

EXCHANGE RATE MANAGEMENT AND INTERNATIONAL COORDINATION:
A THEORETICAL SURVEY

by

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INTRODUCTION

The present literature on the subject of the paper deals with four basic questions.

1) Why should there be exchange-rate management? The answer is far from evident - as usual among economists - and an agreement can only be found for dampening the short-run volatility of the exchange rate.

2) Why should there be international policy coordination? Astonishingly, again the answer is not definitely affirmative. While in the actual policy world there is little exchange rate cooperation (except within the EMS), even in the theoretical literature there cannot be detected a clear-cut consensus on the superiority of international coordination compared to non-cooperative solutions.

3) How should one intervene in the foreign exchange market in order to attain the desired exchange rate? Fortunately, in this field the answer is more clear-cut. Interventions to be effective should be of the non-sterilised type. However, over the long run, such interventions have a predominant impact only on the nominal exchange rate. Proper international coordination is also advisable since it avoids an increase in world inflation such as that of the 1970s.

4) How could one manage the exchange rate by a proper mix of domestic policies? This question concerns the management not of the nominal exchange rate but that of the real exchange rate. The policy mix concerns mainly monetary and fiscal policy. The answer is disastrous for (real) exchange rate management although fiscal policy coordination would have avoided the dramatic real appreciation and depreciation of the dollar during the 1980s.

The following four sections try to answer successively these four basic questions in a more sophisticated way according to our professional rules of the game.

1. WHY EXCHANGE RATE MANAGEMENT?

Since the adoption of floating exchange rates, changes in the nominal exchange rate have been large. One percent in a day, five percent in a month, and twenty percent in a year are not unusual. Table 1 presents the major movements in the dollar/mark and dollar/yen exchange rates over several months or years (day-to-day or month-to-month volatility is shown).

These movements have been mainly real. The large fluctuations in nominal exchange rates have not been offset by differences in national inflation rates since these have been much smaller. Fig. 1 presents the evolution of the nominal and real effective exchange rate of the dollar with respect to the currencies of the Group of Ten over the period of 1979 to 1985.

Do these exchange rate movements represent serious market failures in the foreign exchange market or do they reflect a healthy flexible exchange rate regime? When there are market failures, then a case for exchange rate management can be made. However, even if the foreign exchange market is efficient, should one nevertheless intervene in order to reduce the excess variability of the exchange rate and, if so, do the monetary authorities know the appropriate exchange rate?

1. Market Failure

The postulated inefficiency or "irrationality" of the foreign exchange market has a long history in economic literature. The assertion by Ragnar Nurkse (1944) that destabilising speculation was dominant during the period of floating rates in the 1920s and the counterargument of generally stabilising speculation put forward by Milton Friedman (1953) are well known. In the most recent literature, this debate has re-emerged in terms of "rational bubbles", "sunspot equilibria" and "self-fulfilling runs" all representing cases of destabilising speculation by rational market participants; see e.g. Blanchard (1979), Flood and Garber (1984), Obstfeld (1986) and Evans (1986).

The inefficiency is sometimes ascribed to risk aversion which would not be justified by the underlying fundamentals, pushing their currencies into "overvaluation" (and, by this, other currencies into "undervaluations"). Or there are bandwagon effects: speculation feeding upon speculation, again without any regard to the basic determinants; they can even become self-fulfilling by analogy to the vicious-and-virtuous circle argument. In the presence of these destabilising speculations, it is often argued that government should step in and manage the exchange rate.

The possibility that there may be an absence of stabilising speculation is recognised by Milton Friedman (1953) and in such circumstances he proposed an intervention policy of "leaning against the wind". The Central Bank should become a speculator replacing insufficient stabilising market speculations and, moreover, realise a profit from such interventions. However, Friedman (pp. 175-76) also argued it was unlikely "that government officials (risking funds that they do not themselves own) are better judges of the likely movements in the foreign exchange markets than private individuals (risking their own funds)".

Exchange rate management can only be recommended when the monetary authorities have superior information than that available to the market. An alternative if not the preferable strategy by central banks would be to release the relevant information to market participants and to abstain from intervention. Empirical studies (e.g. Levich, 1978) have shown that foreign exchange markets are efficient (in the sense that prices always reflect fully the available information such that unusual ex ante speculative profits cannot be realised).

2. Excess Variability

The observable excess variability of the exchange rate can be conceived to consist of two parts: volatility, i.e. "short-run variability from hour to hour, day to day, week to week or month to month" around a trend, and persistent misalignments, i.e. "a persistent departure of the exchange rate from its long-run equilibrium level". (Williamson, 1985, pp. 9-10). For Williamson, volatility is a "troublesome nuisance rather than a major cause of concern" (p. 45). However, exchange rate management in practice has been concerned mainly with volatility, while reform proposals with misalignments.

In the recent exchange rate literature, volatility is explained by the equilibrium forces of the financial asset markets. The exchange rate viewed as the relative price of two currencies is always an equilibrium price (from the point of view of financial markets) and under this viewpoint there is no basis for exchange rate management. However, although the exchange rate is well-behaved from the point of view of financial markets it can diverge from the "equilibrium" exchange rate conceived as a relative price of goods, as well as between domestic and foreign traded goods (terms of trade) as between tradeables and nontradeables. The main reason for this discrepancy lies in the slow adjustment of goods prices and quantities to any disturbance (Dornbush, 1976). In this respect, exchange rate management could be considered as a substitute for a quicker adjustment process in the real sector of the economy. It then has the task to accelerate the exchange rate movement towards the equilibrium rate of the real sector. In so doing it would avoid the misallocation of resources that result from a temporary change in the terms of trade (with respect to the production sector of tradables) and in the relative price of tradeables and nontradeables.

A completely different issue for exchange rate management concerns the question of whether, over the long run, there remain "persistent misalignments" in our present system. If this hypothesis is valid, then an additional interpretation of exchange rate management would emerge in terms of monetary reform, since this may prove the most efficient way to tackle such problems.

3. Which Long-Run "Equilibrium" Exchange Rate?

After nearly 15 years of turbulence in the foreign exchange markets, economists can still not agree on what is the fundamental long-run "equilibrium" or desired exchange rate at which exchange rate management should aim. There are two competing schools of thought - that of balanced trade and that of purchasing power parity. In the most recent debate, the main protagonist of the first school is John Williamson (e.g. 1986) and of the second one Ronald McKinnon (e.g. 1986a).

According to the principle of balanced trade, the exchange rate should be such as to equilibrate roughly imports and exports by allowing for the need to make the debt-service requirements and to take into account the "underlying capital flow over the cycle" (Williamson, 1986, p. 1966). Branson (1986, p. 185) mentions even as a possible long-run equilibrium rate the one which sets the full-employment current account balance at zero. The focus on the current account is reminiscent of the elasticity approach to the balance of payments of the 1930s to 1950s where one had to worry about the trade deficits because international (private) capital movements were moribund. The approach neglects - in a world of capital mobility - the possibility of long-lasting net-creditor countries and net-debtor countries and, by this, the advantages of an international division of savers and investors. Furthermore, as a matter of course, any real shock to the economy implies a revision of the exchange rate target, since real shocks influence the current account.

The purchasing power parity approach to exchange rate targeting is only concerned with nominal exchange rates. This approach reminds one of the debate of the 1920s in particular with respect to the division of goods into tradeables and nontradeables (see Oppenheimer, 1975). Official exchange rate targets should be set to correspond to national price levels of tradeable goods so that the real purchasing power of currencies is roughly identical in terms of tradeable goods. A terms of trade effect on the exchange rate is ruled out and the only real exchange rate which is allowed to vary is the relative price between tradeables and nontradeables.

The reform proposals put forward by Williamson (e.g. 1985) and McKinnon (e.g. 1986a) have in common the desire to manage the exchange around the fundamental long-run equilibrium rate, the first author according to the current account balance criterion and the second according to the purchasing power parity criterion. The aim of these proposals is to establish a set of international "rules of the game" for domestic policy makers (Sachs, 1986a). By imposing those rules, the autonomy of domestic policies is limited, since the main reason for the misalignments is viewed as the pursuit of divergent domestic policies which create the excess variability of the exchange rate.

II. Why International Policy Coordination

Despite the repeated plead for international coordination or harmonisation of macroeconomic policies among the major economies, the actual world is characterised by an international laissez-faire system in which a government may take into account the repercussions of its actions on other countries, but - in reality - it is more sensitive to its own pressure groups and constituents. The present world is a decentralized system in which private households, firms, central banks and governments form their own final judgements separately from the others. Since it has not been planned in advance, it has been called a "non-system" (Corden, 1983). Each government acts in "benign neglect" with respect to the effects of its policies on the welfare and objectives of other countries.

If all nations were small economies, the policy of any one would not affect the other ones. This is the equivalent of perfect competition. However, in the actual world, there are several large countries, or groups of countries, acting in concert, whose policy creates "spill-over effects" for others. Cooper (1985) has coined the phrase "structural interdependence" to describe a situation where economic events in one country exert a significant impact on foreign economies. Where such structural interdependence exists, issues relating to the possible coordination of economic policies and in particular exchange rate policies have considerable importance.

Only rather recently, economic theory has been concerned - mainly on a game-theoretical level - with the possible welfare outcome of cooperation and non-cooperation between countries. There is a growing literature, beginning with Hamada (1974, 1976) and culminating, for the moment, in the contributions to a collective book on International Economic Policy Coordination edited by Willem Buiter and Richard Marston (1985). In order to provide a framework for discussing issues relating to international policy coordination, we pose and attempt to answer two questions: (1) What benefits are likely to arise from international coordination? (2) What obstacles stand in the way of greater coordination?

1. Benefits of Coordination

In structurally interdependent economies the policy for one country will depend upon the policies pursued by its trading partners. The optimal policy design lends itself to the application of game theory techniques. The games themselves may be either static or dynamic and increasingly the literature has emphasised the latter setting. The advantage of using dynamic game theory is that it highlights certain time consistency and credibility problems that are not revealed in a static setting. Indeed, in a dynamic framework the pay-off structure may be somewhat different from that in a static setting.

When examining the benefits to be derived from coordination in a game-theoretic setting, one requires knowledge of the pay-off under non-cooperation. In a non-cooperative game each country acts independently under alternative assumptions regarding the interaction of its behaviour with that of the other countries. The two most commonly employed non-cooperative solutions are the Nash and Stackelberg equilibriums.

Under a Nash solution, each country takes the strategies of other countries as beyond its influence and adopts its optimal policy in this belief. The countries interact in this manner despite the fact that each country's chosen strategy does affect the other countries' policy choice. A given set of policies is said to be in Nash equilibrium when there is no incentive for any country to unilaterally deviate from the equilibrium with the other countries' policies being held as given.

In a Stackelberg solution, one country is assumed to be the leader that takes into account the influence of its choice of strategy on the policies chosen by the follower countries. Consequently, the leader country anticipates the possible reactions of the follower countries to its policy and optimises its objective function accordingly. If more than one country were to become a leader, a situation known as "Stackelberg warfare" would break out which has no equilibrium solution because the assumptions that each of the two or more leaders make are mutually inconsistent. That is, one cannot have equilibrium when interdependent countries are simultaneously trying to maximise their gains by maximising the other countries' losses.

The main results to be derived from such a game-theoretic framework are that the Nash and Stackelberg non-cooperative solutions generally prove to be globally sub-optimal, while cooperative solutions, because they encompass all possible outcomes, will prove to be Pareto-efficient. However, it is possible that the Stackelberg solution will prove superior to a globally Pareto-optimal cooperative solution for the leader country. The Stackelberg solution will definitely prove superior for the leader country than the Nash solution and may or may not be so for the follower.

The superiority of cooperation has been shown by Sachs (1986) in the applied field of anti-inflationary policies pursued in a couple of countries. Assume that in each country the policymakers adopt tight monetary policy without cooperation. The central bank takes equally into account the short-run effect of a real appreciation of its currency which adds an anti-inflation "bonus" to the domestic disinflation process. However, from a global view, each currency cannot appreciate with respect to the others, since the tight monetary policy in each country cancels out any change in the real exchange rate. With non-cooperation, no country achieves its original disinflation target.

... the temptation to appreciate the exchange rate in order to fight inflation is just like the temptation to confess in the classic prisoners' dilemma. In the prisoners' dilemma, each prisoner is induced to confess to a crime even though both prisoners would be better off by both refusing to confess. (Sachs 1986, p. 194).

As far as the realisation of the inflationary target is concerned, each country would be better off if the policies were coordinated.

While game theory clearly demonstrates the potential superiority of cooperative solutions, it overstates the case for coordination because it does not highlight the enforceability and credibility aspects of coordination.

A counterexample, now in terms of an inflationary policy, is given by Kenneth Rogoff (1985), who points out that cooperation between monetary

authorities is only potentially superior to isolationist policies. This is because one has to take into account the reaction of private agents to any coordination arrangement between the authorities. The basic argument of the Rogoff paper is that private agents' behaviour cannot be considered as indifferent to any cooperative arrangements that the domestic and foreign authorities come to. As such, an adverse reaction by private agents to any cooperation arrangement could lead to a poorer performance than in the case of non-cooperation.

Rogoff argues that one of the factors that restrain authorities from pursuing an expansionary monetary policy in a world of high capital market integration is fear of the costs that would be imposed by an "overshooting" of the exchange rate. If, however, the domestic and foreign authorities get together, they can remove the fear of an overshooting exchange rate by inflating together. This means that the incentives to inflate are greater in a cooperative arrangement. Rogoff argues that rational private agents will take this greater inflation risk into account when setting their wage contracts. In such circumstances, the authorities may face a higher average inflation rate as a result of cooperation than they would have done in its absence.

The possibility that cooperation between central banks may lead to a deterioration in economic performance stems from a credibility problem vis-à-vis the private sector. Only if there is a credible institutional commitment by the cooperating authorities not to inflate, would cooperation definitely improve welfare as compared to what could be achieved in isolation. Rogoff's paper is of particular importance because it reminds us that cooperation is only potentially superior to the pursuit of isolationist policies.

In a 10-country world cooperation between all 10 would prove globally superior to cooperation between only 5. However, it is far easier to obtain and enforce cooperation with only 5 countries. That is, certain solutions may be relatively efficient from a theoretical viewpoint but they may not be either obtainable or enforceable in practice.

The sharing of information regarding current and future policy intentions and forecasts is likely to be one of the major benefits from coordination. It should improve the information set available to the authorities and therefore permit them to pursue more consistent policies. In the absence of such an exchange, the information set available to the authorities may lead to serious shortcomings in their policy design. This is particularly so in relation to miscalculation of the possible reactions of foreign authorities to the home country's policy - such policy errors could prove highly costly in interdependent economies.

2. Obstacles to Coordination

While there appears to be a strong theoretical case for coordination of macro-economic policies, this contrasts with the low degree of coordination observed at the international level. This naturally leads to the question of what are the principal obstacles to greater coordination?

While ignorance on the part of policy makers and lack of political will are frequently cited as obstacles to greater coordination, a possibly more serious obstacle is the tremendous uncertainty about how to realise the benefits from coordination. The debate in macroeconomics between monetarists and Keynesians over means-end relationships remains very much alive and even within these two camps there are wide differences in views. At the

international level, there remains considerable doubt about the quantitative and even more seriously qualitative transmission effects of macropolicies between two countries. With such tremendous uncertainty, it is not surprising that policy makers have considerable problems in agreeing upon which is the best manner to coordinate their policies. This enormous uncertainty over means-end relationships leaves plenty of scope for disagreement even between countries that share similar objectives.

From game theory another interesting explanation for the lack of international coordination emerges. While cooperation will improve global welfare, it is possible, as in the case of a Stackelberg leader, that one or more of the countries is made worse off from cooperation. In such circumstances, the losing countries will require a compensation payment from the countries that gain in order to participate in a cooperative solution. The compensation issue may be difficult to resolve because of the opposing incentives for the winners and losers from coordination. Those countries that gain may seek to maximise their gain by minimising the compensation payment, while those that lose seek to maximise their compensation receipts. This is particularly so when the countries concerned are of equal size and the gains and losses from coordination are unevenly spread. Hence, cooperation may be limited to countries that are capable of resolving the compensation issue.

Dynamic game theory also highlights the credibility problems posed to cooperative arrangements by the need for time consistency. A set of policies is said to be time consistent when there is no incentive for any of the countries at any time between the start and finish of a dynamic game to renege on the agreement. Curry and Levine (1985) using optimal control theory have shown that the need for time consistency will normally involve cooperative arrangements being limited to sub-optimal outcomes, since Pareto-optimal solutions are normally time inconsistent. They suggest that there may be a need for innovative "punishment clauses" to be exercised on countries that renege, if the full benefits from coordination are to be realised. A "punishment clause" would work by penalising any party that reneges by more than any potential gains from reneging - so that it would end up worse off should it not stick to the agreement. Such "punishment clauses" have the potential to make time inconsistent Pareto-optimal cooperative solutions time consistent.

III. How to Intervene in the Foreign Exchange Market?

At the very outset, it should be emphasised that intervention policies in the foreign exchange market like any other monetary policy have, in principle, no long-lasting effect on the real exchange rate. Monetary policy as a nominal phenomenon can only have nominal effects in the long run, i.e. effects on the price level provided that one excludes long-run money illusion and a long-run impact on the real interest rate. Consequently, there is in principle a long-run neutrality of money on the real exchange rate.

In the short run, monetary policy in the sense of exchange rate management can be used for two different purposes.

a. Either, it can be utilised for employment reasons in terms of an expansionary monetary policy. As far as the foreign sector of the economy is concerned, the "overshooting" phenomenon can take place implying a short-run real depreciation of the home currency. The real depreciation generally represents an employment bonus to the extent that exports rise and imports fall. To the extent that the expansionary monetary policy has been pursued mainly for the employment effect resulting from a temporary real depreciation,

it can be called a policy of exchange rate management of the "beggar-thy-neighbour" policy kind. In the following, we exclude this target of exchange rate management for monetary policy.

b. The other purpose of exchange rate management is the aim to influence nominal exchange rates in order to reduce the excess variability (in the sense of volatility) as was discussed in section I. By assuming that the authorities have chosen a nominal exchange rate target, the present section discusses a rather technical aspect concerning the question of how the target could be realised with the most appropriate mix of monetary policy instruments; other macropolicies will be discussed in section IV. 1. The centre of the debate concerns the traditional distinction between sterilised and nonsterilised interventions on the one hand and the underlying assumption about the degree of substitutability of domestic and foreign financial assets on the other hand. 2. Furthermore, the effectiveness of intervention policies will be increased by a proper international coordination scheme of nonsterilised interventions. 3. Finally, to the extent that such an international cooperation pattern does not exist, world inflation is likely to increase as observed in the 1970s.

1. Sterilised versus Nonsterilised Intervention Policy

The effects of sterilised and nonsterilised interventions have been analysed by Branson (1979), Marston (1980), Genberg (1981), Mussa (1981), Obstfeld (1982, 1983) and Tryon (1983). Their studies constitute the main object of the Jurgensen Report (1983) presented by the working group on exchange market intervention established at the Versailles summit meeting.

When a central bank intervenes in the foreign exchange market, from an analytical point of view it purchases or sells (interest-bearing) bonds denominated in foreign currency in exchange for domestic currency. This type of monetary policy has two immediate effects: the stock of bonds denominated in foreign currency held by the public (at home and abroad) is changed and simultaneously the domestic monetary base is changed. This intervention policy is called "nonsterilised". If at the same time the central bank also sells or purchases bonds denominated in domestic currency ("domestic credit") in exchange for domestic currency such that the monetary base is unaltered, the intervention policy is termed "sterilised". The exchange rate effects of the two types of intervention policy differ from each other depending upon whether one assumes perfect or imperfect substitutability between domestic and foreign bonds.

To the extent that one works with the hypothesis of perfect substitutability, the country concerned will not be able to change its real interest rate beyond the real interest rate parity since the above hypothesis implies perfectly integrated capital markets in the world economy. A sterilised intervention policy will only have an impact on daily or weekly exchange rates, over a longer period it is completely ineffective. Obstfeld, having studied the sterilised intervention policy of the Bundesbank, comes to the conclusion (1983, pp. 184-85): "The model's verdict was that the Bundesbank has little if any power to influence the exchange rate over that time span (a month) without altering current or expected future money-market conditions (i.e. without conducting unsterilised interventions)." On the other hand, nonsterilised intervention is exactly equivalent to an open market operation and produces the same macroeconomic effects as conventional monetary policy. Thus, exchange rate management is possible with a nonsterilised intervention policy (or any other monetary policy instrument). However, only over the short run will it be able to have an impact on the real exchange rate due to the phenomenon of

overshooting. Over the longer run, once the internal price has adjusted to the new outstanding money stock, a nonsterilised intervention policy creates roughly an equivalent change in the nominal exchange rate.

Under the hypothesis of imperfect substitutability between domestic and foreign bonds, the results for nonsterilised intervention will remain the same even though the short-run impact on the exchange rate will be higher since the domestic real interest rate is not linked any more strictly to the foreign one via the real interest rate policy. Over the short run, sterilised intervention will also be effective. Imperfect substitutability implies that the expected returns on assets denominated in different currencies will differ by a "risk premium" such that the real interest rate parity does not hold any more. The risk premium in turn depends, for a given risk aversion, on the relative supplies (or outstanding stocks) of domestic and foreign bonds. Since the monetary authority changes the composition between the two stocks when it conducts sterilised foreign exchange market operations (or, in more conventional terms, the composition of the source of the monetary base - domestic credit and international reserves - is changed), it will have an impact on the exchange rate.

2. Coordination of Exchange Rate Management

As de Grauwe (1983) and Claassen (1983) have shown, international coordination of intervention policies makes a lot of difference for the efficiency of exchange rate management. In the following, we shall remain in the (simpler) framework of perfect substitutability. Consequently, only nonsterilised operations will have a (short-run) impact on the real exchange rate. Since intervention means that the domestic country gains reserves and another country loses reserves (or vice versa), it makes a big difference for the efficacy of exchange rate management whether the foreign authorities sterilise or do not sterilise their reserve losses.

Choosing a two-country framework, one could look at two countries outside the US or at two countries where the first one represents the United States and the other one the rest of the world (ROW). We shall follow the second option since the present dollar standard imposes on the US "unconsciously" a behaviour of sterilisation, and this for institutional reasons which we shall describe later (1). However, similar results can be derived from a two-country model outside the US (eg. for two countries within the European Monetary System) where one country - most probably the surplus country, i.e. the country which tries to avoid an appreciation of its currency ("leaning against the wind") - systematically pursues a non-sterilised intervention policy.

Working with such a two-country model - the United States and the rest of the world (ROW) - raises the question of symmetrical versus asymmetrical sterilisation policies. In Table 2, we have classified different possible types of international monetary cooperation. Case 1 involves the lowest degree of cooperation, which is cooperation of degree zero. Cases 2 and 3 involve asymmetrical arrangements. Case 4 involves the highest degree of cooperation.

1. Symmetrical Noncooperation. The intervention policy used to influence the exchange rate is the most inefficient one. Under perfect substitutability of both countries' bonds, the policy is absolutely ineffective; whereas under imperfect substitutability, the sterilised intervention policy can, when it is combined with open market operations, succeed in influencing the exchange rate, but only after an extremely large amount of intervention. Since the quantity of money is not affected in either country, the world quantity of money also remains unchanged, which could be considered advantageous. However, since the

intervention policy is the most inefficient compared with the other three cases, one should opt instead for a nonintervention policy, particularly in those countries with depreciating currencies, which generally lose a considerable amount of international reserves. Case 1 and subsequent Case 2 are the representative cases of our past managed-floating system.

2. Asymmetrical Cooperation I. One could defend the nonsterilised intervention policy of the ROW and the sterilisation policy of the United States on the following grounds. Because, under the present system the intervening country is generally the ROW and not the United States, the ROW-country is the one that fixes its exchange rate target, which may not be in the interest of the United States, but the US authorities generally accept it. If the intervening country can hit its own exchange rate target, it should also bear the adjustment burden by not sterilising its intervention. As a matter of fact, the amount of intervention and the subsequent change in the ROW's quantity of money will be higher than under a system where the United States also follows a nonsterilisation policy.

As McKinnon (1982, p. 330) has shown, the sterilisation policy of the United States is not consciously pursued but instead is "passive" to the extent that the Federal Reserve System does not know it is pursuing a sterilisation policy, since it is induced by the ROW-country's willingness to hold international reserves in the form of US Treasury bonds: the US sterilisation policy "is passive because the Federal Reserve is not consciously sterilising with offsetting changes in its own domestic asset position. Rather, the American money supply is insulated from changes in official reserves by the willingness of foreign central banks to hold nonmonetary US government debt." Thus, for instance, if the ROW-country avoids an appreciation, it eventually uses, with the aid of the Federal Reserve System as a broker, its reserve inflows to purchase US Treasury bonds or bills in the US market.

The disadvantages of this asymmetrical type of cooperation are twofold. On the one hand, a relatively large amount of reserves is needed for intervention. On the other hand, the world quantity of money changes, since the intervening country's money supply varies.

3. Asymmetrical Cooperation II. The outcome is identical to the preceding case, with only one exception: the United States' quantity of money changes. This case, as well as the following one, are not representative of our past managed-floating system.

4. Symmetrical Cooperation. This case is the optimal one, or the "most fruitful" one, because the intervention policy for influencing the exchange rate is efficient, the need for international reserves is the lowest, the world quantity of money remains unchanged, and the adjustment burden is shared equally between the United States and the ROW-country (2).

3. ASYMMETRICAL COOPERATION AND THE WORLD INFLATION OF THE 1970S

In a pure flexible-exchange-rate system, there is no relation whatsoever between international reserves and the money supplies of various countries, because the former simply remain constant (expressed in US dollars). In a managed system of floating exchange rates, there is, again, no link at all when sterilised intervention policies are pursued, whereas there is a strong link when nonsterilised intervention policies are pursued. If, furthermore, the

United States follows a policy of sterilisation, the impact of nonsterilised intervention policies of other countries on the world quantity of money will be greatest.

By looking at yearly world data on growth rates (for the ten major industrial countries, the growth rates for the world money supply and for the world price level are weighted averages of national growth rates using gross national product weights of 1970), McKinnon (1982, 321-324) finds strong evidence of a link between international reserves, the world quantity of money, and the world price level for two periods, 1971-72 and 1977-78 (when the dollar was under attack), as the figures reproduced in Table 3 indicate. There was only partial nonsterilisation in the countries outside the United States and a sterilisation of the US quantity of money. The weight of the US quantity of money within the world quantity of money is about 50 per cent. The resulting world price inflation had a two-year lag.

In a more recent paper (1986) McKinnon shows why the asymmetrical cooperation of exchange rate management (partly nonsterilised interventions by ROW and always sterilisation by the Federal Reserve) has tended to synchronise the international business cycle as far as monetary shocks are concerned. In Fig. 2 a strong negative correlation is shown between quarterly rates of change in the dollar exchange rate and money growth rates in ROW. Both variables are used (or smoothed) with a five-quarter moving average. When the dollar is rising (i.e. appreciating), ROW's central banks intervene ("leaning against the wind" by selling reserves and buying their own currencies) for reasons of exchange rate management and their money growth rates tend to be reduced collectively. Conversely, when the dollar is falling (i.e. depreciating), partly nonsterilised intervention operations by ROW (creating money against the purchase of reserves) increases their money supply growth rates. To the extent that the appreciation of the dollar was caused by tight US monetary policy (and similarly that the depreciation of the dollar was induced to loose US monetary policy) - a hypothesis which is not always evident for the 1980s -, the total world stock of money must fluctuate cyclically and the basic reason is that the "Federal Reserve has not typically responded to these fluctuations in the dollar exchange rate in an offsetting fashion" (McKinnon, 1986, p. 216).

IV. HOW TO MANAGE THE REAL EXCHANGE RATE IN THE PRESENCE OF REAL SHOCKS?

The most remarkable case of divergence from purchasing power parity over the recent period of floating rates is the real appreciation of the US dollar since the end of 1980 to 1985 (see Fig. 1). This period has witnessed a major real shock: the "formidable" US debt-financed budget deficit since 1981 which has been accompanied by fiscal contraction in Europe and Japan. The "excessive" real appreciation of the dollar cannot be considered as a "rational bubble", but rather it reflects a change in the fundamentals as far as the divergent fiscal policies (coupled with minor divergences concerning tightness of monetary policies) are concerned.

Implicitly, the excess variability dealt with in the preceding sections was created by monetary or financial disturbances (money supply shocks or portfolio shifts) and the proper response was monetary policy to manage the exchange rate. Nominal shocks hit the nominal fundamentals of the exchange rate, real shocks affect the real fundamentals and thus the real exchange rate. By definition, these real shocks emerge in the real sector, i.e. in the goods market, and their origin can be traced to the supply or demand side. Among the

real cost push effects there have been the worldwide oil price increases and the increase in taxation of labour income (social security contributions and personal income tax) constituting real supply shocks which have characterised the 1970s (de Grauwe and Fratiannin 1985). Real demand shocks are those of an increase (or decrease) in autonomous consumption - i.e. fall in savings - investment or bond-financed budget deficits. The case of fiscal expansion in the US and of (relative) fiscal contraction in Europe and Japan is the major real shock in the 1980s.

1) Since it was not a "common" but rather a "divergent" real shock (because of divergent fiscal policies) to the world economy, there had to be a change in the real exchange rate between the US and ROW in a world of high capital mobility. 2) The response of ROW could have been a real exchange rate management via a proper monetary-fiscal policy mix, but the contrary occurred, probably for reasons of real interest rate management. 3) In this particular policy configuration no case can be made for a traditional international coordination of exchange rate management in terms of (nonsterilised) intervention policies.

1. Real Shocks in a World of Capital Mobility

In the recent closed economy literature, there is still an ongoing debate as to whether public debt constitutes net wealth for the global economy. As one can expect, some economists (e.g. Barro, 1974) deny the net wealth aspect and some others argue for it (e.g. Buiter, 1985). One of the essential conditions according to which public debt would not represent net wealth concerns the possibility that the tax payers fully discount their future tax liabilities (which arise to service the debt). Under this hypothesis, a bond-financed budget deficit would imply a reaction by private agents to increase their amount of savings which in the limit could correspond exactly to the volume of the budget deficit. In such a case, a bond-financed budget deficit is equivalent to a tax-financed budget "deficit" (the so-called Ricardo equivalence theorem) and its impact on the real macroeconomic variables would be zero (except for the long-run implications of a higher part of government expenditures in GDP). There would consequently not be any other real effect in an open economy so that the real shock in the form of a bond-financed budget deficit would be completely absorbed by the domestic economy. In the following, we shall assume that public debt is not neutral; the study by Frenkel and Razin (1986) represents an interesting contribution since they assume only a certain degree of public debt neutrality.

Flexible exchange rates do not insulate national economies from a real shock emerging in one of these economies - and in particular in a large economy like the US - to the extent that there is some degree of capital mobility. In the traditional sense, a high degree of capital mobility stands for a high degree of substitutability of domestic and foreign financial assets. According to the terminology of the more recent literature, capital mobility refers to the possibility of capital controls. We shall use the term capital mobility in the sense of both interpretations.

When there is complete capital immobility, the domestic economy works like a closed economy. In this case, flexible exchange rates would insulate the economy concerned absolutely from the rest of the world. Since the balance of payments coincides with the trade balance, any bond-financed budget deficit would be fully financed by domestic savings via a rise in the domestic interest rate. This type of economy was probably in the mind of those economists who in

the 1950s advocated a regime of floating exchange rates, since the stabilisation policy of an individual country would be autonomous, i.e. independent of foreign economies (Purvis 1985, p. 725). At the present time, this model of an economy represents the "ideal" type of an open economy for the proponents of capital restrictions (like Liviatan 1980, Tobin 1982, and Dornbusch 1986) in order to minimise or nullify the impact of capital flows on the volatility of exchange rates.

In a world of capital mobility, the budget deficit will be financed jointly by domestic and foreign savings. Under the hypothesis of perfect capital mobility for a small open economy (which, by definition, has no impact on the real world interest rate), the budget deficit would be totally financed by external savings, i.e. by capital inflows. To the financial transfer must correspond a real transfer in terms of goods. The real transfer is made possible through a real appreciation of the domestic currency which includes (under normal elasticity conditions and by ignoring short-run J-curve-effects) less exports and more imports. Consequently, the budget deficit creates a total crowding-out effect, not with respect to domestic absorption (which remains unchanged) but with respect to net exports. This crowding-out is realised by the change in the real exchange rate - a traditional result of the "old-fashioned" Mundell-Fleming model. Through the real exchange rate effect, domestic goods are available for government expenditures via less export and via a switch from import substitutes to imported goods.

If the budget deficit takes place in a big country - say the US - the adjustment process will differ, since one has to work with a two-country model: US and ROW. We still remain under the hypothesis of perfect capital mobility. The rise in the US-bond-financed budget deficit increases the real world market interest rate. Consequently, there is some crowding-out of private expenditures in the US and some other crowding-out of private expenditures in ROW, the first creating excess savings in the US and the second one excess savings in ROW. It follows that the budget deficit is financed partly by domestic savings and partly by foreign savings via capital inflows. The corresponding transfer of goods from ROW to the US is realised by the real appreciation of the US dollar involving a current account deficit in the US and a corresponding current account surplus in ROW. From the point of view of a two-country-model, the former crowding-out effect of "net exports" (described for a small country) is actually a crowding-out effect of domestic and foreign private absorption.

The last case of imperfect capital mobility (in the sense of imperfect substitutability between domestic and foreign financial assets) would produce a higher real US interest rate and a lower real appreciation of the dollar. The reason is that under imperfect capital mobility, the internal real interest rate can rise by much more than the external one (or, more precisely, much more than the real interest rate parity condition would predict and this additional divergence is called a risk premium). Consequently, more domestic excess savings are available, less foreign excess savings are necessary, and it follows that capital inflows are lower.

From the above description of the adjustment mechanism under various assumptions about the degree of capital mobility, the following general result can be put forward. Bond-financed budget deficits of the domestic economy constitute a real shock to the domestic and foreign country; the same reasoning can be developed for an autonomous increase in domestic consumption or investment. These real shocks influence the real world market interest rate and provoke a switch of savings in the world economy from ROW to the US via capital movements. To the net capital movements must correspond net trade flows which are brought about by a change in the real exchange rate. In this sense, the system of flexible exchange rates does not allow macroeconomic independence except for the case of capital immobility.

Since bond-financed budget deficits lead to a real appreciation, continuously increasing budget deficits involve a continuous ongoing real appreciation over time. Consequently the continuous increase in the US budget deficit from 1981 to 1985 could explain the trend of the US real exchange rate (Fig. 1) (Branson 1986, Frenkel 1986, Dornbusch 1986). Other factors could have played an additional role: tight monetary policy in 1980/81 and relatively loose monetary policy in 1985; the expectation effects with regard to an appreciation as a consequence of the Kemp-Roth tax bill in 1981 and with respect to the depreciation as a result of the Gramm-Rudman-Hollings bill of 1985 according to which the US budget deficit will be gradually reduced over the following years.

2. Exchange Rate Management versus Interest Rate Management

How could the rest of the world have reacted to the real shock brought about by US fiscal policy? In particular, would an appropriate exchange rate management have avoided the tremendous fluctuations in the real exchange rate of the US currency over the 1980s? The proper real exchange rate management could only be conducted by influencing the real fundamentals of the exchange rate and the proper policy tool would be fiscal policy or a monetary-fiscal policy mix. In the following we shall concentrate on possible fiscal policy reactions (Corden, 1986).

Fig. 3 illustrates the fiscal policy reactions of ROW which we shall call Europe (standing for all other OECD members). The European fiscal policy parameter is the size of Europe's budget deficit BD . The real exchange rate of European currencies is represented by e where an increase in e signifies a real depreciation of European currencies which is equal to a corresponding real appreciation of the US dollar. The trade-off line T describes the results of our theoretical arguments (exposed in section IV.1), but now applied to Europe: an increase of Europe's bond-financed budget deficit implies a real appreciation of Europe's currencies; (the slope is mainly determined by the degree of capital mobility and by the elasticity of the trade balance with respect to the real exchange rate). The T_0 -line is constructed for a given US budget deficit (BD^*_0). The initial situation may be characterised by point A. An expansionary fiscal policy of the US (BD^*_1) shifts the T_0 -line to the position T_1 . There can be three fundamentally different fiscal policy reactions by Europe.

No fiscal policy reaction (point B). This case underlies implicitly our two-country model for section IV.1. On the one hand, there is a real appreciation of the US dollar which corresponds to a real depreciation of Europe's currencies (e_1). On the other hand, there is an increase in the real world market interest rate from r_{w0} to r_{w1} . The real shock inside the American economy has been transmitted to Europe in the form of a real depreciation of Europe's currencies and in the form of an increase in the real interest rate.

Expansionary fiscal policy reaction for reasons of real exchange rate stabilisation (point C). The real exchange rate would remain unchanged between both areas (e_0) to the extent that Europe expands in line with the United States by raising its budget deficit from BD_0 to BD_1 . However, there would be a still sharper rise in the real world interest rate (i.e. from r_{w1} to r_{w2}). In both parts of the world, the budget deficits are financed totally by

internal savings via the additional increase in the real interest rate. Consequently, the real exchange rate remains unchanged.

Restrictive fiscal policy reaction for reasons of real interest rate stabilisation (point D). To the extent that the Europeans are annoyed about the rise in the real interest rate (considering the real depreciation of their currencies as stimulating for employment), they are only able to reduce the real interest rate by a contractive fiscal policy. Provided that they want to re-establish the initial real interest rate r_{w0} , they have to reduce their budget deficit by an amount which compensates for the increase in the American budget deficit so that the real interest rate in the world capital market remains constant. The increased savings as a consequence of lower European budget deficits serve for the complete financing of the American budget deficit (when assuming perfect capital mobility). The corresponding trade transfer of goods from Europe to the US can only be realised by a still stronger real appreciation of the dollar, i.e. by a still stronger real depreciation of European currencies.

It is now interesting to observe what actually happened in Europe in the 1980s on the fiscal side. The trend was more in the direction of a restrictive fiscal policy (especially for the UK, Japan and West Germany). Consequently, the relevant evolution of the real exchange rate was that of section BD_2 on the T-line. Thus, Europe's fiscal policy has intensified the size of the change in the real exchange rate. Whether this policy has been conducted consciously for reasons of real interest rate stabilisation or for reasons of public debt consolidation, remains an open question. It is probable that both reasons have played a role despite the tremendous repercussion on the dollar/Europe real exchange rate.

3. The Uneasy Case for Exchange Rate Coordination

The title of this section is borrowed from Sachs' "The Uneasy Case for Greater Exchange Rate Coordination" (1986a). When fundamentals change, as is the case of the new fiscal policy mix between US and ROW, then the real equilibrium exchange rate also changes. In the case of real shocks, there cannot be found any reasonable ground to propose exchange rate management and, by this, any exchange rate coordination (Frenkel 1986, Branson 1986, Dornbusch 1986). On this point, the three eminent experts in the field, William Branson, Rudiger Dornbusch, and Jacob Frenkel are in full mutual agreement:

... a shift in fiscal policy, much as occurred beginning in 1982, will generate an equilibrium adjustment in the real exchange rate as part of the financing process. This movement is probably being reversed now, as the Gramm-Rudman legislation brings real interest rates and the exchange rate down. A monetary policy that attempted to frustrate this movement probably would be a mistake now, as it would have been in 1982". (Branson 1986, pp. 186-7).

The lesson is that large international divergences in monetary or fiscal policy will be reflected in exchange rates. To avoid these fluctuations, bad policies must be avoided. Accomodating a poor fiscal policy by exchange-rate-oriented monetary policy simply adds yet another folly." (Dornbusch 1986, p. 222)

If indeed the root cause for the current difficulties lies in the fiscal positions of the United States, Europe, and Japan, then the solution for the problems does not call for a monetary reform, for tariffs and protectionism, for taxes on capital flows (or for other measures which throw sand in the wheels), nor does it call for intervention rules. Rather, it calls for a restoration of fiscal order in which the United States adopts a more contractionary fiscal stance while Europe and Japan adopt a more expansionary stance. I believe that the central difficulties with the current regime do not rest with the exchange-rate system or with the exchange-rate policies;

rather, they rest with the overall mix of the uncoordinated macroeconomic policies." (Frenkel 1986, pp. 62-63)

Consequently, if one wants more real exchange rate stability, the only way to do it is to coordinate fiscal policy among countries. This means that fiscal policy autonomy is sacrificed to an exchange rate target. In the real world, such a plea for international fiscal policy coordination must remain a pious hope, since it would imply fiscal conversion: all countries pursue, at the same rhythm, either expansion together or contraction together.

Furthermore, as we have shown in section IV.2, this fiscal convergence implies sacrificing real interest rate stability. Behind the background of changing fiscal policies over time combined with fiscal convergence, more real exchange rate stability implies more real interest instability. Thus, worldwide, fiscal expansion raises real interest rates and worldwide fiscal contraction lowers them.

Proponents of target zones such as John Williamson (1985) go even further in believing that the implementation of target zones for exchange rates constitute "a first step in educating governments to pursue good policies" (Dornbusch 1986, p. 222). It should be remembered that there is an endless debate going on in Europe concerning the "merits" of the European Monetary System. The existence of the EMS could indicate that coordination works. However, critics of this mini-Bretton-Woods-system with an adjustable peg consider it in fact as nothing more than a "German Monetary Area" with "occasional crises, realignments, and capital controls" (Dornbusch 1986, p. 218).

Instead of more real exchange rate stability, one could also defend the opposite view of real exchange rate flexibility to the extent that changes in the real exchange rate are an outcome of justifiable real shocks in the world economy. Max Corden (1986) has put forward this point. Real shocks are justifiable when they respond to the adjustment of actual stocks to desired stocks. A fall in the savings ratio represents the case where the actual wealth ratio exceeds the desired one. An increase in private investment is the adjustment of the actual capital stock to the desired stock. A large decline in savings or a large rise in investment have similar effects on the real interest rate and the real exchange rate as large budget deficits: the former rises and the latter falls. Thus, the real exchange rate instability has to be compared with the gains from stock adjustment:

When Japanese savings are being transferred to the United States in order to finance tax cuts or private investment in the United States the process might be regarded as optimal. Hence the much maligned current account "imbalances" may be optimal. There are gains from trade in financial assets against goods, as there are in

goods-goods trade. The Japanese want to export more goods and import more bonds in return, and the Americans want to trade in the opposite direction." (Corden 1986, p. 429).

Concluding Remarks

The conclusions about how much exchange rate management and how much international coordination are the following ones.

(1) Financial markets are efficient. From the point of view of the financial sector, the current exchange rate is always the correct equilibrium rate. However, this correct rate can be the wrong one from the point of view of the real sector. Excess fluctuations of the terms of trade and of the relative price between tradeables and nontradeables could be dampened by exchange rate management. A crucial assumption for exchange rate management concerns the perfect knowledge, by the monetary authorities, of the fundamental equilibrium real exchange rate.

(2) It is not quite evident that international policy coordination is necessarily always superior to non-cooperative solutions. Despite "structural interdependence" among large economies and "structural dependence" of small economies, coordination may lack enforceability and credibility (i.e. time consistency) or it may be based upon the wrong macro model. As far as coordination in the field of monetary policy is concerned, it may be only potentially more efficient than isolationist management since joint actions by inflation-biased policy makers could increase world inflation pressures since it removes the fear of exchange rate depreciation against each other.

(3) Concerning the choice of the proper monetary policy mix for effective exchange rate management, nonsterilised intervention policies are doubtlessly superior to sterilised ones. The reason is that one of the monetary fundamentals - the outstanding stock of money - is altered. However, such a policy will not have a long-lasting impact on the real exchange rate to the extent that the internal price level adjusts. International symmetrical coordination of exchange rate management (and here of nonsterilised intervention policies) is seen to be the most efficient - in particular between the United States and the "rest of the world". Such a coordination would produce the greatest impact on the exchange rate (for a given amount of reserves used by the intervention operation) and would avoid world inflation pressures.

(4) A case against exchange rate management must be made in the presence of real shocks. The shocks of divergent fiscal policies to the world economy over the 1980s illustrates this. In a world of capital mobility, a bond-financed budget deficit will be financed, to a large extent, by foreign savings. In order to assure the real transfer in terms of more available traded goods, the real exchange rate has to appreciate. This real appreciation is nothing more than a reflection of the change in the real fundamentals of the exchange rate. Exchange rate management of the nonsterilised intervention type and, a fortiori, international monetary system (and over the long run it could only change the nominal exchange rate). Consequently, if any international coordination should be implanted in order to avoid the real shock, it could only be on the level of fiscal convergence - a hopeless hypothesis in the present circumstances (as is the plea for a symmetrical cooperation of nonsterilised intervention policies between the U.S. and ROW).

FOOTNOTES

1. Intimately related to this "institutional" reason of the dollar standard is the so-called $(n-1)$ problem. With n currencies there are only $(n-1)$ independent exchange rates. Consequently, there is one degree of freedom and the fundamental question is to know which country assumes this extra degree of freedom. In the dollar standard the degree of freedom is allocated to the United States, whereas the other $(n-1)$ countries pursue their exchange rate target with respect to the US dollar.

Any operational monetary system has to find a formal solution of the $(n-1)$ problem which represents another aspect - probably a very long-run aspect covering several decades - of "proper exchange rate management". This issue is not treated in the present paper.

2. The question one may now ask is whether such symmetrical cooperation could be brought about. Here again, we refer to the contribution of McKinnon (1982, pp. 331-33). Because the ROW-country represents, in principle, all members of the Fund except the United States, one could negotiate a "mutual nonsterilisation pact" as McKinnon calls it, only among those that have fully convertible currencies, that have relatively large economies, and that are the best candidates to pursue a stable monetary policy. McKinnon mentions a pact between the United States, the Federal Republic of Germany, and Japan (and probably indirectly with their respective monetary satellites, such as the Netherlands and Austria in the case of Germany). Furthermore, in order to avoid money-supply shocks which increase the variability of the exchange rate, these countries should also agree on the rates of domestic credit expansion to be permitted in each country. Furthermore, passive sterilisation by the United States could be avoided if central banks held their dollar reserves as deposits with the Federal Reserve System, on which the latter paid an interest rate equivalent to the yield on US Government debt.

An extreme alternative to the above symmetrical cooperation scheme could be a mutual agreement among these same three countries, or among all industrial countries, not to intervene at all in the foreign exchange market so that there would be a pure regime of flexible exchange rates. Such a nonintervention pact could be in conflict with the "optimal degree of flexibility". However, the "optimal degree of flexibility" is only defensible when the technique of intervention follows the principle of asymmetrical cooperation or, better still, of symmetrical cooperation.

Table 1: Variability in the Nominal Exchange Value of the US Dollar, 1970-1986

Percent appreciation (+) or depreciation (-) of the US dollar ^a		
Period	Spot exchange rate with German mark	Spot exchange rate with Japanese yen
June 1970 to March 1973	-22.6	-27.0
March 1973 to July 1973	-17.0	+1.0
July 1973 to January 1974	+20.5	+12.6
January 1974 to March 1975	-17.6	-3.4
March 1975 to September 1977	+0.2	-7.3
September 1977 to October 1978	-20.9	-31.2
October 1978 to May 1979	+3.8	+19.0
May 1979 to July 1980	-8.4	+1.2
July 1980 to August 1981	+43.2	+5.5
August 1981 to November 1981	-10.9	-4.4
November 1981 to November 1982	+14.6	+18.3
November 1982 to January 1983	-6.5	-11.8
January 1983 to January 1984	+17.7	+0.5
January 1984 to March 1984	-7.6	-3.7
March 1984 to February 1985	+27.1	+15.6
February 1985 to July 1986	-34.8	-39.1
June 1970 to September 1977	-36.0	-25.7
September 1977 to July 1980	-24.8	-17.1
July 1980 to February 1985	+89.0	+17.8
February 1985 to July 1986	-34.8	-39.1
June 1970 to September 1977	-36.0	-25.7
September 1977 to July 1980	-24.8	-17.1
July 1980 to February 1985	+89.0	+17.8
February 1985 to July 1986	-34.8	-39.1
June 1970 to July 1986	-40.8	-55.8

a. Underlying spot exchange rates are monthly average of daily rates.

Source: McKinnon (1986a)

Table 2: Types of International Monetary Cooperation

United States		
Rest of the World (ROW)		
Sterilisation	<u>Case 1. Symmetrical Noncooperation</u>	<u>Case 3. Asymmetrical Cooperation II</u>
	-Each "national" quantity of money remains unchanged	-United States' quantity of money changes
	-Intervention policy is inefficient	-Intervention policy is efficient
	-An extremely large amount of reserves is used	-A large amount of reserves is used
	-World quantity of money remains unchanged	-World quantity of money changes
Non-sterilisation	<u>Case 2. Asymmetrical Cooperation I</u>	<u>Case 4. Symmetrical Cooperation</u>
	-Rest of the world's quantity of money changes	-Each "national" quantity of money changes
	-Intervention is efficient	-Intervention policy is efficient
	-A large amount of reserves is used	-A small amount of reserves is used
	-World quantity of money changes	-World quantity of money remains unchanged

Table 3: Growth Rates of US Money Supply, of International Reserves, of World Quantity of Money, and of World Price Level (in percentage)

Year	US Money supply (M ₁)	International reserves	World Money supply (M ₁)	World Price Level
1970	4.3	74.8	8.19	4.4
1971	6.5	142.0	11.77	3.1
1972	9.1	14.7	12.73	4.1
1973	5.7	8.9	7.65	12.9
1974	3.0	-0.8	6.51	21.9
1975	5.5	0.2	9.22	7.5
1976	5.9	6.2	7.36	6.6
1977	8.2	47.6	10.27	6.6
1978	8.2	33.5	10.98	5.6
1979	8.0	-19.9	7.60	11.1
1980	5.3	0.8	4.88	13.5

Source: McKinnon (1982)

References

- Barro, Robert J. "Are Government Bonds Net Wealth?", Journal of Political Economy, Vol. 82, 1974, 1095-1117
- Blanchard, Olivier, "Speculative Bubbles, Crashes and Rational Expectations", Economic Letters, Vol. 3, 1979, 386-389
- Branson, William H., "Exchange Rate Dynamics and Monetary Policy", in Assar Lindbeck (ed.), Inflation and Employment in Open Economies, Amsterdam, 1979, 189-224
- , "The Limits of Monetary Coordination as Exchange Rate Policy", Brookings Papers on Economic Activity, No. 1, 1986, 175-194
- Buiter, Willem H., "A Guide to Public Sector Debt and Deficits", Economic Policy, Vol. 1, 1985, 14-79
- Buiter, Willem H., and Richard C. Marston (eds.), International Economic Policy Coordination, Cambridge, 1985
- Claassen, Emil-Maria, "Comments on Paul de Grauwe's 'What are the Scope and Limits of Fruitful International Monetary Cooperation in the 1980s?'" in George M. von Furstenberg (ed.), International Money and Credit: The Policy Roles, International Monetary Fund, Washington, 1983, 409-419
- Cooper, Richard N., "Interdependence and Coordination of Policies", in Peter B. Kenen and Ronald N. Jones (eds.), Handbook of International Economics, Vol. 2, Amsterdam, 1985, 1195-1234
- Corden, W. Max, "The Logic of the International Monetary Non-System", in Fritz Machlup, Gerhard Feld and Hubertus Muller-Groeling (eds.), Reflections on a Troubled World Economy, Essays in Honour of Herbert Giersch, London, 1983, 59-74
- , "Fiscal Policies, Current Accounts and Real Exchange Rates: In Search of a Logic of International Policy Coordination", Weltwirtschaftliches Archiv, Vol. 122, 1986, 423-438
- Curry, David and Paul Levine, "Macroeconomic Policy Design in an Interdependent World" in Willem H. Buiter and Richard C. Marston (eds.), International Economic Policy Coordination, Cambridge, 1985
- De Grauwe, Paul, "What are the Scope and Limits of Fruitful International Monetary Cooperation in the 1980s?" in George M. von Furstenberg (ed.), International Money and Credit: The Policy Roles, IMF, Washington, 1983, 375-408
- Dornbusch, Rudiger, "Expectations and Exchange Rate Dynamics", Journal of Political Economy, Vol. 84, 1976, 1161-1176
- Evans, George W., "A Test for Speculative Bubbles and the Sterling-Dollar Exchange Rate: 1981-84", American Economic Review, Vol. 76, 1986, 621-636
- Fleming, J.M., "Domestic Financial Policies under Fixed and Floating Exchange Rates", IMF Staff Papers, Vol. 9, 1962, 369-379
- Flood, Robert and Peter Garber, "Gold Monetization and Gold Discipline", Journal of Political Economy, Vol. 92, 1984, 90-107
- Frenkel, Jacob A., "Commentary on 'Causes of Appreciation and Volatility of the Dollar'", in Federal Reserve Bank of Kansas City (ed.), The U.S. Dollar - Recent Developments, Outlook, and Policy Options, 1986, 53-63
- Frenkel, Jacob A. and Assaf Razin, "The International Transmission and Effects of Fiscal Policies", American Economic Review, Papers and Proceedings, Vol. 76, 1986, 330-335
- Friedman, Milton, "The Case for Flexible Exchange Rates", in M. Friedman, Essays in Positive Economics, Chicago, 1953
- Intervention in the Foreign Exchange Market", International Monetary Fund, Staff Papers, Vol. 28, 1981, 451-476

- Hamada, Koichi, "Alternative Exchange Rate Systems and the Interdependence of Monetary Policies", in Robert Aliber (ed.), National Monetary Policies and the International Financial System, Chicago, 1974
- , "A Strategic Analysis of Monetary Interdependence", Journal of Political Economy, Vol. 84, 1976, 677-700
- Jurgensen, Philippe, Report of the Working Group on Exchange Market Intervention, Paris, 1983
- Levich, R.M., "Tests of Forecast Models of Market Efficiency in the International Money Market", in J.A. Frenkel and H.G. Johnson (eds.), The Economics of Exchange Rates, 1978
- Liviatan, N., "Anti-Inflationary Monetary Policy and the Capital-Import Tax", Warwick Economic Research Papers, No. 171, 1980
- Marston, Richard C., "Cross Country Effects of Sterilisation, Reserve Currencies and Foreign Exchange Intervention", Journal of International Economics, Vol. 10, 1980, 63-78
- McKinnon, Ronald I., "Currency Substitution and Instability in the Dollar World Standard", American Economic Review, Vol. 72, 1982, 320-333
- , "Commentary on 'Is There a Case for More Managed Exchange Rates?'" in Federal Reserve Bank of Kansas City (ed.), The U.S. Dollar - Recent Developments, Outlooks and Policy Options, 1986, 213-215
- , "Monetary and Exchange Rate Policies for International Financial Stability: A Proposal", unpublished manuscript, Stanford, September 1986a
- Mundell, Robert A., "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates", Canadian Journal of Economics and Political Science, Vol. 29, 1963, 475-485
- , International Economics, New York, 1968
- Mussa, Michael, The Role of Official Intervention, Occasional Paper No. 6, New York, 1981
- Nurkse, Ragnar, International Currency Experience, Lessons of the Interwar Period, Princeton, 1944
- Obstfeld, Maurice, "Can We Sterilize? Theory and Evidence", American Economic Review, Papers and Proceedings, Vol. 82, 1982, 45-50
- , "Exchange Rates, Inflation, and the Sterilization Problem: Germany 1975-1981", European Economic Review, Vol. 21, 1983, 161-189
- , "Rational and Self-Fulfilling Balance-of-Payments Crises", American Economic Review, Vol. 76, 1986, 72-81
- Oppenheimer, P.M., "Non-Traded Goods and the Balance of Payments: A Historical Note", Journal of Economic Literature, 1975
- Purvis, Douglas D., "Public Sector Deficits, International Capital Movements, and the Domestic Economy: The Medium-Term is the Message", Canadian Journal of Economics, Vol. 18, 1985, 723-742
- Rogoff, Kenneth, "Can International Monetary Policy Cooperation be Counterproductive?", Journal of International Economics, May 1985, 199-217
- Sachs, Jeffrey D., "The Uneasy Case for Greater Exchange Rate Coordination", American Economic Review, Papers and Proceedings, Vol. 76, 1986a, 336-341
- , "Is there a Case for More Managed Exchange Rates?" in Federal Reserve Bank of Kansas City (ed.), The U.S. Dollar - Recent Developments, Outlook, and Policy Options, 1986, 185-211
- Tobin, James "A Proposal for Monetary Reform", in Essays in Economic Theory and Policy, MIT Press, 1982
- Tryon, Ralph W., Small Empirical Models of Exchange Market Intervention, Board of Governors of the Federal Reserve System, Staff Studies, No. 134, 1983
- Williamson, John, The Exchange Rate System, Washington, 195
- , "Target Zones and the Management of the Dollar", Brookings Papers on Economic Activity, No. 1, 165-174

