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INTERNATIONAL MONEY AND  
THE FUTURE OF THE SDR

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K. ALEC CHRYSTAL



INTERNATIONAL FINANCE SECTION

DEPARTMENT OF ECONOMICS

PRINCETON UNIVERSITY

Princeton, New Jersey

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**PETER B. KENEN, Director**  
*International Finance Section*

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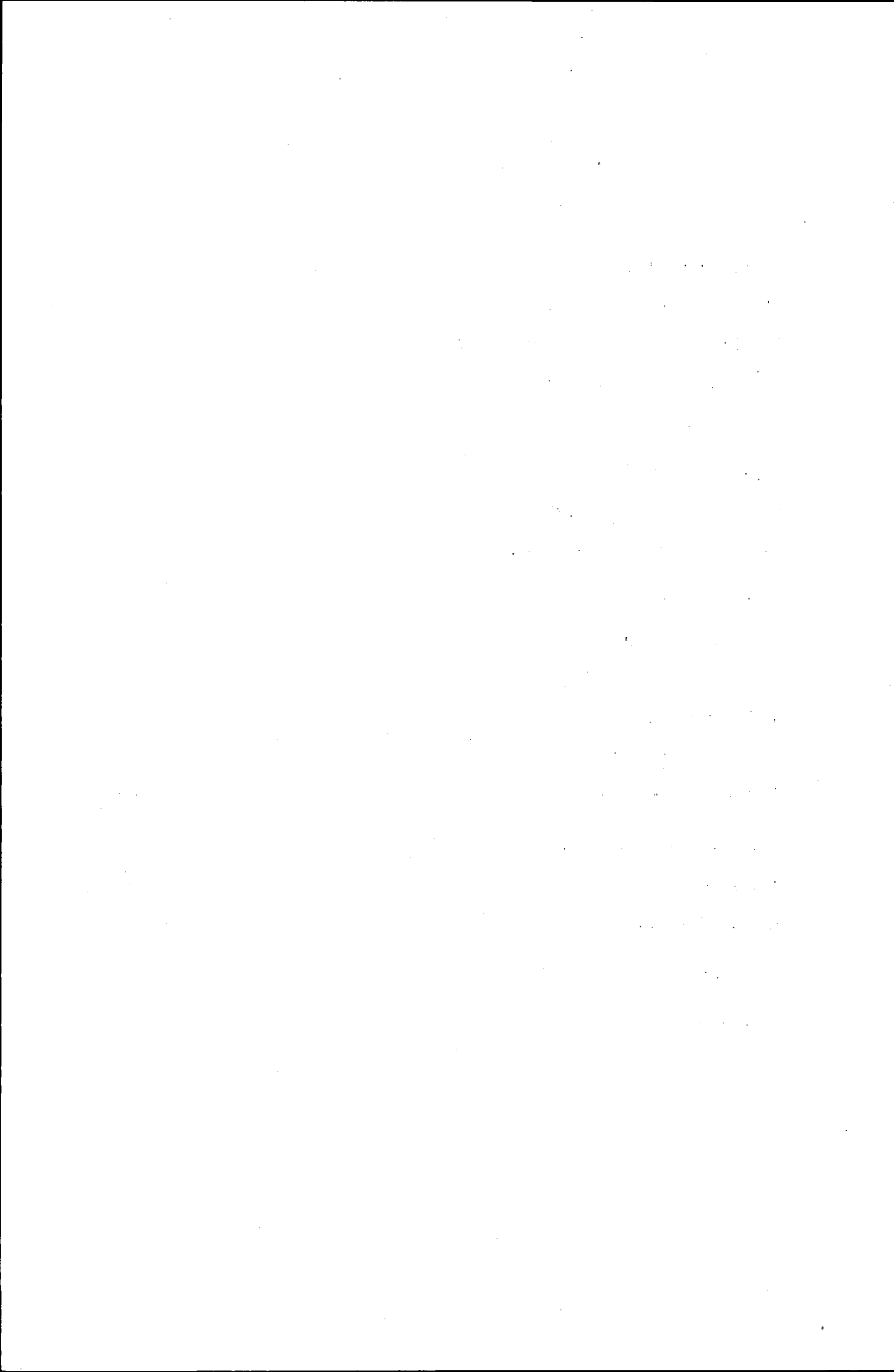
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# International Money and the Future of the SDR

## Introduction

The aim of this Essay is to develop a particular view of the international monetary system as a whole and to draw some implications for the future of Special Drawing Rights. The approach I employ is a logical extension of ideas to be found in monetary theory, but the emphasis is rather different from that found in the international monetary literature of the last three decades. There, the overwhelming weight of attention has been directed at the official sector and especially at official reserves and intervention policies. From that standpoint, creation of the SDR was an official-sector response to an apparent official-sector problem.

In this Essay, the argument is based upon a different view of what constitutes the fundamental international monetary problem. In contrast to domestic monetary systems that have a unique medium of exchange, the international economy has no single money that all are obliged to use and accept. It is usual to argue that households and firms hold balances of domestic money in some relation to their domestic transactions. It might also be expected that they would wish to hold internationally acceptable moneys in some relation to their international transactions. If this is correct, then it is the provision of internationally acceptable money that is the fundamental problem, not the provision of official reserves. At present, this role is filled by the currencies of particular countries, especially the dollar, but so long as there are close substitutes, externally held balances of national currencies are a potential source of instability. Unfortunately, prospects for making the SDR the centerpiece of a symmetrical monetary system are nil unless the SDR can be reformed in such a way that it obtains characteristics at least as desirable as those of the dollar.

The medium-of-exchange approach to international monetary issues is not entirely new. Swoboda (1968) and McKinnon (1969) incorporated aspects of it into their analyses, and some empirical support is presented in Chrystal (1975, 1976, 1977). The novel feature of this Essay is its use of that approach to draw new implications for the operations of the international monetary system and for the reform of international institutions. The argument is developed first by a selective survey drawing attention to the convergence of previously disparate analyses. There follows a discussion of the relationship between private and official international money holdings. Finally, there is an assessment of the SDR.

## Existing Arguments

### *The Transactions Demand for Money*

Prior to the twentieth century, writers on money were not concerned to identify the precise nature of what have come to be called demand functions for money. Rather, classical economists had a twofold concern, first with the relationship between the money stock and the price level, and second with the tasks money performs in an economy. Those tasks were to serve as a medium of exchange, a store of value, and a unit of account, the first two of which required the physical presence of a money token, the last of which did not. The two concerns of older writers have aroused renewed interest among modern monetary theorists, but the approach they adopt would appear to be of greater technical sophistication.

Curiously, it was the classical concern with the relationship between money and the price level rather than with analyses of the functions of money that was the precursor to modern theories of the demand for money. In particular, the Quantity Theory implied that, for a given level of real transactions and fixed velocity of circulation of money, the price level would be proportional to the size of the money stock. It was Wick-sell (1898, Chap. 5) who first noted of this theory that it is based upon the demand for money as a medium of exchange. "It assumes that everybody maintains, or at least strives to maintain, his balance at an average level that is constant (relatively to the extent of his business or of his payments)." Keynes (1936) built upon this demand-for-money approach by postulating four separate motives for holding money: the income motive, the business motive, the precautionary motive, and the speculative motive. In his subsequent argument, he merged the first two as the transactions motive and the last two as the speculative motive. It is worth noting that the transactions motive can be broadly associated with the medium-of-exchange function of money, whereas the speculative motive corresponds to the store-of-value function. It is the transactions motive and the resultant transactions demand for money that is of particular interest here.

There have been two major theoretical developments concerned with the transactions demand for money. Both involve a formalization of the optimal behavior of a decision-making unit transacting in an economy with a unique money as the means of payment.

The first approach is by Baumol (1952), who looks at the optimal average cash balance for an individual who has to make a steady stream of payments for which he withdraws cash from interest-bearing assets. Since



Baumol assumes that there is a fixed brokerage cost per withdrawal, it follows that withdrawals will be made in discrete lumps and thus that the average cash balance will be positive. But the significant result is that the average cash balance grows less than proportionately to the size of the stream of payments that the individual must make. Specifically, Baumol shows that the average cash balance grows in proportion to the square root of the level of payments. This result does not apply, however, if the cause of an increase in payments is merely a rise in the general price level (i.e., inflation), because an increase in payments that is accompanied by a proportionate increase in brokerage costs will cause the average cash balance to rise in strict proportion to transactions. Therefore, transactions economies of scale with respect to cash inventories occur only for a *ceteris paribus* increase in real transactions.

The second important contribution to the transactions approach to the demand for money is by Miller and Orr (1966). They are concerned with a situation in which the decision-making unit has neither continuous nor discrete payments and receipts. Rather, inflows and outflows of cash are viewed as being generated by some stable statistical process, and a simple rule is adopted to restore cash balances to some target level by withdrawing cash from, or converting cash into, interest-bearing assets whenever the actual balance reaches an upper or lower bound. Surprisingly, this model implies a relationship between average cash balances and transactions very similar to that of Baumol's model. Average cash balances rise in proportion to the square of the cube root of transactions. In the Miller and Orr experiment, then, the transactions elasticity of demand for cash balances is two-thirds, whereas in the Baumol model it is half. In both cases, average cash balances demanded rise less than in proportion to a rise in real transactions. This result will be invoked in relation to the transactions demand for international money.

### *The Demand for International Reserves*

In contrast to transactions-demand theory, which is concerned with the behavior of trading individuals, the vast bulk of international monetary literature has focused on the stock of reserves held by governments or their central banks. It is worth looking at a typical recent approach to the demand for international reserves. One of the most elegant analyses is that of Clark (1970). Assuming a fixed-exchange-rate regime, he views reserves as a buffer stock, the use of which permits a degree of flexibility in the adjustment of domestic imports following an exogenous change in exports. Imports are assumed to be regulated by domestic ag-

gregate demand policies. The probability of running out of reserves can be held to a given level either by holding a high average level of reserves and allowing a slow adjustment of imports, or by holding lower reserve levels and adopting a faster speed of adjustment. Since imports are adjusted by changing domestic income and since reserve holdings have a real opportunity cost, the reserve problem can be formulated as a tradeoff between the level and the variability of income. Faster adjustment of imports to any change in exports produces a greater variance of income, but a higher reserve level produces a lower income level owing to the opportunity cost of holding reserves. Target levels of reserves are therefore chosen to maximize utility, which is positively related to income and negatively related to its variance.

The preoccupation with official holdings exemplified by Clark's model was easy to explain in an era of fixed exchange rates, when central banks had to maintain balances of reserves in order to support the price of the domestic currency in the foreign-exchange market. Crises resulted when reserves ran out. The same focus, however, led to the tendency to lose sight of the fact that the maintenance of fixed exchange rates may not be the sole reason for holding balances of foreign currencies, even within the official sector. Now that fixed exchange rates are no longer as dominant, studies that attempted to throw light on the "demand for international reserves" or the "adequacy of liquidity" are difficult to interpret or to apply. But two points emerge clearly from an examination of earlier literature: (1) There have always been good reasons for a trading nation to hold balances of externally acceptable money. And (2) there was a distinct tendency for such balances to be pooled long before exchange-rate pegging made official holdings of reserves mandatory.

As an example of the first point, Thornton (1802, p. 153) viewed gold reserves as a kind of buffer stock that, even though not "officially" held, effectively performed a function very similar to that discussed by Clark. The need to hold gold reserves had nothing to do with the exchange-rate regime, merely with the fact that they were acceptable in payment abroad, whereas domestic paper money was not:

The common manufacturer, if he understood his own interest, would approve rather than complain of the temporary substitution of paper for gold, which has been thus occasioned; for the export of gold has served to ease him in the first instance: his labour, indeed must hereafter purchase back again the gold which has been exported, but he will have to buy it back by exertions less severe than would otherwise have been needful.

In this context, subsequent arguments in Britain during the nineteenth century between the "currency" and "banking" schools can be viewed as

a discussion about international reserves. The currency school was in effect proposing that the domestic money supply should equal the country's stock of internationally acceptable money, whereas the banking school thought that the domestic money supply could safely exceed the country's stock of reserves.

One of the first writers to discuss international reserves from the point of view of their medium-of-exchange function was Marx (1886, Part 1, Chap. III, Sec. 3c), who said: "Just as every country needs a reserve of money for its home circulation so too it requires one for external circulation in the markets of the World."

Both Thornton and Marx were talking about stocks of reserves that need not be centrally or "officially" held. Indeed, the reserve holdings they were discussing antedate the very existence of central monetary institutions as they are now known. They were certainly not discussing the reserve holdings of the monarch. In brief, there are long-established precedents for arguing that members of an open economy will choose rationally to hold balances of moneys that are acceptable to foreigners, for reasons very similar to the domestic medium-of-exchange function discussed above. The exchange-rate regime is of minor importance in this context.

At this point, the common ground between the public's demand for "reserves" and the demand for money is clear. The literature on the demand for money has been concerned with the special case of a closed currency area, but once there is trade between two or more currency areas, international media of exchange must be incorporated. There will be a demand for balances of moneys that are internationally acceptable in addition to a demand for the domestic medium of exchange.

As an example of the second point, that reserves were pooled long before exchange-rate pegging made official holdings mandatory, Bagehot (1870, Chap. II) clearly described the Bank of England as a reserve depository in the nineteenth century. Traders did not individually hold their own balances of external money but to a large extent deposited them instead in a few deposit-taking institutions. "The Directors of the Bank are, therefore, in fact if not in name, trustees for the public, to keep a banking reserve on their behalf."

It is not difficult to think of reasons why this pooling of reserves might come about. There is an opportunity cost to the holder and the country associated with holdings of an external money. Further, as has been seen, there are reasons to expect economies of scale in money holding. A pooled reserve could thus be smaller than the sum of individually held balances, and the opportunity cost to the nation as a whole could thereby

be reduced. It should be no surprise, then, to find Bagehot continuing: ". . . But the danger to the depositing banks is not the sole or principal consequence of this mode of keeping the London reserve. The main effect is to cause the reserve to be much smaller in proportion to liabilities than it would otherwise be."

Bagehot was not trying to argue for the existence of economies of scale. On the contrary, he thought the situation to be potentially dangerous. But his factual observation is valid and may merely indicate that the Directors of the Bank knew their business rather better than Bagehot did. The implication of this argument, however, is important. So long as we have trading domains within which there are different currencies, and so long as there is actual or potential trade between members of different currency areas, some individuals may be expected to hold balances of foreign currencies. Some of those balances may rationally be held centrally or jointly. There could thus be a reason for central reserve holdings whatever the exchange-rate regime, although the type of regime will affect both the total size of the stock of foreign money a country will choose to hold and the proportion of that stock that is centrally held. As I argue below, this point has important implications for institutional development. These have been missed because most writers have taken a myopic view of reserves as being solely an instrument for exchange-rate support and therefore an official-sector problem.

### *The Vehicle-Currency Hypothesis*

The idea that money balances might be required to fulfill the function of international media of exchange is not entirely new, but when the point has been made, the focus has been on the private trading sector. There has been no clear attempt to link the needs of the private sector with the behavior of the official sector (but see Cooper, 1972). Before discussing the nature of this link, it is useful to outline the three main elements of the literature concerned with what Swoboda (1968) calls "vehicle" currencies, or what I call international media of exchange. First, the theory of transactions demand for money is applied to international transactions. Second, the "vehicle-currency hypothesis" states that significant economies result from the conduct of international trade in terms of few currencies. And, third, there is a need to explain why certain national currencies are used as international money in the absence of a supranational currency.

The transactions demand for money acceptable internationally is treated by Swoboda in a manner similar to the transactions demand for domestic money discussed above. An individual is assumed to have a steady

stream of foreign-currency payments to make and withdraws the necessary cash from domestic interest-bearing assets in discrete lumps, as in Baumol's model. The result is that the average balance of foreign currency will be proportional to the square root of real transactions made in that currency. It would also be possible to apply the Miller and Orr (1966) model mentioned above, in which case the trader would have stochastic payments and receipts. Here, the average cash balance would turn out to be proportional to the square of the cube root of transactions. In either case, transactions economies of scale are shown to exist in the sense that, as trade increases, average money balances increase less than proportionately.

The existence of transactions economies of scale is used by Swoboda (1968) to make the second point, that, in a world of many currency areas, inter-currency-area trade would not be conducted in every one of the different national currencies. If traders had to use and hold a multitude of currencies, they would have to devote much larger resources to holding and managing cash balances than if all international transactions were conducted in one currency. An alternative path to the same conclusion, which relates rather to the numeraire function of money, is offered by Brunner and Meltzer (1971). Through an analysis of the informational efficiency of monetary exchange they "suggest by implication the benefits that would accrue to the world economy from the use of a medium of exchange." Their key proposition is that the marginal cost of acquiring information about the properties of any asset declines with an increase in the frequency with which that asset is used. McKinnon (1969) combines the transactions-demand and the informational-efficiency arguments when he suggests that "private traders would concentrate their transactions in the most suitable major currency in order to economize on inventory-carrying costs and to minimize the informational uncertainty arising from floating rates." A further important point, made by Swoboda, is that where there are risks involved, specialization in the use of a single national currency may not be complete, since there will be gains from diversification. This means that a small group of internationally acceptable moneys is likely to emerge rather than one dominant money.

The final question concerns which currencies actually come to be used as international moneys if the choice is left to market forces. Swoboda (1968, p. 10) has pointed to a number of important factors:

. . . In the first place, asset-exchange costs play an important role in this choice. For instance, conducting transactions on income account in dollars will be preferred to conducting these transactions in Dutch guilders if the

asset-exchange costs from dollars to domestic currency are lower than those from guilders to domestic currency. It is likely that asset-exchange costs depend inversely on the size of the market for a particular asset: economies of scale in financial intermediation are likely to arise if only because of familiarity and bookkeeping economies. The size of the market for a particular currency depends, in turn, in part on the size of a country's foreign transactions and, therefore, on the volume of its external trade and the structure of its balance of payments.

Second, he continues, holders are likely to be risk averse, so that the currency chosen will be one with a market characterized by "depth, breadth and resilience." There is a greater probability of loss from selling on a small market than on a large one. Finally, for similar reasons, no currency whose exchange value is likely to fluctuate widely is likely to be held as an international money for very long. Taken together, these arguments clearly suggest that the currencies that come to be used in international transactions will be those of the dominant trading nations, in the absence of a *marketable* currency issued by a supranational authority.

### *Currency Substitution*

A final body of relevant literature examines what has come to be called "currency substitution" (Calvo and Rodriguez, 1977; Girton and Roper, 1976). Citizens of some countries may be able to hold external money, in addition to the internal money. They hold external money for "speculative" purposes, that is, because it is a better store of value than the internal money. The faster the rate of depreciation of the domestic currency, the larger will be domestic holdings of external money.

This analysis identifies a potentially important process in international economics that is closely related to the theory of optimal currency areas (McKinnon, 1963). Its practical importance is limited, however, because in every economy where speculative foreign-currency holdings are likely to become important, strict foreign-exchange controls and restrictions on overseas investment are imposed. Obvious examples are such countries as Israel, Italy, and the United Kingdom, not to mention countries that have even higher inflation rates. Obvious examples of countries that do not have restrictions, such as West Germany and Switzerland, often have the opposite problem. They try to restrict *foreign holdings of their domestic money*.

In every country that imposes exchange controls, there is one loophole through which foreign currency can pass. Foreign-exchange dealers, traders, and travelers must be permitted to hold working balances of the moneys they need for their transactions. Such balances will be allowed

to increase with economic activity, but the scope for permanently increasing speculative balances is severely limited. For the most part, the only remaining major mode of speculation is to lead and lag trade payments relative to an underlying trend determined by the growth in trade. *It is trading economies that hold significant foreign-currency balances, not high-inflation countries* (see Chrystal, 1976, for evidence on this point).

Since most currency areas have passed legislation that successfully restricts the holding of external money, there is no serious objection to the existence of a foreign currency that has characteristics superior to all other currencies. Currency substitution can, on the whole, be prevented without seriously impairing the efficiency of the real economy. It would however, be conventional to argue that portfolio restrictions are inconsistent with the existence of a *global* welfare optimum (Kareken and Wallace, 1977).

### **Money in the International Economy**

The arguments that have been outlined here have been drawn from the literature. Some of them must be developed or refined before their major implications for the role of the SDR can be pointed out.

#### *Private and Official Holdings*

An important element of the view propounded here is that there is a strong link between private and official holdings of international money. The vehicle-currency literature has concentrated on the private sector and the international-reserve literature has concentrated on the official sector, when, in fact, these are subsets of the general problem posed by the need for international moneys. What has to be considered, then, is the relationship between central-bank and private demands for stocks of international money. It is convenient to proceed by analyzing a number of conceptual situations.

Consider first a gold-standard world where the base money is the same externally and internally, though domestic circulation is predominantly in deposit notes and external payment is only in bullion. There is no significant official sector. Every trader with transactions abroad will need to have a stock of bullion at his disposal, and there is a strong likelihood that this bullion will be held with a deposit-taking institution. If there are economies of scale to bullion holding, the number of such deposit-taking institutions will be small.

There will be a real resource gain to the economy as a whole from the

pooling of bullion stocks, since they have a real opportunity cost per period. Such economies could come from two sources, a transactions elasticity of demand smaller than unity or a variance of net bullion flows for the aggregate of traders that is less than the sum of the individual variances, although these two conditions are not independent. Put another way, if two trading firms were to merge under the postulated conditions, then the bullion balance required by the new firm would be less than the sum of the balances required by the two firms separately. Thus the total bullion stock that a deposit-taking institution requires to meet any deposit/withdrawal pattern of a number of traders is less than would be required to finance *the same pattern* if each trader held his own stock of reserves.

If, then, the centralized reserve holding is thought of as being that stock which the trading sector would choose to hold jointly (i.e., representing their utility functions and providing the same service flow as if traders held equivalent amounts for themselves), some determinate bullion stock would be generated. Where this bullion stock is held by one commercial bank (for example, by the Bank of England in the nineteenth century, as described by Bagehot, 1870), the jointly demanded stock would presumably not differ greatly from the bank's own reserves. If it did differ, the bank would either suffer perpetual crises or make less profit than it otherwise could. The bank's optimal stock of reserves is clearly connected with the behavior of traders. If the variability of foreign-trade payments grew, the bank would need to increase its average reserves to prevent an increase in the probability of running out. Moreover, the bank's optimal average reserve stock would clearly change if traders were to increase the bullion balances that they held for themselves. And traders' balances would not be independent of the confidence they had in the adequacy of the bank's reserves. This is not to suggest that any given total stock of reserves can be held by either the bank or the traders. The existence of economies of scale denies that there will be a one-for-one relationship between the bank's stock of reserves and what traders would hold for themselves, and the size of the total stock will therefore vary, depending on how it is held. The important point is that, other things being equal, the more reserves traders hold for themselves the less will be held in the bank and vice versa.

What would happen if this bank were to become a genuine central bank under state control? If the government preference function was the same as that of an optimizing private institution, the reserve stock would differ little from that generated in the example above, although it is not difficult to postulate a government preference function that could cause



either more or less bullion to be held. For example, the government might require a "war chest." Unless some such additional objective were being met, social resources would be wasted if the reserves were higher than those generated by the processes described above. And crises would occur if they were smaller, requiring action such as direct intervention to restrict traders free access to foreign exchange.

Note, however, that if such a central bank were not in a position to compete for deposits, there could be welfare gains to the economy as a whole from statutory foreign-exchange controls. This perhaps surprising conclusion follows from the fact that the holding of external money involves an opportunity cost to the economy as a whole, whereas the holding of domestic fiat money does not (assuming an issue of domestic paper money in excess of reserves). Given that there are transactions economies of scale, the resources available to the economy can be increased by the enforced pooling of reserves. The resultant holding will be smaller than it would otherwise have been, and the benefit could exceed the cost to traders in loss of convenience. Thus there are quite general circumstances in which it would be rational for a government to restrict the freedom of its citizens to hold balances of foreign exchange. These circumstances do not necessarily include a balance-of-payments crisis or even a perfectly fixed exchange rate, but a logical extension of this analysis could be the argument that central banks *should* support their exchange rate. This point will be discussed later.

Returning to the main argument, central-bank reserves may differ in quantity from what might be jointly demanded by the trading sector. But so long as the central bank fulfills a banking function of some kind, and for any reasonable state preference function, the bank's optimal reserves will change at the margin in line with the demands of the trading sector. That is to say, so long as there is perceived to be some cost of running out of reserves and some cost of holding excess reserves, and so long as the bank optimizes in terms of these costs, the average reserves required must change in the same direction as the changes in the deposit/withdrawal pattern of the trading sector. Thus, the fact that a central bank is state owned does not mean that its level of reserves is independent of the desired reserves of the trading sector or of the level of reserves that the trading sector holds for itself.

It is a small step now to move to a situation in which domestic and foreign currencies are fiat moneys (i.e., are the creation of national monetary authorities) and the exchange rate of the domestic currency is variable. If international transactions take place in foreign money, the trading sector of the economy will require balances of foreign exchange just

as before. It can also be argued, for the same reasons as above, that centralized holding of reserves would result in a resource gain for the economy as a whole. We are therefore left with the conclusion that even in a world of perfectly flexible exchange rates there would be reason for central banks to hold reserves.

To what extent is the more conventional view of official reserves as being essentially an instrument of exchange-rate support compatible with the view being developed here? After all, some modern central banks do not actually take deposits of foreign exchange from their trading sector or even from domestic banks. They enter the market for foreign exchange only when they wish to influence the exchange rate of the domestic currency. Clearly, if they did not wish to exert influence they would need no reserves. In what sense, then, can the reserve of the central bank and the foreign-exchange holdings of the trading sector be thought to be interdependent? The answer is simply that if the central bank has no *active* reserve with which it smooths fluctuations in the exchange rate, the trading sector will require larger balances of foreign exchange than it otherwise would.

Although it has previously been assumed that foreign trade is conducted in external money, in a world of fiat moneys this cannot be universally true. Nevertheless, the extent to which the foreign trade of a particular country is conducted in external, as opposed to domestic, money is a variable. One of the primary determinants is the stability of the exchange rate of the domestic currency. Thus, if the domestic central bank reduces its activity of smoothing fluctuations in the domestic exchange rate, an increased proportion of external trade will come to be conducted in external money. The value (in terms of a basket of traded goods) of contracts thus denominated will be less uncertain as a result. Similarly, traders will wish to increase their balances of foreign money relative to domestic money even for a given invoicing pattern, because the real value of foreign-money balances will be less uncertain than that of domestic money. These arguments are further reinforced to the extent that the domestic monetary authority sees a reduced commitment to support the domestic exchange rate as permitting a less restrictive domestic monetary policy, though this is not a necessary feature of the argument.

We have seen that even if a central bank has no direct contact with its trading sector and merely operates in the market, there is still a clear relationship between the reserves of the central bank and the foreign-currency holdings of the trading sector. The more active is the central bank in smoothing the domestic exchange rate, and therefore the larger is its average reserve, the smaller will be the average foreign-currency hold-

ings of the domestic trading sector. To reinforce this point, notice that the relationship would also work the other way round. If traders built up significant balances of foreign exchange in times of net surplus and ran them down in times of deficit, the reserves required by the central bank to achieve any given degree of exchange-rate stability would be greatly reduced. It must be remembered, however, that this argument is intended to apply particularly to a situation in which there is no underlying trend in the exchange rate. There will be times when attempts by traders to switch into foreign exchange will impede the efforts of a central bank to support a disequilibrium exchange rate. But such events should not be taken as a negation of my underlying point.

The interrelation between private and official reserves provides a possible criterion for official intervention policy. Starting from a position of freely floating exchange rates and zero official reserves, it could be argued that the central bank should increase its average reserves, and therefore its intervention activity, up to the point at which the marginal resource cost of official reserves is just equal to the saving in transactions costs to the private sector. A significant element in these savings could be the flow cost per period of the reduced foreign-currency balances that result. Extreme solutions cannot be ruled out *a priori*, but if there is any truth to the economies-of-scale argument, the extreme fixed-rate solution is more likely to be optimal by this criterion than the freely flexible solution. Some might justifiably contend that the existence of capital flows negates this argument for fixed rates, since the costs of fixing are too great. However, the real point of the analysis is that authorities should as a very minimum smooth fluctuations around trend. Wherever possible, they should also provide as much information as possible about their monetary and exchange-rate policies, and ultimately monetary policies should be coordinated.

Finally, in order to lay the groundwork for what is to follow, it is necessary to look at the composition of private and official foreign-exchange holdings. Is there any relationship between the currencies the private sector will choose to hold and those the central bank will find convenient to retain in its reserve portfolio? If the central bank serves as a genuine bank, in the sense of being a deposit-taking institution, clearly it will select the currencies in which its liabilities are denominated. The composition of its reserves will therefore be directly related to the deposit pattern of the trading sector. If, however, the central bank merely intervenes in the market, the relationship is much more complicated.

First, consider a situation in which all central banks actively maintain fixed exchange rates. From the point of view of exchange-rate policy, it

would not matter which foreign currency was used for intervention purposes. In the interests of the stability of the system as a whole, however, it would be best to choose the currency for which the market was largest, so that the defense of the domestic currency would have the least significant repercussions elsewhere. From its own point of view, moreover, the central bank must take account of two important points: (a) The intervention currency must be marketable and therefore must be usable by traders—and preferably widely used. (b) Although it is sufficient for the central bank to hold one intervention currency for the purpose of fixing exchange rates, it may be optimal from the point of view of the domestic economy for the central bank to provide a *de facto* banking function and hold reserves of the currencies that traders would themselves choose to hold for transactions purposes.

Second, consider a situation in which exchange rates are generally flexible. In such a case, it will never be optimal for a central bank to hold just one currency in its reserve portfolio. It would suffer a loss if it wished to support its own currency at a time when the intervention currency it held was temporarily undervalued. For this reason alone, central banks should wish to hold a portfolio denominated in a range of major trading currencies. Added to this, the economies-of-scale argument says that if the trading sector would hold significant balances of any particular currency, it may be beneficial for the central bank to maintain an active inventory of that currency, in order to reduce the size of the balance that the economy as a whole needs to hold. The link here is a little tenuous if central banks do not directly take deposits, since it seems equivalent to arguing that the central bank would aim to stabilize not just its own weighted average exchange rate but also variations in specific other rates of exchange. For example, the Bank of England, by holding dollars and deutsche marks, would smooth both the sterling/dollar rate and the sterling/deutsche mark rate and thereby reduce the dollar and deutsche mark balances that its trading sector would need to hold. This would be possible, however, only if central banks offered to traders guaranteed exchange rates for various currencies, a practice that does not appear to be widespread. Even when we abandon this line of argument, it is still likely that a central bank actively smoothing its exchange rate will wish to hold a diversified portfolio of major tradable currencies, although the structure of that portfolio is then likely to depend on more general considerations than the currency holdings of its trading sector. Nevertheless, private holders will be influenced by exactly the same factors in choosing their portfolios—risk, return, and marketability of the currencies available—

which means that there may be some correspondence between official and private holdings.

Finally, there should be little difference in the behavior of traders and central banks with regard to excess reserves, since both will be likely to optimize with respect to yield and risk for a given portfolio size. However, in many countries excess reserves are effectively pooled as a result of foreign-exchange controls.

The conclusion, then, is that the aggregate reserves of a central bank should not be independent of those of the trading sector of its economy. Central banks will usually wish to hold significant balances of marketable currency, and both central-bank and private reserves are likely to be diversified in a world of floating rates as a result of similar exogenous factors, although the group of currencies widely used is likely to be small.

### *The Vehicle-Currency Hypothesis Clarified*

Grassman (1973) has objected to the vehicle-currency hypothesis on the grounds that the evidence, such as it is, does not support the view that a substantial proportion of foreign trade is invoiced in currencies other than those of the sellers. The bulk of the evidence available so far, however, relates to invoicing practices in an era of generally fixed and stable exchange rates (though the pattern reported in Grassman, 1976, is largely unchanged). Here the currency of invoicing is of little consequence, so that it is natural to choose the one in which the seller sets his prices. Even in an era of fixed exchange rates, moreover, a wide range of goods, notably homogeneous primary commodities, are marketed internationally in terms of vehicle currencies, and in a period of floating or changeable exchange rates, the proportion of manufactured trade invoiced in stable major currencies is likely to increase. Furthermore, monetary theory suggests a specific role for international moneys in foreign-exchange markets even if trade were entirely invoiced in the currency of the seller. This point requires some elaboration.

In a world of many different currencies, there is unlikely to be an active market between each pair of them. It is much more efficient for currency traders to price each currency in terms of an international money. The defining characteristic of an international money would then be that it acts as a numeraire and a medium of exchange between currencies. The benefits from such an arrangement are analogous to those of a monetary, as opposed to a barter, economy: the resources devoted to trading are thereby reduced. The numeraire function could be performed

by an instrument that had only a notional existence so long as it was clearly defined and of stable value. But one factor is likely to cause the numeraire and means-of-payment functions to be tied to the same concrete instrument: the need for a store of value and a medium of exchange will give rise to a demand for balances of an actual currency that has the characteristics of an international money. It would therefore be inefficient to use one instrument as a numeraire when another already fulfilled the role of an international money in all other respects.

The demand for balances of international moneys does not depend on the currency in which actual transactions are denominated. This demand could arise because transactions costs between the international money and any other currency are significantly less than those between any two ordinary national currencies. Even though a trader may always make ultimate payment in the currency of the seller, it will pay him to convert his net receipts into the international money rather than into his domestic currency if he has irregular requirements to make payments in a variety of currencies. When the time comes to make another payment, it will be cheaper to move out of the international money than out of his domestic currency (or any other currency, for that matter). This argument is reinforced to the extent that the next payment is more likely to be made in the international money than in any of the other currencies. It is not difficult to see that the currencies of the dominant trading nations are the strongest candidates for adoption as international moneys, since they will have the smallest transactions costs and the highest probability of use in the next transaction.

Thus, the minimum functions of an international money are related to the efficiency of money markets. No presumption is required as to the invoicing practices of traders. But, of course, the functions of an international money might well be extended in an era of floating exchange rates if pricing practices change in ways that seem possible.

### **The SDR**

The fundamental function of an international monetary system is to facilitate trade between residents of different currency areas. Clearly, international moneys must play a leading role. In light of the preceding analysis, can the SDR, which was invented as the solution to a differently stated problem, be considered an international money?

In the world of fixed exchange rates that followed the establishment of the Bretton Woods system, overwhelming attention was given to official reserves as assets for the support of the exchange rate. The critical

problem was perceived to be how to provide for sufficient growth of official reserves (usually synonymous with international liquidity) without becoming dependent upon the dollar as a reserve currency. The danger of dependence was that the ratio of U.S. gold reserves to dollar liabilities would become so small that confidence in the dollar would be undermined. The SDR was invented as a way to provide for an increase in official reserves without increasing dependence upon the dollar. It was widely believed that the SDR would reduce dependence upon the dollar and upon all reserve currencies. This has not happened, and the system that the SDR was designed to save survived for only a year and a half after the first SDR was issued.

Was the rescue attempt too late? Perhaps, but I will argue rather that it was in large part misconceived. My intention is not to denigrate the SDR per se, since a supranational currency could produce a stable long-run solution. My aim is rather to point out ways in which the SDR must be reformed before it is likely to make a significant contribution to the fundamental function of an international monetary system.

### *The Nature of the SDR*

The story behind the creation of the SDR has been well told by Williamson (1977), and only a brief outline will be given here. An agreement was reached at the annual meeting of the International Monetary Fund in Rio de Janeiro in 1967 to establish a new reserve asset that would be administered at the Fund. Special Drawing Rights, as the new reserve asset came to be called, would be issued to each member country in proportion to its quota in the IMF. Issues would continue to be made over time in line with the anticipated growth of demand for international reserves. As a result, it was thought, the SDR would become the central asset of the international monetary system and dependence upon the dollar and other foreign-exchange reserves would ultimately be phased out. SDRs were allocated in roughly equal annual amounts at the beginning of 1970, 1971, and 1972 to a total value of about \$9 billion. No subsequent allocations have taken place.

The new facility was set up in such a way that transfers of SDRs could occur only between member central banks. The facility's primary effect was thus to enable central banks "... to use special drawing rights to acquire an equivalent amount of a currency convertible in fact" (IMF, 1968, p. 172). In other words, SDRs were not to be used directly by central banks for financing balance-of-payments deficits. They were to be used to acquire foreign exchange from another central bank, and the

foreign exchange could then be used to support the domestic currency. However, there was an obligation for central banks to reconstitute their SDR holdings in the event that drawings on them became excessive. In particular, "The average net use . . . made by a participant of its special drawing rights calculated on the basis of the preceding five years, shall not exceed 70 per cent of its average net cumulative allocation during this period" (IMF, 1968, p. 173). And the obligation by participants to accept SDRs ". . . extends to the point where its holdings of special drawing rights equal the amount received as its net cumulative allocation, plus twice this amount" (IMF, 1968, p. 14).

The problem of the valuation of the SDR was solved formally by fixing its value in terms of gold. But since the dollar was also believed to have a fixed gold value, in practice one SDR was set equal to one dollar. The SDR/gold relationship was maintained even after the dollar price of gold was allowed to rise in 1971. In 1974, because of instability in the value of the SDR vis-à-vis nondollar currencies resulting from the advent of floating exchange rates, a procedure was adopted for basing the value of the SDR on a basket of major currencies.

The interest-rate position of the SDR, at first sight, looks rather strange, since ". . . A participant will earn interest on its holdings of special drawing rights, and will pay a charge on the amount of its net cumulative allocation. . . . The rate of interest and the rate of charge will be the same; both will initially be 1½ per cent" (IMF, 1968, p. 15). The effect of this does, however, give to the facility a characteristic that many commentators have applauded: net users of SDRs pay interest to net holders, and the whole system is approximately self-financing. For example, if a central bank holds onto its initial allocation of SDRs, it neither pays nor receives interest. Payments of interest are made on the shortfall between holdings and accumulated allocations, and payments are received on the excess of holdings over allocations. At the time of the change in valuation procedure, a higher interest rate of 5 per cent was adopted, with subsequent changes to be made so as to hold the SDR interest rate below a weighted average of interest rates in five major financial centers.

In the late 1960s, few would have disagreed with this IMF (1968, p. 16) assessment:

. . . the broad impact of the new facility will be that it will permit the Fund to assure an appropriate level of international reserves in the light of the needs of the world economy by supplementing the existing reserve assets in the form of gold and reserve currencies. For the first time, therefore, the total stock of reserves and its rate of growth will reflect deliberate interna-



tional decisions rather than being determined solely by the availability of gold for official reserves and the accumulation of balances in reserve currencies.

With hindsight, it is easy to see that the possibility of SDR creation, at best, provides a lower but not an upper bound to reserve increases.

It is interesting that only two things were widely agreed to during the reform attempts of the Committee of Twenty (see Williamson, 1977): (1) There should be fixed but adjustable parities, and (2) the SDR should become the major reserve asset in the system. Events have made it unlikely that the former will be possible in the next decade. And I will argue that the SDR cannot evolve into the major reserve asset unless some basic changes are made in its constitution. It is convenient to discuss the SDR under the three headings of yield, valuation, and marketability.

### *The Yield on the SDR*

The conflict concerning the yield on the SDR is well captured in the "Documents of the Committee of Twenty," where it is reported that "The effective yield on the SDR will be high enough to make it attractive to acquire and hold, but not so high as to make countries reluctant to use the SDR when in deficit" (p. 15).

Yet Grubel (1977, p. 183) has recently argued that "... a high interest rate on SDRs will not prevent their use for the financing of imbalances." In order to comprehend Grubel's position, it is necessary to digress into an analysis of the optimum quantity of money. Briefly, the idea is that people hold money balances up to the point at which the marginal utility of money is equal to the marginal utility of other assets. The marginal utility of other assets is typically thought to be the rate of interest. However, money is a free good for society as a whole, since it is virtually costless to produce. Therefore, the socially optimal money holding is the one at which the marginal utility of money is zero. Consumer surplus would at that point be maximized. But because money is not perceived to be a free good by individuals, they will increase their holdings to the socially optimal level only in the event that money yields the market rate of interest. Thus, the optimal point is not achieved, from the social-welfare point of view, unless interest is paid on money at the market rate.

Applying the optimum-quantity-of-money analysis to the SDR, Grubel concludes that paying market interest rates on SDR's (in fact, he talks in terms of the equivalent real return on capital) would lead to an optimal

holding of SDRs by central banks. This analysis would undoubtedly be correct if holders of SDRs received interest on the entire balance. However, the SDR system, under which net users pay interest to net holders, makes the optimum-quantity-of-money argument entirely inappropriate. An SDR is an unconditional right to borrow "real" convertible currency from another central bank at a specified rate of interest. It should be thought of as an unused overdraft facility rather than as the interest-bearing checking account to which Grubel likens it. The mere fact of unconditionality does not change the nature of the instrument.

The SDR is basically a credit instrument. Users of the SDR would prefer the rate of interest to be low, since that is the price they pay to borrow. Net holders would prefer the rate to be high, since that is what they receive for lending. If capital markets were perfect and the SDR bore the market rate of interest, the SDR stock would be irrelevant, since loans would already be available at the market rate of interest. This is not to say that, in reality, central banks will not be pleased to receive an SDR allocation. Everyone is pleased, in an imperfect world, to have more credit. However, they would be much more pleased to receive a gift of genuinely convertible (and investable) currency. The two are obviously not equivalent.

The compromise adopted by the IMF of fixing the interest rate on the SDR below a weighted average of rates in five major centers is clearly unsatisfactory. Designated net holders are thereby obliged to lose income. However, as has been noted, to rectify the position for net holders would be to destroy the usefulness of SDR credit for all but the least credit-worthy, i.e., those who find it difficult to borrow at market rates. An SDR yielding competitive interest rates would simply be a means of channeling loans to the weakest countries, with the Fund acting as guarantor. This may be admirable but is surely not what the SDR is meant to be about. Yet an SDR at less than market rates will never be attractive to hold.

### *SDR Valuation*

The issue of SDR valuation is closely linked to the issue of interest payments, since together they establish yield characteristics. Valuation is of more general interest, however, because its purpose is to promote the widespread use of the SDR as numeraire in the world economy. This is the only function it can provide directly for the private sector.

When the method of valuation of the SDR became an issue, "techniques" were sought for arriving at a price for the SDR in terms of other currencies besides the dollar. A change was sought because of the de-

clining value of the floating dollar and therefore of the SDR against the currencies of major European currencies. Four methods of SDR valuation were discussed: the standard basket, the asymmetrical basket, the adjustable basket, and the par-value technique. The precise details of all these techniques will not be developed here, since they have been adequately explained elsewhere (Polak, 1974). The method actually chosen for valuing the SDR was the standard basket. Under this method, an appreciation or depreciation of any currency in the basket in terms of all other currencies would raise or lower the value of the SDR in terms of every other currency. For example, if the dollar had a weight of 30 per cent and it depreciated by 10 per cent against all other currencies, the SDR would depreciate by 3 per cent against all other currencies and would appreciate by 7 per cent against the dollar.

The arguments in favor of the standard basket were that it was simple to calculate, that it did not require statement of par values, and that it would provide enough stability to the value of the SDR to encourage its use as a numeraire. Do these characteristics make the SDR a good numeraire? There may be grounds for believing that they do not.

First, the fact that a change in the value of any currency in the basket is reflected to a lesser degree in the SDR does not make the value of the SDR easier to predict than the value of any single currency. Indeed, the amount of information required to predict the value of the SDR vis-à-vis any particular currency is greatly in excess of that for any single currency. Thus, if the same effort is needed to forecast the value of the dollar to within 1 per cent as to predict the value of the SDR to within, say, 3 per cent, the dollar may still be preferable as a numeraire despite the fact that the SDR has greater stability. Only if the concern is with values relative to other currencies in general will the SDR be an efficient numeraire in this sense.

Second, although experts may find the basket method of valuation the easiest, in the sense of requiring the simplest calculation, it is by no means clear that traders or businessmen find it easy to understand. This point is additional to the first, which was that even if the technique is understood it requires a lot of information to arrive at a prediction. The second point is that the technique itself is not widely understood, and there is no strong reason why it should ever come to be so.

Third, although the SDR must be more stable than some currencies in the basket, it may be less stable than others. For example, if the dollar maintains a perfectly smooth path while sterling and the deutsche mark fluctuate violently, the dollar will obviously be preferred to the SDR as a numeraire.

Fourth, and related, if the numeraire is required to maintain its value vis-à-vis traded goods, some currency in the basket will always be preferable to the SDR. This is because the SDR will depreciate relative to goods at about the average inflation rate, whereas some currencies will do so at a rate below average.

The final point is the practical one that few prices in the international economy are clearly better set in terms of SDRs than in terms of *some* other currency, because parties to all transactions live in some currency area or currency zone. The prices of most goods are set in terms of the currency in which payment is to be made. Since the SDR is not a means of payment, there has to be a clear advantage to setting prices in terms of it. Usually, there is no such clear advantage. For example, if international air fares were set in SDRs (as is intended in some circles), would it make any sense if the price paid by a Briton to travel from London to East Africa were to fall by 3 per cent in sterling terms just because the dollar had depreciated by 10 per cent?

The SDR valuation method is not entirely useless, of course. It is the natural response of an international organization to form a numeraire that reflects, in some sense, the average numeraire of its members. Most international organizations have responded to floating exchange rates in the same way, but each numeraire is different because each organization has different requirements and a different composition (e.g., the European Community or NATO). While the present regime of managed floating persists, no marginal improvement in the formula will prove of great benefit. The SDR has a useful function to perform within the IMF, but it has little or no future, as presently constituted, as a numeraire in the world economy. It is basically an index number, the weights of which have no widespread significance.

### *Marketability of the SDR*

If the SDR gets low marks as a store of wealth and a unit of account, it gets zero as a medium of exchange. I argued above that the primary need for international money is as a means of payment for transactors in a multicurrency world. The SDR has no contribution to make in this respect because it is not available to the trading sector.

Central banks will not develop their portfolios in such a way as to increase dependence upon the SDR. If they are actively involved in exchange-rate stabilization or smoothing, they will require working balances of liquid *marketable* assets. On the whole, excess reserves will be held where they yield the highest possible return. The SDR is attractive for

neither reason. As a result, it is clear that the SDR, *even as a reserve asset*, let alone as a monetary instrument, has little part to play in the evolution of the world economy. To enforce its use by legislation would, of course, prove the point.

One further circumstance stacks the odds against the SDR even more. It was presumed at the inception of the SDR that the net effect of an SDR issue would be to increase world reserves in total by less than the amount of the issue, so that the absolute value of foreign exchange held in reserves would decline. Successive issues of SDRs would lead to increasing proportions of reserves being held in SDRs. However, the way in which the SDR facility works has exactly the opposite effect (see Chrystal, forthcoming). Central banks with balance-of-payments problems use SDRs to acquire convertible currency. To the extent that the lending countries provide their own currency, which would appear to be quite common, the foreign-exchange component of global reserves rises immediately. The SDR content stays constant. Thus, if there is any presumption at all as to the effect of SDR issues on the proportion of reserves held in foreign exchange, it is that the *proportion would be more likely to rise rather than fall*.

### *The Second Amendment*

The change in the Articles of Agreement of the IMF that instituted the SDR represented the First Amendment to the Bretton Woods Agreement. At the time of writing, a Second Amendment is in process of ratification. The principal object of this reform is to take formal account of the changed status of gold, but there is also an apparently minor change in the rules concerning use of SDRs:

The proposed Articles lay on members the obligation to collaborate with the Fund and with other members to make the SDR the principal reserve asset in the international monetary system. . . . Among other things, the requirement of balance of payments need before SDRs may be sold will no longer apply to transactions by agreement and participants trading in SDRs by agreement can do so without the need for authorisation by the Fund" (U.K. Draft Legislation, 1977, p. 4).

The obligation to make the SDR "the principal reserve asset" requires no further comment. The critical change appears in Article XIX, Section 2(b). This used to read:

A participant, in agreement with another participant, may use special drawing rights:

(i) to obtain an equivalent amount of its own currency held by the participant; or

(ii) to obtain an equivalent amount of currency from the other participant in any transactions, prescribed by the Fund. . . .

It now reads simply:

A participant, in agreement with another participant, may use its special drawing rights to obtain an equivalent amount of currency from the other participant.

The intention of this amendment is clearly to increase the attractiveness of the SDR as a reserve asset. Central banks are in effect permitted to make portfolio adjustments so long as another central bank agrees to the exchange. The danger of this has been pointed out in Chrystal (forthcoming). If central banks regard SDRs as inferior assets (as the above analysis suggests they might), the freedom to adjust portfolios will make them try to acquire foreign exchange. Only "banker" central banks are different, because by acquiring SDR's in exchange for their own currency, they can print their own reserves.

The freedom of portfolio adjustment thus raises as many problems as it solves; it could certainly reinforce the tendency, observed above, for SDR issues to increase the foreign-exchange component of reserves. The problem, however, is to be found in the basic inadequacies of the SDR, not in the current amendment.

### **Is There a Future for the SDR?**

A decade has passed since the Rio agreement to establish the SDR and yet the SDR has had no major critical appraisal. The present Essay is designed largely to revive constructive thinking about the future. The analysis, if correct, has major implications for the development of our monetary institutions. In brief, I have argued that there is little future for the SDR as presently constituted. It clearly has a role within the operations of the IMF, but it is unlikely to *evolve* into the major reserve asset. The SDR has very little, if any, contribution to make to the monetary environment of market traders.

Some commentators would regard this situation as quite satisfactory. McKinnon (1969), for example, regards the *de facto* dollar-based system as perfectly acceptable. He points out that this system has evolved over time and serves the world well. Little or no seigniorage accrues to the United States as the world's banker because the dollar and Eurodollar banking system is perfectly competitive. Because of its existence, international monetary transactions are facilitated in a highly efficient manner.

There is clearly some truth in this proposition. Many, however, would be happier if the dollar were unique. In a world of fixed exchange rates

we face the problem described by Triffin (1960): shifts in currency preferences could drain a reserve center of its own assets. The equivalent of the Triffin problem in a world of floating exchange rates is that the existence of large stocks of various *substitute* currencies causes short-run instability in exchange markets. Once expectations are formed of a change in exchange rates, a stock-adjustment process occurs that may have highly undesirable consequences during the transitional period. Not many economists believe that competition among media of exchange leads to an optimal monetary system.

If the long-run solution is to be found in a system characterized by a single international fiat money and a genuine symmetry of national currencies, it is worth considering the direction in which it is constructive to move. A detailed program for reform would almost certainly fall on deaf ears; it is unlikely that there will be any interest in another reform effort like that of the Committee of Twenty for many years to come. Still, if the SDR in its present form cannot become the dominant international asset, it is worth planting a few seeds that may germinate in time.

### *The First Step*

First, and most basic, if the IMF is to become the world central bank, it must begin to behave like an orthodox financial institution, and the SDR must be transformed into a more conventional monetary asset. It is of no benefit to the international economy to have the SDR imposed on it. A superior system must be based on a money that has characteristics superior to those of the moneys already available and that is allowed to evolve at a rate determined by demand rather than supply.

A simple reform would eliminate many of the problems discussed earlier. The interest-rate conflict would disappear, and the SDR would cease to be merely a credit instrument. Analysis and policy based on the notion of the optimum quantity of money would become appropriate. Most important of all, the institutions would be correctly structured to permit the evolution of the system along the lines apparently desired by the international community.

Under this reform, the IMF, instead of just supervising transfers between central banks as at present, would issue deposits denominated in SDRs and hold assets denominated in a range of major currencies, including SDRs. Interest, perhaps varying with term, could be paid on SDR deposits out of yields on other assets held. For any given financial objective, such as cover costs, the SDR interest rate would be smoothly adjusted along with market rates, according to normal commercial cri-

teria. Interest would accrue on all SDRs held by central banks, not just on net acquisitions. In these ways, the status of the SDR would be enormously enhanced.

The attractions of the scheme could be substantial, because it would simultaneously solve the dollar-overhang problem. The IMF would acquire dollar assets as backing for its SDR issue. The question of a separate substitution account would not arise. And the financial system would be ideally structured to make the jump that would ultimately be necessary to issuing "high powered" SDR deposits to private banking institutions. In principle, international liquidity could eventually be more effectively controlled, since the Fund would be enabled ultimately to make open-market purchases and sales. But even within the official sector, it could exert pressure in either direction by increasing or reducing overdrafts denominated in the SDR.

While it might be objected that the IMF could not possibly operate simultaneously in many money markets and could not accept deposits from private banks, as is implied, this would never be a serious problem. The Fund would have to deal directly only with member central banks, as at present. Central banks would be responsible for issuing to private banks SDR deposits that could be "matched" by deposits in the Fund. Private banks could in turn issue SDR deposits to private traders. The system is essentially the same as at present but with one more layer on the pyramid.

### *Interim Valuation*

Ultimately, the SDR is intended to have the *n*th-currency role in the system. This means that all exchange rates will be expressed in terms of the SDR. Once there is genuine marketability, valuation will be determined automatically in the market. Then the problem becomes how to determine the rate of growth of SDR balances to ensure an inflation-free money. With the possibility of global open-market operations, this should not be impossible. In the interim, however, it is necessary to decide how to continue to value the SDR in the present system, and during the transition to marketability, so as to promote its use as a numeraire and encourage its acceptance as a reserve asset.

If the SDR is to be promoted primarily as a numeraire, the main concern must be with its characteristics and only secondarily with the techniques of arriving at those characteristics. Only two characteristics could make the SDR an "optimal" numeraire. The SDR must provide either a fixed point relative to currencies or a fixed point relative to goods.



The attraction of having an SDR that is of stable value relative to a typical bundle of traded goods is obvious, since it would provide a gamble-free pricing option for all traders. But it amounts to "indexation" of the SDR and could be opposed by those who, rightly or wrongly, feared a spread of indexation to other financial markets and indeed to domestic wage bargaining. Perhaps a more critical objection in this context, however, is that indexation of the SDR would to a large extent preempt further discussion as to its supply, and, as has been suggested, the supply of SDRs requires careful study, in both the present and future systems. However, indexation does not require commodity backing, as some have proposed.

The only politically acceptable characteristic for SDR valuation, therefore, would be as a fixed point relative to currencies. The SDR would then not change its value relative either to other currencies or to traded goods as a result of a change in the value of any single currency. The real value of the SDR would fall in line with the average world inflation rate and the relative appreciation or depreciation of any currency could be calculated directly by its SDR price, whereas at present a separate calculation is required.

The objection to this procedure could not be that it was difficult to understand, since the meaning of the SDR value would become transparently clear to everyone. Rather, the objection would be that the SDR value would be too difficult to calculate. This is certainly true, but a complex calculation producing a sensible answer is more worthwhile than a simple calculation producing nonsense. The appropriate technique would appear to be the adjustable basket, in which currency weights are adjusted so that a change in the value of one currency does not change the SDR value of any other. If such a technique could be achieved, the SDR would become the natural benchmark in a floating world. The problem is that when all rates are fluctuating, it is impossible to judge which currency has appreciated and which depreciated. What would be required is a system of discretely adjusting par values, but par values as we used to know them are unlikely to return.

A simple solution would be to incorporate SDR valuation into the reference-rate proposal of Ethier and Bloomfield (1975). Under this proposal, a central bank may intervene only to move its currency toward its "reference rate," an exchange rate accepted by central banks. All reference rates could be expressed in terms of the SDR and could be adjusted frequently, say weekly. Reference rates therefore would need to be no further from market prices than par values used to be. Frequent small adjustments of exchange rates that needed to change would be approxi-

mately random, so that the SDR would not be expected to move relative to its neutral starting point. However, a bias that did develop could easily be offset so as to hold the SDR constant relative to the average. Central banks would transact with each other at reference rates. The SDR would become the centerpiece of the system by assuming the *n*th-currency role for which it is ultimately intended. This valuation reform could be achieved independently, as it requires none of the structural changes suggested above. In short, to give the SDR the desirable characteristics achievable only by the adjustable-basket method requires some change in exchange-rate policy. A par value system would make possible the application of an adjustable basket. Failing this, the SDR could be established as the *n*th currency in a reference-rate system. Ultimately, the SDR will be valued in the market.

### **Conclusion**

Few could seriously believe that the SDR during its first several years has made major strides toward becoming "the principal reserve asset" of the international monetary system. The analysis in this Essay is designed to raise the possibility that this may be no accident. Some believe that the collapse of the dollar, the oil crisis, and the drift into floating are to blame. Yet the role of the dollar continues to expand in both the private and official sectors. Perhaps, then, the critical problem is rather in the nature of the SDR itself.

As the world economy grows, so too will the demand for balances of international moneys. While it is unlikely that there will ever be a world currency area or even a global monetary union, an internationally acceptable money will always be needed. At present this need is filled by currencies of member countries in the IMF, for both private and official purposes. This need is *not* filled by the SDR, which provides neither a suitable way of storing wealth nor a possible instrument for central-bank market intervention. It is instead a credit instrument that allows central banks to borrow real money. There is little reason to expect the creation of SDRs to reduce the dependence of the official sector upon foreign-exchange reserves. Cynics might say that at least the SDR is harmless. This is true, but the international monetary problem remains. While the market will continue to provide a solution, it may be possible to improve on it, and it may be desirable, for both economic and political reasons, to make the attempt.

Unless the SDR is transformed into a potential real money and the IMF is restructured as a potential world central bank shaped on realistic

lines, there is no hope for a symmetrical international monetary system. And there is little or no future for the SDR.

Finally, it is worth thinking of a better name for the unit. Perhaps the problem with the SDR is simply that its name takes too long to say over international telephone lines. Transactions costs might make it lose out to the franc, the mark, the yen, the pound, and even the dollar. The Committee of Twenty should at least have come up with a better title. If an acronym is appropriate, perhaps the "SOU," for Special Overall Unit or the "GIN," for Genuine International Numeraire, would do. In fairness, however, it should be named after the man who started the ball rolling—Triffin. But, alas, the day of the Triffin may never come!

## References

- Bagehot, Walter, *Lombard Street*, London, 1870.
- Baumol, William J., "The Transactions Demand for Cash: An Inventory Theoretic Approach," *Quarterly Journal of Economics*, 66 (November 1952), pp. 545-556.
- Brunner, Karl, and Allan H. Meltzer, "The Uses of Money: Money in the Theory of an Exchange Economy." *American Economic Review*, 61 (December 1971), pp. 784-805.
- Calvo, Guillermo A., and Carlos A. Rodriguez, "A Model of Exchange Rate Determination under Currency Substitution and Rational Expectations," *Journal of Political Economy*, 85 (June 1977), pp. 617-625.
- Chrystal, K. Alec, "Demand for International Media of Exchange," University of Essex Ph.D. thesis, 1975.
- , "Some Evidence in Defence of the Vehicle Currency Hypothesis," University of Essex Discussion Paper, Department of Economics, 1976.
- , "Demand for International Media of Exchange," *American Economic Review*, 67 (December 1977), pp. 840-850.
- , "International Money and International Reserves in the World Economy," International Economics Study Group Conference Paper, September 1977, in John Martin and Alasdair Smith, eds., *Trade and Payments Adjustment under Flexible Exchange Rates*, London, Macmillan, forthcoming.
- Clark, Peter B., "Optimum International Reserves and the Speed of Adjustment," *Journal of Political Economy*, 78 (March/April 1970), pp. 356-376.
- Cooper, Richard N., "Eurodollars, Reserve Dollars and Asymmetries in the International Monetary System," *Journal of International Economics*, 2 (September 1972), pp. 325-344.
- Ethier, Wilfred, and Arthur I. Bloomfield, *Managing the Managed Float*, Essays in International Finance No. 112, Princeton, N.J., Princeton University, International Finance Section, 1975.

- Girton, Lance, and Don Roper, "Theory and Implications of Currency Substitution," International Finance Discussion Paper, Washington, Federal Reserve Board, 1976.
- Grassman, Sven, *Exchange Reserves and the Financial Structure of Foreign Trade*, London, Saxon House, 1973.
- , "Currency Distribution and Forward Cover in Foreign Trade," *Journal of International Economics*, 6 (May 1976), pp. 215-221.
- Grubel, Herbert G., *The International Monetary System*, London, Penguin, 1977.
- Kareken, John, and Neil Wallace, "Portfolio Autarky: A Welfare Analysis," *Journal of International Economics*, 7 (February 1977), pp. 19-63.
- Keynes, John Maynard, *General Theory of Employment, Interest and Money*, London, Macmillan, 1936.
- McKinnon, Ronald I., "Optimum Currency Areas," *American Economic Review*, 53 (September 1963), pp. 717-725.
- , *Private and Official International Money: The Case for the Dollar*, Essays in International Finance No. 74, Princeton, N.J., Princeton University, International Finance Section, 1969.
- Marx, Karl, *Das Kapital*, 1886 (William Glaiser, 1920 edition).
- Miller, Merton, and D. Orr, "A Model of the Demand for Money by Firms," *Quarterly Journal of Economics*, 80 (August 1966), pp. 413-435.
- Polak, J. J., *Valuation and Rate of Interest of the SDR*, Washington, D.C., International Monetary Fund, 1974.
- Swoboda, Alexander K., *The Euro-Dollar Market: An Interpretation*, Essays in International Finance No. 64, Princeton, N.J., Princeton University, International Finance Section, 1968.
- Thornton, H., *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain*, 1802 (Frank Cass, 1962 edition).
- Triffin, Robert, *Gold and the Dollar Crisis*, New Haven, Yale University Press, 1960.
- United Kingdom Draft Legislation, *The Second Amendment to the Articles of Agreement of the International Monetary Fund*, Cmnd 6705, London, Her Majesty's Stationery Office, 1977.
- Wicksell, K., *Interest and Prices*, 1898 (Frank Cass, 1962 edition).
- Williamson, John, *The Failure of the International Monetary Reform 1971-4*, London, Nelson, 1977.

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