

THE MANAGEMENT OF FOREIGN EXCHANGE RESERVES
IN SMALL DEVELOPING COUNTRIES

By

Dr. Courtney N. Blackman

THE MANAGEMENT OF FOREIGN EXCHANGE RESERVES
IN SMALL DEVELOPING COUNTRIES

by

Dr. Courtney N. Blackman
Governor, Central Bank of Barbados

For the major developed nations of the world, the management of foreign exchange reserves is hardly an issue. For them reserve management is an aspect of exchange rate policy. Under the Bretton Woods Agreement adequate holdings of gold or foreign currency were needed for intervention into the foreign exchange markets so as to maintain the national currency within the range determined by the IMF rules. With the advent of general floating there is, theoretically, no need for reserves at all except for maintaining orderly market conditions - unless a country wants to indulge in "dirty" floating. Frequently, the manipulation of interest rates may achieve similar results, and probably at a lower cost, than heavy sales or purchases of foreign exchange. To achieve the kind of strength vis-a-vis gold and other currencies during 1981 which resulted from the extraordinary rise in interest rates in the U.S.A., the Federal Reserve System would have had to sell several billions of dollars worth of gold or foreign currencies.

With the L.D.C.'s, however, foreign reserve management is not so much a means of achieving an optimal exchange rate level or of maintaining orderly trading conditions in the foreign currency markets; it is, in fact, a critical element of any strategy of economic development. I have elsewhere summarized the issue of reserve management for economic development as follows:

- (1) The structural dependence of most L.D.C.'s on foreign trade,

- (2) Wild fluctuations in the export earnings of L.D.C.'s on the one hand and a steady demand for imported necessities on the other;
- (3) Technological and financial dependence on the modern industrial economies;
- (4) The need to allocate scarce foreign exchange resources from low priority uses to strategic development activities;

On this occasion, I articulated five broad reserve management policies for monetary authorities in L.D.C.'s within a strategy for economic development.

- (1) The need to manage carefully available foreign exchange,
- (2) The provision of incentives to export and of disincentives to consume non-essential imports,
- (3) The permission of foreign borrowing rights only to sectors which promote economic development, especially of activities which earn foreign exchange,
- (4) For most developing countries it is preferable to err on the side of an "overvalued" than an "undervalued" currency.
- (5) The economical and liberal administration of exchange control regulations.

This paper addresses the problems of foreign exchange reserve management faced by a central bank in small developing countries, given the critical rôle of foreign exchange in the development process

and given the special circumstances in which such central banks function. The paper does not pretend to provide a detailed foreign reserve investment handbook but to establish a systematic approach to the problem of reserve management and to bring into focus the relevant theoretical and philosophical issues.

The section following describes the several objectives of reserve management in small developing countries. Next we attempt to develop an appropriate philosophy of reserve management and we set out the implications of such a philosophy. Section three suggests broad operational guidelines for the management of the reserve portfolio. Section four takes up the issues and problems pertaining to the measurement of performance in the management of foreign reserves. We end with a brief summary and conclusions.

Objectives of Foreign Reserve Management in Small Developing Countries

The objectives of central bank management are substantially different from those of a private sector institution where the goal is essentially that of profit maximization. A central bank is an institution charged with the public interest and so its objectives must reflect the current concerns of Government, no matter how independent of Government its constitution may declare it to be. At any rate, profit is hardly the appropriate measure of central bank performance, even though central banks usually generate healthy surplus from their operations.

A high proportion of central bank income, for example, frequently derives from credit extension to Government; certainly, it behooves a central bank to minimize its income from that source when inflationary conditions prevail.

Since Governments have multiple objectives, so we may expect the objectives of reserve management to be multiple as well. Five distinct objectives of reserve management may be identified:

- (1) Liquidity
- (2) Income
- (3) Precaution against "rainy day"
- (4) Maintenance of value
- (5) Political considerations

Liquidity :

Assuming that the small developing country operates an exchange control regime and maintains a fixed currency relationship to a key currency, the monetary authorities require commercial banks to surrender to the central bank foreign exchange in excess of prescribed limits. In turn, the central bank is prepared to sell foreign exchange to commercial banks when the demand on them exceeds their foreign exchange receipts. Because of the extreme openness of most small developing economies and because of the seasonality and lumpiness of receipts from sale of primary commodities which such economies typically export, foreign exchange inflows and outflows will not necessarily move in sympathy. As a consequence, the Central Bank will have to maintain considerable sums of foreign exchange in the form of liquid assets. Holdings of liquid assets must cover both seasonal and cyclical variations in foreign exchange inflows. A major objective of reserve management then must be the reliable availability of foreign exchange to meet the essential import needs.

Income

The holding of reserve assets involves an opportunity cost in respect of goods and services which might otherwise be imported if the reserves were immediately spent. Indeed, Third World economists used to argue not very long ago, and with great emotion, that the holding of reserves constituted a loan to the developed countries whose liabilities were held and should be reduced to a minimum. Indeed, this attitude may well have led countries like Ghana, which held considerable sterling reserves, to exhaust them in an orgy of "development" spending on unproductive projects. It is quite appropriate then that income from the investment of reserves should be maximized as long as other critical constraints are satisfied. Any funds which are not immediately held as liquid assets should be invested so as to bring the maximum returns. Also assets held for liquidity purposes should be deployed in such a manner as to obtain the highest return. Earnings from liquid assets will reduce the opportunity costs of holding reserves. Where no "productive" alternative uses exist, the income from foreign reserve holdings in fact constitute an opportunity gain.

Precaution against "rainy day"

One objective of maintaining reserves is to guard against the extreme possibility of total ruin. There should be somewhere a "nest egg" to be utilized when the "wolf" is actually clawing at the door. The gold tranche of a reserve portfolio probably fills this role better than any other. It is an asset which, even in the most of unsettled of times, is likely to find a willing purchaser. At the start of the Second World War, it was her extensive gold holdings which bought

Britain the time that President Roosevelt needed to whip up support in the U.S.A. for the Allied cause. On the occasion of the first Oil Shock, the Bank of Italy was able to pledge its gold holdings to the Bundesbank in return for foreign exchange to pay for its vital imports of oil. The great drawback of gold is that it is not an earning asset, and so the security of holding significant quantities of gold involves an opportunity cost of the return of alternative investments which, in times of high interest rates, could be very high. In recent years, there also has existed the possibility of a capital loss on gold holdings! However, it is most likely that gold prices, although likely to fluctuate wildly in the short run, will keep pace with inflation over the long run. Furthermore, it is also likely that its price will rise in times of calamity when the nest egg will presumably be most useful.

Political Considerations

To fulfill some national or institutional goal, the central bank may be called upon to make investments which do not fall into the category of the "prudent man" variety. A friendly nation may suffer a natural disaster such as a hurricane or an earthquake; in such circumstances the central bank may be invited to buy that country's treasury bills or debentures to shore up its faltering external liquidity. These securities may be low-yielding and unmarketable. In such cases political approval should be obtained and the responsibility for the possible loss of such investments placed squarely on the Government Administration. Even so, the central bank should have a clear view of acceptable limits of loss and should so advise the Administration.

Sometimes the bank may, either with Government encouragement or in pursuit of its own institutional goals, purchase the securities of certain international financial institutions, such as the World Bank, the Inter-American Development Bank, or its regional development bank. Such investments, although quite safe and sometimes quite marketable, might not constitute an optimal investment in terms of maturities, earnings, and liquidity. Such investments are appropriate as long as their nature is clearly recognized.

Maintenance of Value

Sometimes a developing country finds itself with extraordinarily large holdings of foreign exchange as a result of windfall earnings from commodity sales or, more recently, from sharp increases in oil export earnings. Trinidad and Tobago, with reserves now in excess of US\$2½ billion and a population of one million is, an excellent case in point. In such cases, the country may be quite unable to absorb imports on the scale required to run down these reserves without wasteful expenditures and severe disruptions of the society. It would make sense for the country to store these reserve assets until such time as they can be usefully spent.

In the case of the rich oil-exporting countries, reserve assets may have to be stored for periods well in excess of ten years. In these circumstances, the problem of maintaining the value of such assets becomes critical. Unless the value of the reserve assets can be maintained, it might be better to withhold the commodity from the market.

The operational implication of the above analysis is the segregation of the reserve portfolio into tranches corresponding with the several management objectives. Such segregation might be conceptual or separate accounts might be established and managed as distinct portfolios. If size warranted, they might even be placed under the responsibility of different managers.

Schematically, the structure of the reserve portfolio would be as follows:

5	Maintenance of Value (Capital Fund)
4	Liquidity
3	Income
2	Political
1	Gold

Selecting a Philosophy of Investment

Modern decision theory identifies four basic types of decisions:-

- (1) Decision-making under certainty -- when we know for certain which state of nature will occur. In these circumstances the selection of a strategy is straight-forward.
- (2) Decision-making under risk -- when we are in a position to assign probabilities to the prospective states of nature. In such cases we select the course of action which brings us the highest expected value, i.e. the rewards of an outcome multiplied by the probability of success.

- (3) Decision-making under conflict -- when we are pitted against a rational opponent intent on minimizing our gains to his advantage. In such cases the Theory of Games is properly brought into play.
- (4) Decision-making under uncertainty -- when we are unable to assign probabilities to the prospective states of nature, and when no reliable pattern (as in the case of a rational opponent) can be attributed to the prospective states of nature, in other words, when we are totally ignorant of the prospective states of nature.

Foreign reserve management generally exemplifies decision-making under uncertainty -- especially over the past two decades. Who could have predicted a prime rate of over twenty per cent per annum in capital rich USA? Who could have predicted gold at US\$800 per ounce? Who could have predicted a quadruple rise in the price of oil? Who could have predicted the shennanigans of the Ayotallah Khomeini? Yet these events have largely shaped the states of nature with which the foreign reserve manager is currently operating.

Decision theory provides no single best criterion for decision-making under uncertainty. The best advice available is that we should honestly examine our hearts and determine our own attitude to life or else, on some other basis, establish some clear-cut organizational policy; then we should faithfully stick to it. At the extremes we may discover that we are either pessimistic or optimistic. The worst results will be obtained if we switch willy-nilly from one criterion to another; by so doing we could very well end up with the worse of both worlds.

The pessimistic reserve manager will be attracted by Abraham Wald's "maximin" criterion. Under this criterion, the decision-maker assumes that the breaks will always go against him, that Nature is malevolent; he therefore selects a strategy which maximizes the minimum gains possible no matter what state nature occurs; he thus avoids maximum loss. The optimistic reserve manager, on the other hand, selects the "maxima" criterion, i.e. he always selects the course of action which promises the maximum gains, thus accepting the possibility of maximum loss should the actual state of nature turn out to be the most unfavourable of all.

Central bankers traditionally exhibit an extreme aversion to risk; in the jargon of management science they opt for the "maximin" criterion. This seems most appropriate in a small developing country. The reserves which they manage constitute one of the nation's last defences against economic ruin, so that a major investment loss would constitute an unacceptable disaster. A reserve manager who uses the "maximax" strategy is prepared to sustain severe losses occasionally with the expectation of making exceptionally large gains from time to time. He is confident that his superior skill will enable him to out-perform the market over time. However, the assumption of superior investment skills is not often warranted by investment managers in small developing countries operating far from the major financial centers of the world. So long as major losses are unacceptable, the manager should logically adopt a "maximin" strategy.

The adoption of the "maximin" criterion has important implications for reserve management. Most Central Bank Acts impose restrictions on reserve investments. Investment in foreign securities is usually

restricted to Government debentures and treasury bills or Government guaranteed securities issued by quasi-governmental or international institutions. But such legislative restrictions cannot be exhaustive and additional guidelines should be specifically established.

III. Operational Guidelines

The first obvious guideline is the limitation of business relationships to enterprises of unquestioned integrity and financial soundness. For example, an investment in the U.K. might be limited to the clearing banks or in the U.S.A. to the city banks of the Federal Reserve System. The respective monetary authorities in these countries are unlikely to permit the financial collapse of one of their major financial institutions. Even so, a limit should be placed, depending on the size of the reserve portfolio, on the sums which might be invested with a single institution. Secondly, investment should be restricted to those countries which have historically demonstrated a high degree of political stability, which possess well developed economic and financial institutions, and which have demonstrated a high level of responsibility in the fulfillment of their international obligations. This would obviously eliminate countries with a propensity for civil disorder and coups d'etat.

There might be one modification in the application of the "maximin" criterion, namely in the management of the tranche dedicated to income maximization, as long as the basic precautions spelled out in the previous paragraph are met. In the first place, the "Income" tranche will represent a relatively small proportion of the total portfolio, so that even a substantial investment loss would not constitute total ruin, or even unacceptable loss, when we consider the reserve portfolio as a whole. Furthermore, there is the distinct possibility of significant gains.

Given such protection, investment of the income tranche might reasonably be regarded as an exercise in decision-making under partial, rather than complete, uncertainty. Since the reserve manager will be involved in careful study of economic trends and of technical conditions in the financial markets, he will not be truly ignorant of the prospective states of nature. He might justifiably adopt the subjectivist, or Bayesian approach, by which subjective probabilities are assigned to the state of nature and the investment exercise treated as decision-making under risk.

The "maximin" criterion might also have to be relaxed in the investment of the "maintenance of value" tranche. The achievement of the goal of maintenance of value might necessitate the adoption of more aggressive investment policies than with the use of a cautious "maximin" criterion. The reserve manager might once again adopt the Bayesian approach and regard himself as making decisions under risk. Since the very existence of a "maintenance of value" tranche implies that the risk of national ruin or unacceptable loss is extremely remote, some of the safety precautions may also be relaxed. Certainly, the investment in equity and real estate might reasonably be considered as a hedge against inflation.

IV Measurement of Reserve Management Performance

We come next to the problem of measuring our progress towards the achievement of our objectives. The nature of the objective will determine our criteria of measurement. We will therefore have to examine each case separately and tailor our accounting system to each objective. It is notorious that accounting measures influence the behaviour of managers who tend to maximize the indices which are being formally measured.

An important aspect of the measurement problem will be the time period over which performance is to be measured. It makes a tremendous difference whether we use a monthly, quarterly or annual time measure, since the rate of return usually varies with the maturity of the security selected. Finally, valuations of performance will also vary with the unit of account selected, since units of account themselves are not absolute, but vary over time and in their relation shift to other units of account.

Gold Tranche

The purpose of gold tranche is to provide security against the possibility of national economic ruin. Truthfully, we shall not know whether we have achieved our objective or not until we have sustained at least one national disaster. If the liquidation or pledging of our gold reserves protected us from total ruin, we would regard the holding of gold as useful. If our gold holding in no way alleviated our economic discomfort, we might view the gold tranche a failure. But then again the fact that one has never had his house burned down is not an argument against taking out a fire insurance policy.

The accounting system for the gold tranche portfolio must take into account the long term and, indeed the indefinite time period of our objective. It should not therefore concern itself with day to day, or even year to year, fluctuations in the price of gold. The obvious convention would be to measure gold holdings at cost in the central bank's official reporting currency and to take profits or losses only on liquidation. Such liquidation would occur only if a disaster did occur or there were a strategic change in the decision to hold gold. This presumably would not happen often.

6

This convention to hold gold at cost rather than at market is an important policy issue. Conceivably, gold might be held in either the "income" tranche or the "maintenance of value" tranche, in which case holdings would be valued at market and profits or losses recognized at the end of the relevant time period. But to value the gold tranche holdings at market would motivate the portfolio manager to speculate in gold in his anxiety to avoid losses; he would be behaving then as a profit maximizer, or at least, as a cost minimizer when, in fact he should be maximizing security or minimizing the possibility of national ruin.

It would still be useful, however, to establish a review period, say every ten years, to examine how gold is performing against other commodities. Such overviews may suggest either an increase in gold tranche holdings or a decrease. The review might even suggest a move from gold into silver, platinum or some other commodity -- though this is most unlikely.

Political tranche

Since the purpose of the political tranche is to maximize goodwill rather than earnings, the measurement of performance in pure terms of money values would be most inappropriate. The measurement of the value of the goodwill achieved by coming to the assistance of friends in need or in investing in the securities of international financial institutions is a purely subjective exercise. -

Nevertheless, it may be politically useful for us to know the opportunity cost of our gestures of goodwill. This is easily ascertainable by using the average rate of return on the "income" tranche and applying it to the political tranche. The differential earnings would constitute the opportunity cost of our goodwill. We could then decide whether we are in fact prepared to extend assistance on such a scale or whether we are prepared to do even more for those less fortunate than ourselves.

Liquidity Tranche

The main objective of the "liquidity" tranche is to ensure that liquid funds are readily available at all times to meet the day to day demands upon the Central bank for foreign exchange. The measurement of and the reserve manager's performance poses severe "difficulties since the adequate" level of liquidity is a moving target in that it changes from day to day and from month to month over the business cycle, with the fortunes of the country's balance of payments. At the same time, he will try to employ funds not immediately required as profitably as possible. This also poses severe difficulties. The investment options of the "liquidity" manager will be constrained by the timing of demands on the portfolio, which are largely outside his control. He may face heavy demands when interest rates are low; this would minimize his earnings on available balances.

It would be virtually impossible to come up with a single index which measured the success of the manager in attaining his objective of an "adequate level of liquidity". We could more easily measure the non-accomplishment of his objective. It would be a black mark against

him if he incurred serious losses on currency speculation, in search of higher income, since income maximization is not his main objective! He would fail were he forced to break terms deposits at high penalty costs in order to meet unforecast demands, or if he forced the central bank to dip into its "income" tranche and sell long term securities at high capital loss! Such failures would be most reprehensible unless brought on by the most unusual circumstances, like an oil shock or by eccentric economic policy on the part of Government.

However, it is possible to measure the cost of maintaining adequate liquidity over a given time period. We could calculate the weighted average daily balance of funds held in the liquidity portfolio and the average weighted daily rate of interest on investment in similar securities over the same time period. Of course, such a rate of interest would be obtainable only if the manager had perfect knowledge of the timing of his inflows and outflows of foreign exchange. This ideal rate of return could be approached only asymptotically. Nevertheless, the difference between the ideal rate of return and the actual rate of return would indicate the maximum opportunity cost of having to maintain liquid balances. However, it would be impossible to determine the maximum opportunity cost the manager could have achieved; nor could we usefully match his performance with that of manager in similar circumstances since no two countries have the same balance of payments profile. However, we might expect the manager over the years to improve his performance through experience and increased skill in liquidity management. We would be disappointed if the rate of return on liquid balances moved progressively away from the ideal rate.

Income Tranche

The appropriate measures of performance for the management of the "income" tranche are almost identical with those for the management of private funds. As indicated above, the "maximin" criterion would be relaxed and the manager would be deciding under risk rather than under uncertainty. However, central bank aversion to risk would still impose constraints in respect of the integrity of financial institutions with whom he dealt and the reliability of those political entities whose securities he purchased. The purchase of equities might also be excluded.

The manager of the "income" tranche would therefore operate as a profit maximizer subject to the constraints of safety imposed by the central bank's overall "maximin" criterion. In fact, many funds managers in the major financial centers manage clients' accounts under similar conditions. Once the relevant constraints were observed, the manager would be free to select the maturity and currency denomination of securities for the "income" portfolio, taking into consideration current and prospective conditions in the money and capital markets.

As in the case of private funds manager, the "income" manager's performance would be measured on the basis of the rate of return on the fund entrusted to him. Two parameters would have to be determined in advance: the unit of account for measuring the rate of return and the time period over which performance is to be measured. The most important criteria of a unit of account are consistency and convenience. (There is, of course, no perfect unit of account). The national currency would, of course, be the most convenient since that is the unit of account

in which the Central Bank's accounts are kept. However, if the national currency is volatile, it might make sense to use either the U.S. dollar or the SDR in measuring the performance of the "income" manager, even if the accounts are translated into national currency units for official reporting. The U.S. dollar is, of course, the most convenient of all since it is the currency most used in international transactions, but there may be a case for some central banks to use the French franc, the Deutsch mark, the pound sterling, the Japanese Yen, or even some other currency. The minimum accounting period for the measurement of performance would be one year. However, it is difficult to arrive at a valid assessment of a manager's performance until he has managed through a full interest rate cycle - five years or more.

The benchmark of the "income" manager's performance would be the rate of return achieved by funds managers operating under similar constraints. One technique of establishing a comparable measure of performance is to farm out a portion of the "income" tranche to portfolio managers in a major money center financial institution and use their results as a benchmark for judging the domestic manager. Some allowance would have to be made for the fact that the manager in a developing country usually operates at some distance from the major international financial centers. In spite of the tremendous advances in telecommunications, he would still be at a serious disadvantage in respect of the timelines of information vis a vis the foreign funds manager, against whom he is competing. His handicap allowance might be the equivalent of the fees charged by the foreign managers for their services.

Except in the most unusual circumstances, the "income" tranche should be managed by nationals. Funds management can only be learned through rigorous application and long experience. The opportunity costs of not farming out the entire income portfolio to professional foreign fund managers may be viewed as the cost of training national fund managers.

Maintenance of Value Tranche

The objective of the "maintenance of value" is the preservation of capital values over the long run. There are two major threats to the achievement of this objective -- currency depreciation and inflation. To counter these effects, the manager must achieve a rate of return on investment which equals or exceeds the combined rates of inflation and currency depreciation. The measure of the manager's performance must be designed so as to establish unequivocally whether or not this goal has been achieved.

As usual the first requirement for performance measurement is the determination of a suitable unit of account. This will be particularly important in this instance because the extended accounting time period, probably in excess of ten years. The unit of account should therefore exhibit a high degree of stability relative to other units of account. The ideal accounting unit would also exhibit stability in purchasing power over time, but in times like these that might be asking too much. We would settle for the unit of account least likely to depreciate dramatically over time. Actually, our choice is quite limited; we either choose the currency which we think will best fit these requirements

-- which boils down to the Swiss franc, the U.S. dollar, the Deutsch mark, the pound sterling or the Japanese Yen -- or we construct a composite currency. The weight of argument would probably come down on the side of the SDR which includes all the feasible currencies and also avoids the possibility of currency depreciation to which each currency is liable.

The choice of unit of account does not deal with the problem of inflation, although the tendency would be for the weights of the least inflated currencies to increase in the SDR basket overtime. However, even the strongest currencies will suffer erosion in their values from inflation and so the manager will have no option but to generate earnings which exceed the general rate of inflation. The general rate of inflation might be taken to be the composite inflation rate of those countries represented in the SDR currency basket weighted according to their respective weights in the SDR basket.

Summary and Conclusions

As in any other activity, the first requirement for success is the clear establishment of objectives. As with most governmental activities, there will be multiple objectives in foreign reserve management. The nature of these objectives are to a large extent a function of the portfolio size. If the nation's reserve position is desperate, the only relevant objective will be liquidity; if it is comfortable, some funds may be stashed away in gold for the rainy day and segments of the portfolio dedicated to income maximization and assistance to friendly countries. If these are windfall earnings, then the issue of maintenance

of value comes into play. To deal with these multiple objectives, it is practical to segment the portfolio into tranches reflecting the several objectives.

Because of the critical importance of reserve management to the economic health of the nation, and because of the fickle and uncertain international environment for investment, the basic philosophy of foreign reserve management will be one of risk aversion. The basic criterion of decision-making will be the "maximin". As reserves reach levels where the prospect of total national ruin recedes, the "maximin" criterion may be relaxed with respect to the "income" and "maintenance of value" tranche; the reserve manager, using his experience and knowledge, will then be prepared to pit his skill against Nature, behaving as a decision-maker under risk. In the management of the "maintenance of value" tranche, he will increasingly take calculated risks in his attempts to maintain the value of his capital over time.

It is important that appropriate measures of performance be established in order to motivate managers to achieve their goals. In this respect, the selection of a suitable unit of account and relevant accounting procedures are of critical importance. Some ingenuity is also required in the establishment of measures of performance for non-monetary objectives.

Reserve managers in small developing countries will have to monitor closely conditions in the major financial markets, familiarize themselves with modern investment theory and techniques, and keep up to date with the most recent technological developments. This will enable them to

squeeze additional income from their portfolio; where large sums are involved, a marginal increase in earnings can be quite substantial.

Finally, movements in foreign reserves reflect more fundamental developments in the national economy. They provide feed-back to the national decision-makers about the consequences of their economic policies. Rapid increases in reserves may signal new opportunities; a rapid decline may be a warning that fundamental changes in policy are required. To use the vernacular, the foreign exchange portfolio is the "wash" where it all comes out.