + g^*) - g^{*2}[(g - \tilde{g})/(g - g^*)]$$

It can be shown that $1 > A^* > A$, so that the Stackelberger solution is less contractionary than the Nash, and less contractionary for the follower than for the leader.

Finally, the locus of efficient points is given by the tangency of the loss contours. Equating the slopes from (18) and (18'), we get:

$$(23) \qquad g^*(m^2 + m^{*2}) - (g + \tilde{g})\, mm^* - \eta\nu\bar{w}(m + m^*) = 0$$

This is an hyperbola going through the origin and through the intersection of the axes and the Cournot reaction functions, as shown by the dotted line in Figure 1 in the text.

Consider now the case where $\mu^* < 0$. As shown in the second numerical example given earlier, it requires a low elasticity of money demand. It is clear from (20) that the size of the contractionary bias

is smaller in that case but, as seen in (21), this does not affect loss in the Cournot-Nash solution.

From the definition of g^* after (18), we see that, in order for $g^* < 0$, given that $\mu^* < 0$, it is also necessary that the weight on the price level target be low:

$$(24)\quad \eta < \left| \frac{(\rho - \tilde{\beta})\,(2\zeta + \rho + \tilde{\beta})}{(\beta/a)^2\,(\zeta + \rho)^2} \right|$$

Note that the bias in the Stackelberger solution becomes smaller for the leader if condition (24) is satisfied because in that case $A > A^*$. Also, the numerical example would give $g^* < 0$ if $\eta < 1$. This case can be illustrated in Figure 1, with downward sloping reaction functions.

Appendix Table 1
1980 Import Weights

	SG(SGa)	ML	ID	TL	PL	KR	TW
Singapore	-	12	9	6	*	*	*
Malaysia	14	-	*	*	*	*	*
Indonesia	*(11)	*	-	*	*	*	*
Japan	18	23	13	21	20	26	28
Australia	*	5	5	*	*	*	*
United States	14	15	31	14	24	22	22
Saudi Arabia	12	6	9	9	10	15	8
Germany	*	5	6	4	4	*	3
United Kingdom	*	5	*	*	*	*	*
Other	42(31)	29	32	46	42	37	39
Memo: EC9	11	20	13	9	12	13	8

Note: * neglected.

Source: International Monetary Fund, Direction of Trade, Trade Statistics of the Republic of China (for Taiwan).

Memo item: Singapore from Wong (1984)

Malaysia from Lim (1984), Western Europe, average 1975-80

Indonesia from Beals (1984)

Thailand from Ajanant (1984)

Philippines: U.K. and Germany only

Korea: Germany, U.K. and France only

Taiwan from Schive (1984)

Appendix Table 2

1980 Export Weights

	SG	ML	ID	TL	PL	KR	TW
Singapore	-	19	11	8	*	*	*
Malaysia	15	-	*	*	*	*	*
Thailand	4	*	*	-	*	*	*
Japan	8	23	20	15	17	17	11
Australia	4	*	*	*	*	*	*
United States	13	16	49	13	28	26	36
Saudi Arabia	*	*	*	*	*	5	3
Germany	*	*	*	4	4	5	4
Netherlands	*	*	*	13	6	*	*
United Kingdom	*	*	*	*	*	3	*
OTHER	56	36	20	47	35	44	46
Memo EC9	12	20	6	19	12	13	13

Note: * neglected.

Source: Same as Appendix Table 1.

Appendix Table 3

Effective Exchange Rates

Indonesia

	Nominal		Real	
	Export	Import	Export	Import
1958	.302	.303	2800.5	2973.2
1959	.302	.303	2493.0	2657.0
1960	.302	.296	2133.7	2209.3
1961	.302	.297	1132.5	1174.6
1962	.302	.297	462.0	475.8
1963	.302	.297	212.8	217.0
1964	.302	.297	92.9	94.8
1965	.302	.297	14.0	14.2
1966	.302	.297	2.4	2.4
1967	.302	.297	.721	.924
1968	.589	.580	.820	.816
1969	.640	.631	.807	.803
1970	.717	.711	.853	.846
1971	.787	.781	.942	.931
1972	.917	.906	1.071	1.054
1973	1.000	1.000	1.000	1.000
1974	.957	.976	.822	.831
1975	.951	.978	.754	.785
1976	.946	.970	.669	.710
1977	1.007	1.025	.686	.723
1978	1.259	1.255	.831	.851
1979	1.742	1.764	.995	1.028
1980	1.720	1.755	.907	.934
1981	1.766	1.754	.885	.883
1982	1.713	1.719	.813	.819
1983	2.429	2.406	1.052	1.046

Appendix Table 4

Effective Exchange Rates

Korea

	Nominal		Real	
	Export	Import	Export	Import
1958	.112	.111	.346	.335
1959	.112	.111	.339	.329
1960	.140	.136	.393	.373
1961	.281	.272	.749	.713
1962	.286	.277	.738	.702
1963	.286	.277	.637	.608
1964	.471	.456	.828	.794
1965	.586	.568	.937	.899
1966	.598	.579	.884	.845
1967	.595	.577	.818	.785
1968	.604	.590	.778	.750
1969	.630	.615	.759	.735
1970	.683	.662	.749	.717
1971	.777	.752	.789	.752
1972	.931	.918	.881	.852
1973	1.000	1.000	1.000	1.000
1974	.988	.985	.920	.944
1975	1.190	1.185	.998	1.050
1976	1.174	1.185	.934	1.026
1977	1.216	1.235	.946	1.051
1978	1.338	1.379	.957	1.066
1979	1.341	1.360	.871	.938
1980	1.677	1.686	.935	.985
1981	1.843	1.905	.911	.974
1982	1.878	1.939	.906	.957
1983	1.995	2.094	.956	1.022

Appendix Table 5

Effective Exchange Rates

Malaysia

	Nominal		Real	
	Export	Import	Export	Import
1958	1.030	1.058	.721	.744
1959	1.030	1.058	.742	.769
1960	1.030	1.042	.756	.772
1961	1.034	1.045	.777	.798
1962	1.035	1.046	.801	.821
1963	1.035	1.046	.808	.824
1964	1.035	1.046	.831	.848
1965	1.035	1.046	.860	.876
1966	1.035	1.046	.883	897
1967	1.035	1.045	.874	.886
1968	1.035	1.034	.906	.907
1969	1.035	1.035	.945	.949
1970	1.035	1.041	.970	.981
1971	1.048	1.054	1.011	1.027
1972	1.051	1.052	1.019	1.033
1973	1.000	1.000	1.000	1.000
1974	.965	.966	.976	.974
1975	.970	.957	1.018	1.036
1976	1.010	.984	1.098	1.128
1977	1.025	.982	1.113	1.158
1978	1.086	1.034	1.180	1.218
1979	1.032	.984	1.145	1.190
1980	1.020	.981	1.160	1.217
1981	1.072	1.021	1.193	1.238
1982	1.030	.967	1.129	1.162
1983	1.039	.955	1.121	1.137

Appendix Table 6
Effective Exchange Rates
Philippines

	Nominal		Real	
	Export	Import	Export	Import
1958	.248	.259	.335	.367
1959	.248	.259	.342	.377
1960	.250	.253	.339	.359
1961	.252	.255	.347	.368
1962	.479	.483	.643	.677
1963	.489	.493	.649	.678
1964	.489	.493	.617	.643
1965	.489	.493	.627	.648
1966	.488	.492	.616	.631
1967	.488	.492	.599	.612
1968	.488	.492	.612	.622
1969	.488	.492	.632	.642
1970	.743	.750	.897	.903
1971	.825	.828	.911	.908
1972	.920	.921	.965	.953
1973	1.000	1.000	1.000	1.000
1974	.981	.989	.851	.867
1975	1.051	1.056	.929	.975
1976	1.073	1.082	.972	1.042
1977	1.126	1.121	.997	1.077
1978	1.266	1.234	1.098	1.151
1979	1.264	1.229	.986	1.025
1980	1.271	1.240	.925	.959
1981	1.303	1.232	.900	.942
1982	1.325	1.329	.862	.909
1983	1.740	1.750	1.048	1.105

Appendix Table 7

Effective Exchange Rates

Singapore

	Nominal			Real		
	Export	Import	Import a)	Export	Import	Import a)
1958	1.076	1.087	1.304	1.025	.965	1.472
1959	1.075	1.087	1.304	1.017	.972	1.481
1960	1.075	1.045	1.263	1.031	.949	1.452
1961	1.076	1.045	1.263	1.051	.972	1.480
1962	1.077	1.045	1.263	1.067	.990	1.502
1963	1.077	1.045	1.263	1.072	1.000	1.508
1964	1.077	1.045	1.263	1.069	1.007	1.515
1965	1.077	1.045	1.263	1.086	1.027	1.539
1966	1.077	1.045	1.263	1.096	1.033	1.541
1967	1.077	1.045	1.263	1.101	1.037	1.539
1968	1.077	1.045	1.134	1.120	1.056	1.259
1969	1.077	1.045	1.119	1.155	1.103	1.272
1970	1.077	1.045	1.099	1.199	1.147	1.267
1971	1.080	1.052	1.091	1.210	1.176	1.258
1972	1.055	1.049	1.065	1.214	1.192	1.231
1973	1.000	1.000	1.000	1.000	1.000	1.000
1974	.991	.988	.989	.949	.960	.935
1975	.954	.959	.961	.963	1.032	.985
1976	.969	.985	.990	1.056	1.200	1.130
1977	.977	1.011	1.009	1.100	1.283	1.186
1978	.975	1.038	1.010	1.113	1.307	1.159
1979	.941	.996	.916	1.102	1.264	.995
1980	.924	.974	.896	1.101	1.233	.958
1981	.894	.952	.877	1.076	1.190	.914
1982	.867	.924	.850	1.062	1.156	.876
1983	.856	.926	.807	1.075	1.173	.796

a) Including imports from Indonesia.

Appendix Table 8

Effective Exchange Rates

Taiwan

	Nominal		Real	
	Export	Import	Export	Import
1958	.837	.788	1.050	.898
1959	.941	.887	1.078	.924
1960	.939	.870	.924	.784
1961	.949	.879	.884	.758
1962	.949	.879	.884	.767
1963	.949	.879	.888	.781
1964	.949	.879	.906	.804
1965	.949	.879	.930	.833
1966	.949	.879	.943	.846
1967	.949	.879	.941	.847
1968	.949	.879	.907	.817
1969	.950	.879	.910	.820
1970	.955	.822	.933	.839
1971	.964	.897	.960	.872
1972	1.004	.972	1.006	.953
1973	1.000	1.000	1.000	1.000
1974	.983	.968	.758	.776
1975	.984	.965	.798	.833
1976	.982	.964	.835	.896
1977	1.008	1.012	.856	.948
1978	1.047	1.115	.891	1.032
1979	1.026	1.071	.856	.956
1980	1.010	1.056	.795	.866
1981	1.023	1.081	.751	.811
1982	1.055	1.080	.789	.818
1983	1.084	1.126	.824	.861

Appendix Table 9

Effective Exchange Rates

Thailand

	Nominal		Real	
	Export	Import	Export	Import
1958	.812	.859	.647	.695
1959	.819	.866	.692	.748
1960	.820	.840	.712	.745
1961	.826	.838	.681	.714
1962	.821	.831	.671	.703
1963	.819	.829	.696	.728
1964	.818	.828	.722	.752
1965	.818	.828	.750	.774
1966	.818	.828	.751	.767
1967	.818	.828	.745	.762
1968	.818	.828	.758	.773
1969	.819	.829	.775	.789
1970	.824	.834	.816	.831
1971	.841	.848	.875	.879
1972	.913	.921	.949	.946
1973	1.000	1.000	1.000	1.000
1974	.980	.971	.911	.928
1975	.999	.974	.960	.998
1976	.981	.968	.998	1.046
1977	1.037	1.013	1.004	1.092
1978	1.169	1.137	1.101	1.182
1979	1.199	1.140	1.084	1.133
1980	1.197	1.133	.984	1.023
1981	1.196	1.198	.936	1.020
1982	1.188	1.195	.925	1.003
1983	1.182	1.212	.909	1.001

References

Aghevli, B. (1981), Experiences of Asian Countries with various Exchange Rate Policies, in J. Williamson, ed., Exchange Rate Rules, Macmillan.

Ajanant, J. (1984), Trade Patterns and Trends of Thailand, in NBER.

Bank Negara Malaysia (1984), Money and Banking in Malaysia, Kuala Lampur.

Beals, R. (1984), Trade Patterns and Trends of Indonesia, in NBER.

Branson, W. (1981), Monetary Stability and Exchange Rate Objectives in Singapore, in Monetary Authority of Singapore, Papers on Monetary Economics, Singapore University Press.

_____ (1984), Trade and Structural Interdependence Between the U.S. and the NICs, in NBER.

Bressand, A. (1982) ed. RAMSES, The State of The World Economy, Ballinger.

Canzoneri, M. and J. Gray (1983), Two Essays Monetary Policy in an Interdependent World, Federal Reserve Board, International Finance Discussion Paper #219, February.

Chee, P.L. (1984), Changes in the Malaysian Economy and Trade Trends and Prospects, in NBER.

Cooper, R. (1984), Economic Interdependence and Coordination of Economic Policies, in R. Jones and P. Kenen (eds.), Handbook in International Economics, North-Holland.

Dornbusch, R. (1982), Equilibrium and Disequilibrium Exchange Rates, Zeitschrift fur Wirtschafts und Sozialwissenschaften, vol. 6.

Feldstein, M. (1983), The Dollar and Exchange Market Intervention, draft, Paris (France), April.

Frenkel, J. (1984), International Liquidity and Monetary Control, in G.v. Furstenberg (ed.), International Money and Credit: The Policy Roles, IMF.

Hamada, K. (1979), Macroeconomic Strategy and Coordination under Alternative Exchange Rates, in R. Dornbusch and J. Frenkel (eds.), International Economic Policy, Johns Hopkins University Press.

Haseyama, T. et al. eds. (1983), Two Decades of Asian Development and Outlook for the 1980s, Institute of Developing Economies.

Khan, M. (1980), The Dynamics of Money and Prices and the Role of

Monetary Policy in SEACEN Countries, The South-East Asian Central Banks Research and Training Center, Occasional Paper no. 1.

Kouri, P. and J. Macedo (1978), Exchange Rates and the International Adjustment Process, Brookings Papers in Economic Activity, 1.

Lee, S.Y. (1984), Developing Asian Financial Centers, in PAFTAD.

Lin, S.Y. (1984), ASEAN: Financial Development and Interdependence, in PAFTAD.

Macedo, J. (1983a), Exchange Rate Volatility in an Interdependent World Economy, draft, Princeton University, May.

_____ (1983b), Policy Interdependence Under Flexible Exchange Rates: A Two-country Model, Woodrow Wilson School Discussion Paper in Economics # 62,Princeton University, May.

_____ (1984a), Small Countries in Monetary Unions: A Two-Tier Model, draft, Princeton University, April.

_____ (1984b), Comment on Oudiz and Sachs (1984).

NBER, Proceedings of a conference on The Global Implications of the Trade Patterns of East and Southeast Asia, held in Kuala-Lumpur, January 1984.

Oudiz, G. and J. Sachs (1984), International Policy Coordination in Dynamic Macroeconomic Models, NBER Working Paper no. 1417, August.

PAFTAD (1984), Proceedings of a Conference on Pacific Growth and Financial Interdependence, held in Singapore, June 1984.

Rana, P. (1981), ASEAN Exchange Rates, Policies and Trade Effects, Institute of South East Asian Studies, Singapore.

Rogoff, R. (1983), Productive and Counterproductive Cooperative Monetary Policies, International Finance Discussion Paper #233, Federal Reserve Board, December.

Schive, C. (1984), Trade Patterns and Trends in Taiwan, in NBER.

Tobin, J. (1982), The State of Exchange Rate Theory: some skeptical remarks, in R. Cooper et al., (eds.) The International Monetary System Under Flexible Exchange Rates: Global, National and Regional, Ballinger.

Tobin, J. and J. Macedo (1981), The short run macroeconomics of floating exchange rates: an exposition, in J. Chipman and C. Kindleberger (eds), Flexible Exchange Rates and the Balance of Payments, North-Holland.

Wong, C. (1984), Trends and Patterns of Singapore's Trade in Manufactures, in NBER.

Yamazawa, I. (1984), Japan and her Asian Neighbours in a Dynamic Perspective, in NBER.