

ESSAYS IN INTERNATIONAL FINANCE

No. 58, February 1967

TOWARD ASSESSING THE NEED
FOR INTERNATIONAL RESERVES

J. MARCUS FLEMING



INTERNATIONAL FINANCE SECTION

DEPARTMENT OF ECONOMICS

PRINCETON UNIVERSITY

Princeton, New Jersey

This is the fifty-eighth in the series **ESSAYS IN INTERNATIONAL FINANCE** *published from time to time by the International Finance Section of the Department of Economics at Princeton University.*

The author, J. Marcus Fleming, was formerly a member of the League of Nations Secretariat, Deputy Director of the Economic Section of the U.K. Cabinet Offices, U.K. representative on the Economic and Employment Commission of the United Nations, and Visiting Professor of Economics at Columbia University. He is now Deputy Director of the Research and Statistics Department of the International Monetary Fund. His publications, in the form of journal articles, are mainly on welfare economics and international economics. The present essay, a revised version of a talk given before a graduate economics seminar at Harvard University, expresses the personal opinions of the author, and carries no implication as to the views of the International Monetary Fund.

The Section sponsors the essays in this series but takes no further responsibility for the opinions expressed in them. The writers are free to develop their topics as they will. Their ideas may or may not be shared by the editorial committee of the Section or the members of the Department.

FRITZ MACHLUP, Director

ESSAYS IN INTERNATIONAL FINANCE

No. 58, February 1967

TOWARD ASSESSING THE NEED
FOR INTERNATIONAL RESERVES

J. MARCUS FLEMING



INTERNATIONAL FINANCE SECTION

DEPARTMENT OF ECONOMICS

PRINCETON UNIVERSITY

Princeton, New Jersey

Copyright © 1967, by International Finance Section
Department of Economics
Princeton University
L.C. Card 67-16269

Printed in the United States of America by Princeton University Press
at Princeton, New Jersey

TOWARD ASSESSING THE NEED FOR INTERNATIONAL RESERVES

Over the past few years, increasing attention has focussed on the question of deliberate creation of international reserves. No aspect of this question has presented greater difficulties, both theoretical and practical, than that of assessing the world's "need" for such reserves.

In a paper published in 1961, I tried to develop a systematic approach to the problem.¹ This approach, which might be termed a teleological one, has won a measure of acceptance in official documents. Unlike the principal alternative approaches, it does not ask what amount of reserves each country would like to have, or what amount it would require in order to be able to follow desirable policies, and then add up the results to get a world total. Instead, it asks what would be the *effects* on world economic welfare—given the probable reactions of governments, central banks, and individuals—of increasing total reserves or rates of reserve growth, the increases being distributed among countries in some specified way.

On this approach the world's "need" for reserves or for reserve growth is determined at the point where the effects of further reserve increments on world economic welfare cease to be positive and begin to become negative. (Some, including the author, would assess the effect on economic welfare by taking account of effects not only on real income but also on income distribution, both within and between countries.) Such an approach, though traditional in welfare economics, is open to the charge of being "dictatorial." Instead of accepting the preferences of governments, it seeks to evaluate them in the light of ultimate criteria. In any event, consensus between governments is unattainable, and the dictatorial judgments of economists may help to provide the basis of a reasonable compromise.

Reserve changes generally exercise their effects on world real income through national monetary and fiscal policies, such as those affecting imports, capital exports, and exchange rates. There are some exceptions to this general rule. For example, such changes may act on the minds of private individuals by inspiring a greater or lesser degree of confidence in exchange stability. But even in this instance—and granting that hot-money movements have a direct impact on economic life—the ultimate effects on real income are largely mediated through national

¹ "International Liquidity: Ends and Means," *Staff Papers*, Vol. VIII (1960-61), pp. 439-463.

policies. However, as is explained later, if reserve changes as such act through national policies, the processes through which reserves come into existence or are acquired by countries may act more directly on the level of monetary demand.

CRITERIA FOR OPTIMIZATION

Other things being equal, the higher the level of a country's reserves and the better its prospects of increasing them in the future, the more inclined the country will be to adopt policies that, *inter alia*, worsen its balance of payments.

Thus, higher reserves will encourage a country to adopt more expansionary monetary and fiscal policies, relax restrictions on imports or even promote them, relax promotion of exports or even restrict them, relax restrictions on capital exports, restrict capital imports, be more willing to provide capital exports and aid in untied form, be more generous in the provision of foreign aid, or be less willing to devalue and more willing to revalue the rate of exchange.

The effect of a widespread increase in reserves on balance-of-payments equilibrium is ambiguous. Both the countries tending toward surplus and those tending toward deficit will be encouraged to expand demand, liberalize external expenditures, and compete less actively for external receipts. However, unless the distribution of new reserves is deliberately confined to countries in balance-of-payments surplus, stronger effects may be expected in deficit countries than in surplus countries, with the result that open payments imbalances will tend, on the whole, to increase. In other words, countries will have more extensive recourse to official compensatory or balance-of-payments financing, including the use of reserves.

The desirability of a particular change in reserves depends partly on whether the countries most likely to be affected are suffering from inadequate or excessive demand pressure, whether the degree of balance-of-payments restriction being applied to trade and capital movements offers scope for significant liberalization if reserves are increased, whether more or less recourse to official compensatory financing is appropriate, and whether more stability or more adjustment of exchange rates is required. It also depends, of course, on the relative effects that reserve changes may be expected to have on all these variables.

On further reflection, I consider that my 1961 paper treated desirable exchange-rate behavior too much as an ultimate objective, while paying too little attention to the desirability, other things being equal, of promoting balance in external payments, and thus minimizing recourse to official compensatory financing. The use of such financing, I would now maintain, provides *prima facie* evidence of a distortion of international capital flows. Although it is preferable, up to a point, to

the kinds of misallocation of resources that in some situations may provide the only practicable alternatives—namely, those associated with trade restrictions, unemployment, price inflation, etc.—the distortion of capital flows through official compensatory financing is, nevertheless, a disadvantage to be taken into account. (The welfare loss involved in official compensatory financing may not be negligible. *Prima facie*, assuming free capital movements and good judgment on the part of capitalists, it would be measured by the amount of compensatory financing times approximately half the change in the differential between home and foreign interest rates that would be required to induce private financing to take the place of official.)

Broadly speaking, and making the type of value judgments that economists usually make, I would say that reserves and reserve growth ought to be increased to the point at which beneficial effects in the form of higher employment and reduction of impediments to international transactions are outweighed by untoward effects in the form of inflation and recourse to official compensatory financing.

RESERVE NEEDS AND THE ADJUSTMENT PROCESS

It is sometimes argued that international-reserve regulation is to be judged by its contribution toward improving the process of balance-of-payments adjustment. From what has been said, it should be clear that this emphasis on payments adjustment, though not wrong, only pushes the question one stage further back. What is a good or a better adjustment process must itself be judged by criteria of the kind just discussed. For example, the array of policy propensities in the various countries that might add up to a good adjustment process in a time of general burgeoning of demand might not be conducive to a good adjustment process in generally depressed conditions. The emphasis on the adjustment process may also be dangerous if it leads to the conclusion that the supply of reserves should be brought closer to what would be needed if that process were more or less perfect. For if the adjustment process were perfect—and this involves near perfection in domestic financial policies—the use of reserves (and in a sense the need for them) would be small. (The optimal level of reserves would be indeterminate above a low level, since reserves above that level would have no effect on policies.) Yet with the world as it is, a reduction in the use of reserves might well entail a net worsening of the adjustment process in the form of increased resort to restrictions or to unemployment in deficit countries.

There is a closely related half truth which is quite popular nowadays, to the effect that an improvement in the adjustment process would necessarily reduce the “need” for—in the sense of the use of—reserves.

In fact, however, it all depends on what the improvement is. More effective incomes policies—better adjusted to the balance-of-payments situation—, more flexible exchange-rate policies, and demand policies that reacted more quickly to incipient inflationary or deflationary tendencies would all doubtless reduce the use of reserves. But less ready resort to restrictions on trade and capital movement, though it might also count as an improvement in the adjustment process, would probably intensify the use of reserves.

This being said, however, it is highly desirable that efforts to improve the supply of world reserves should be accompanied by efforts to improve the adjustment process in other ways. The fact that reserve creation has to take account of many different objectives means that it cannot pursue any of them effectively. For example, a stimulus to world-reserve growth now might well have good results in some countries and in some respects and bad results in other countries and in other respects. Thus, it might encourage some relaxation of restrictions on imports and capital exports in the United Kingdom and the United States, as well as a more generous flow of economic aid from industrial countries in general, while leading, on the other hand, to excessive inflationary pressures in deficit and surplus countries alike, and necessitating an excessive flow of official compensatory financing from Continental Europe to the reserve-center countries. This dilemma arises from the fact that the instruments available to national authorities for regulating the balance of payments are either too few or are not being so used in the various countries as to permit the simultaneous achievement of domestic and international objectives. Anything that can be done to enhance international control over national adjustment processes—to enforce the “rules of the game”—will simplify the task of international-reserve management.

The adjustment process is governed in some measure by the Articles of Agreement of the Fund and by the General Agreement on Tariffs and Trade. Attempts are now being made to improve the operation of this process, as between the principal industrial countries, through exchange of information, mutual consultation, and the informal adoption of “rules of the game” within the framework of the Organization for Economic Cooperation and Development. It is, however, very difficult to secure effective cooperative action of this kind without some sort of financial sanction. By long odds, the most effective method of improving the adjustment process—at any rate so far as countries in payments deficit are concerned—would be for a much higher proportion of international liquidity than at present to take a form, such as drawing facilities in the credit tranches of the Fund, that could be used only on condition that

appropriate policies were adopted. It is a tacit presupposition of the current enquiry into deliberate reserve creation, however, that countries are unwilling either to accept an increasing reliance on conditional liquidity for themselves or to provide the financial resources that would enable other countries to satisfy a markedly higher proportion of their liquidity needs in this form.

RESERVE STOCKS AND RESERVE GROWTH

So far, I have referred rather vaguely to the need for reserves, for reserve growth, for increases in reserves, etc. The time has come to distinguish more clearly between stocks and growth rates of reserves. In considering how they will act on those instruments of policy that exercise a significant effect upon the balance of payments, the authorities of a country will be influenced, *inter alia*, by the extent to which their minds are at ease with respect to the balance of payments. This degree of balance-of-payments ease, in turn, is affected by both the stock and the rate of growth of the country's reserves. A high reserve stock and a high rate of growth of reserves are, from this standpoint, substitutes for each other. More precisely, the higher a country's reserve stock, the lower the rate of growth of reserves—and the higher the rate of growth of its reserves, the lower the reserve stock—that will be required to create in the mind of its authorities a given degree of balance-of-payments ease. This is easily understood. The sense of balance-of-payments ease has to do with the confidence of the authorities in their ability to meet payments deficits. Now, the higher the reserve stock, the greater is the country's ability to meet current and future deficits. On the other hand, the faster the current rise in reserves, the smaller such deficits are likely to be in the immediate future and the higher reserves are likely to be in the further future to meet such deficits as may then occur.

All this, of course, represents a considerable oversimplification. The degree of balance-of-payments ease engendered by a given rate of reserve growth—and hence the rate of substitution between reserve stocks and reserve growth—will depend on such circumstances as

- (1) how long the reserve growth is expected to persist (which, in turn, depends on how it comes about);
- (2) the extent to which the growth of reserves is associated with a growth of liquid external liabilities;
- (3) the extent to which reserve growth is associated with transactions that are "above the line" in the balance-of-payments accounts of the country in question rather than among the financing items.

Less account is taken of changes in the rate of reserve growth if they are considered essentially temporary than if they are considered en-

during, if they are accompanied by liquid liabilities than if they are not so accompanied, and possibly if they are conventionally ranked "below the line" rather than above it. The bearing of liquid liabilities in particular is difficult to formulate. They are perhaps best considered as equivalent to negative reserves—and a rise in liquid liabilities as equivalent to a fall in reserves—but to the extent only of a fraction of their value. This fraction itself, however, varies according to the country's balance-of-payments strength: the stronger the country's balance-of-payments position, the more closely the fraction approaches zero. (Reserve stocks, likewise, will be less productive of balance-of-payments ease if they are accompanied by stocks of liquid external liabilities. However, even if the ratio of liquid liabilities to reserves were the same for stocks as for growth, it would not follow that the rate of substitution between reserve stocks and reserve growth would remain unaffected by the height of that ratio.)

To complicate matters further, a growth in liquid liabilities to official holders abroad, if it results from and helps to finance a payments deficit, may be taken as evidence that the country can expect to be able to finance future deficits in the same way. This expectation, so long as it lasts, is itself a substitute for reserves or reserve growth, and as such a source of balance-of-payments strength.

In addition to the distinctions mentioned above, reserve growth, quite apart from its effect on the degree of balance-of-payments ease and hence on balance-of-payments policies, may apply a direct stimulus to demand pressure in the country in which it occurs which will be greater,

- (4) the more it accrues through transactions that tend to add to the money supply, and
- (5) the more it accrues through current-account transactions which directly affect the level of incomes.

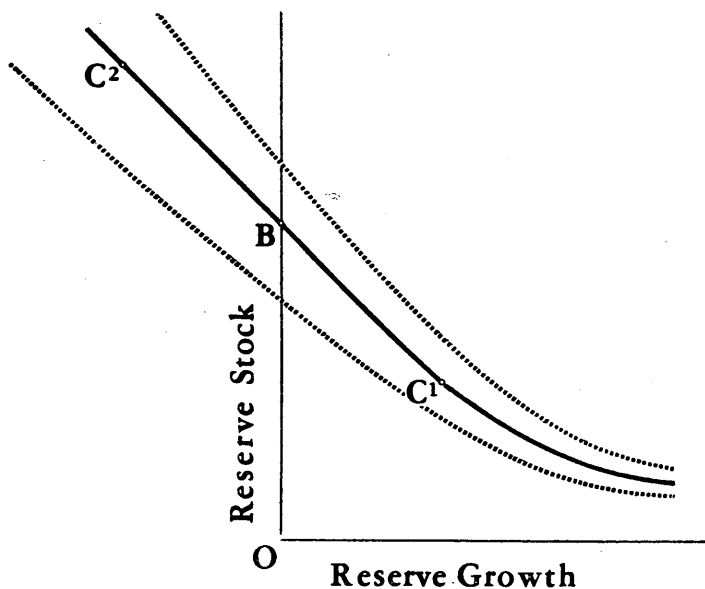
These distinctions assume considerable importance when we come to consider how the rate at which it is appropriate to create reserves by deliberate international action may be affected by the form in which they are created and by the proportions in which they are initially distributed among countries.

Let us assume for the moment, however, that any changes in reserve growth that may take place in a given country, other than those brought about by changes in its policies, exercise no direct effects on its incomes or money stocks, that they appear below the line in its balance of payments, and that they are expected to dwindle at a given proportionate rate over time. We can then derive certain propositions about the time shape of optimal reserve growth which, though highly abstract, have a certain practical relevance.

RESERVE STOCK, RESERVE GROWTH, AND BALANCE-OF-PAYMENTS EASE
IN AN INDIVIDUAL COUNTRY

First, let us look at the static relationship between reserve stock and reserve growth in a particular country, as illustrated in Figure 1, in the form of an indifference map, derived from the preference function of the authorities. In this, reserves are measured along the y-axis, and

Figure 1

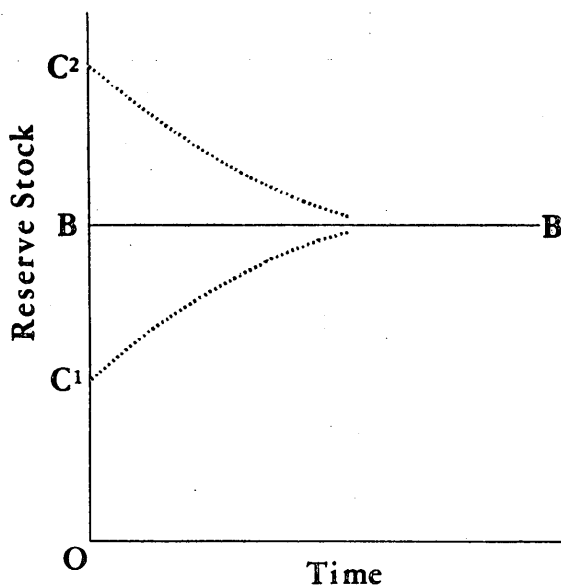


reserve growth along the x-axis, while the various contours represent degrees of balance-of-payments ease. The relationship between x and y is assumed to be linear over the greater part of the map, as would seem to be natural if, for example, any changes in the current reserve growth would be expected to dwindle at a given proportionate rate over time. However, there is assumed to be some minimum level below which reserves must not fall if confidence is to be preserved, and all the indifference contours tend to the horizontal as they approach that level. Assuming that substitution of reserves for reserve growth, or vice versa, does not affect the degree of attainment of domestic goals associated with a given set of national policies, each indifference contour, representing a given degree of balance-of-payments ease, will be associated with a given set of policies affecting the balance of payments. The degree of balance-of-payments ease rises northeastward on the chart, and, assuming that the interest cost of reserve acquisition is no greater than the interest

earned on reserve holdings, the increase in balance-of-payments ease will bring an increase in satisfaction to the authorities. There is no "desired" degree of payments ease, short of infinity; beyond a certain point, though, increasing ease may become a matter of indifference.

Now let us bring in the passage of time. If circumstances both inside and outside the country are sufficiently static, the country's indifference map, relating reserves and reserve growth, will remain constant through time. Each indifference contour will also continue to be associated with the same set of balance-of-payments policies. For each contour (that is, for each degree of balance-of-payments ease, or each set of balance-of-payments policies), it will then be possible to draw a family of paths illustrating how the country's reserves would have to develop from any given starting point in order to avoid disturbing these policies. (This is a *required* not an *actual* development of reserves—the meaning is not that constant policies would tend to bring about this development, but that the development is necessary if the policies are to remain constant.) This development is represented in Figure 2, where reserve stock is measured along the y-axis and time along the x-axis. Each path in Figure 2 corresponds to a different initial level of reserves, and the whole set of paths corresponds to only one of the contours—say the solidly-lined one—in Figure 1.

Figure 2



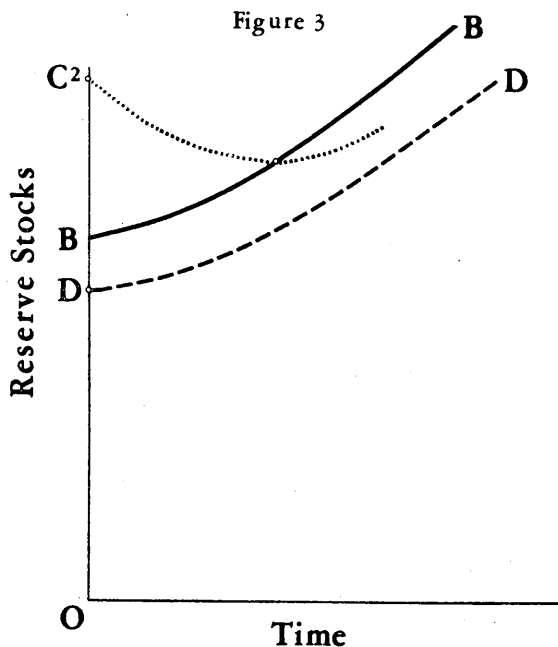
If the reserve level at time zero in Figure 2 corresponds to the point at which the solidly-lined contour cuts the y-axis in Figure 1 (point B), no change in reserves will be required to maintain over time the degree of balance-of-payments ease and the set of policies which that contour represents; the path starting from that level of reserves in Figure 2, therefore, remains horizontal. From any starting level of reserves lower than B, a positive rate of reserve change will be necessary to attain that degree of ease; this is shown by the position of point C_1 in Figure 1, or by the slope of the dotted line at C_1 in Figure 2. In order to permit the maintenance of the specified degree of ease, reserves must rise through time, but their rate of growth must decline, as shown in Figure 2, so that they move asymptotically toward level B. Similarly, if reserves start from level C_2 , higher than B, they must decline asymptotically toward level B in order to permit the maintenance of the degree of payments ease in question. (See Mathematical Appendix.)

B, therefore, represents a sort of equilibrium level of the country's reserves in relation to a particular degree of balance-of-payments ease, that is, the level toward which its reserves must tend if this degree of ease is to be maintained indefinitely. We might call this an "equilibrium level of required reserves."

Now let us turn to the more interesting case in which, as time passes, the country, in order to maintain a given degree of balance-of-payments ease, requires either more reserves or a higher rate of reserve growth or both. (In a dynamic situation, maintenance of a given degree of balance-of-payments ease will lead to the maintenance of unchanged policies only if with such policies the degree of attainment of domestic policy targets also remains unchanged.) Reserve needs in this sense might rise either because of a rising propensity on the part of the authorities to worry about the balance of payments or because of a tendency for potential balance-of-payments deficits to increase in size, for example, because of a continuing growth in the value of international transactions. In either case, the contours in Figure 1 corresponding to given degrees of balance-of-payments ease will move northward, as time passes, at a rate corresponding to the growth in the need for reserves; in the latter case, in addition, the contours are likely, at any point of time, to be farther north than would otherwise be the case, on account of *anticipations* of rising potential imbalances.

Under the new circumstances, the various paths representing the manner in which reserve stocks, starting from different levels at the base date, would have to move in order to maintain a given degree of balance-of-payments ease, will still, if reserve needs grow in some steady and systematic way, tend to converge on an equilibrium reserve path. In Figure 3, the growth of reserve needs is defined by the curve BB,

which is the locus of the reserve levels that would be required at different points of time to achieve the given degree of balance-of-payments ease *at a zero rate of reserve change*. This may be called the curve of the "static equilibrium level of required reserves." (All curves in Figure



3 may be taken to correspond to the degree of balance-of-payments ease represented by the solid-line contour in Figure 1, adjusted upward to allow for anticipations of rising potential imbalances.) It is not a required-reserves *path*, in the sense of a conceptually feasible movement of required reserves through time, since, though it shows what reserves would be required at a zero rate of reserve change, its own rate of change is positive.

Now the various required-reserves paths corresponding to different levels of initial reserves will tend to converge not on this static equilibrium curve, but on a dynamic required-reserves path related to it. Thus, for example, if the static equilibrium level of required reserves rises steadily at a constant proportionate rate through time (and if we assume as before a linear relationship at any point of time between the required level of reserve stocks and the required rate of growth of reserves), the various required-reserve paths will tend to converge on a line (DD) which lies below the BB line, and whose distance from the x-axis is a constant fraction of that of the BB line.

In other words, the dynamic equilibrium level of required reserves will bear a constant proportion (less than unity) to the static equilibrium level, and both curves will rise at the same proportionate rate. In those circumstances, as is indicated in Figure 3, any required-reserve path that starts from a point C_2 above the static equilibrium level of required reserves will decline through time until it intersects the static equilibrium path, and will thereafter rise, at an accelerating rate, until as it converges on the dynamic equilibrium path it approximates the proportionate rate of growth of the latter. (It is an interesting question whether the dynamic level of required reserves, corresponding to any given degree of payments ease, will be higher or lower at any point of time if potential imbalances are rising, and are expected to rise, than if they are constant and are expected to remain so. In the former event the dynamic equilibrium level will be below the static equilibrium level, whereas in the latter event the two will coincide. On the other hand, in the former event, owing to anticipation of rising potential imbalances, the static level of required reserves will be higher than in the latter event. Cf. Mathematical Appendix.)

This model has, I think, some relation to a well-known reality. Assume a country whose reserves are declining but which (like the United States in the early 1950's) can maintain a considerable degree of balance-of-payments ease because its reserve stock is high relative to the static equilibrium level of reserves that is required to maintain that degree of ease. Such a country is likely to find later on that it has to check the decline in its reserves and, still later, to accumulate reserves if it is to maintain the same degree of ease. If it does not do so, its balance-of-payments position will deteriorate, not only because its reserves decline, but because the static equilibrium level of required reserves increases. (The situation in the United States has been complicated by the existence and growth of liquid external liabilities, which count to some extent as offsets to reserves, and by the existence—and dwindling—of a potentiality for financing a part of its deficits by a further accumulation of such liabilities, which, as mentioned earlier, is a kind of reserve substitute.)

WORLD RESERVE STOCKS AND OPTIMAL RESERVE GROWTH

Thus far, I have spoken of the bearing of a country's reserves and rate of reserve growth on its sense of balance-of-payments ease, and on its policies as they are affected thereby. The next step is to extend the analysis, with the necessary adaptations, to the world as a whole, and to see how far it can be used in the definition and measurement of the need for reserves or for reserve growth.

Broadly speaking—with a number of qualifications discussed below—

the types of relationships described above as existing between the reserve levels and rates of reserve increase of individual countries, with respect to their effect on the balance-of-payments policies of these countries, will also obtain between aggregate reserve levels and rates of aggregate reserve increase of groups of countries. Subject to still further qualifications, we may even say that the sort of relationship that exists between "required" and actual stocks and rates of increase of reserves in a single country will also obtain between optimal and actual stocks and rates of increase of aggregate reserves in a group of countries. In particular, the optimal level of aggregate reserves will tend to vary inversely in any given circumstances with the actual rate of growth of these reserves, and the optimal rate of growth of aggregate reserves will tend to vary inversely with the actual level of these reserves. It is time to decide on which of these optima it were best to focus our attention; since sudden, once-for-all changes in the level of aggregate reserves are rare, it is undoubtedly more convenient to focus on the optimal rate of change of reserves as affected by the existing levels of reserves. This procedure represents an important departure from the way in which the reserve-needs problem has until recently been viewed, a departure which owes a good deal to the pioneering work of Mr. Høst-Madsen of the IMF.²

Again, just as the effects of reserve growth in an individual country will vary according to the nature of the transactions by which reserves are increased, so the effects of a given rate of reserve growth in the world as a whole will vary according to the nature of the transactions or procedures whereby world reserves are increased. Thus, that part of the growth in world reserves which results from additions to official holdings of foreign exchange is likely to have a relatively weak expansionary effect. Not only is it partly offset, from the standpoint of the reserve-currency countries to which it initially accrues, by a corresponding increase in liquid liabilities, but it corresponds to no net positive effect on the sum of payments balances of countries, has no direct effect on aggregate incomes, and little if any effect on the aggregate supply of money. Reserve growth resulting from gold dishoarding has a somewhat more expansionary effect, since it corresponds to an increase in the sum of payments balances and tends directly to increase the money supply. Most powerful of all is the reserve growth resulting from gold production, which not only adds to the sum of balances of payments and tends to swell the stock of money but also enters directly into the world's income

² Cf. Poul Høst-Madsen, "Asymmetries Between Balance of Payments Surpluses and Deficits," Appendix, *Staff Papers*, Vol. IX (1962) pp. 182-200, at p. 198. See also the trenchant paper by Milton Gilbert, *Problems of the International Monetary System*, Essays in International Finance, No. 53 (Princeton, New Jersey, 1966). Mr. Gilbert lays great, perhaps excessive, emphasis on the importance of reserve growth, compared with reserve stocks.

stream. Some of these expansionary effects, as pointed out earlier, act directly on the private economy independently of repercussions on national policies.

EFFECT OF DISTRIBUTION OF RESERVES ON RESERVE GROWTH AND OPTIMAL RESERVE GROWTH

The first set of qualifications we have to make in drawing an analogy between the required rate of growth of reserves of an individual country and the optimal rate of aggregate reserve growth of a group of countries arises from considerations of intercountry distribution of reserve growth and of reserves.

Basically (given the average degree of balance-of-payments ease prevailing among countries), the greater the disparity among countries with respect to balance-of-payments ease and difficulty, the higher is likely to be the optimal rate of growth in aggregate reserves. Such disparity may be greater than usual at any given time because payments imbalances between countries are larger than usual, because reserves are abnormally maldistributed in relation to potential payments fluctuations, or because actual payments imbalances are abnormally maldistributed in relation to the distribution of reserves—in other words, because to an unusual extent it is the countries with small reserves rather than those with large reserves that are tending to have deficits. Now, if we start from a position in which all countries have much the same degree of payments ease, and if we then shift reserve stocks or payments balances so that one country is better off and another worse off, the first country is not likely to liberalize trade and capital movements as much as the second will restrict them, nor is the first country as likely to expand demand as is the second to contract it. For these reasons, greater disparity in payments ease creates a case for increasing the rate of reserve growth and adding to ease all round. There are two main counterarguments to this. One arises from the distortion of capital flows involved in reserve use and other forms of official balance-of-payments financing. An increase in payments disequilibria, such as would probably result from a stepping-up in the rate of growth of aggregate reserves, would increase the amount of such financing and such distortion. Again, if an increase in disequilibria called for the adjustment of exchange rates, a higher rate of growth of reserves might tend to delay the adjustment. These arguments, which partly overlap, can claim some validity only if the imbalances are of a long-term character and if their cure is to be sought in exchange depreciation in deficit countries. If they are short-term or of a type that should be arrested by action on the part of surplus countries, the arguments lose much of their force.

Distributive considerations enter into the estimation of optimal reserve

growth in another way. Any additions made to world reserves by deliberate action must be distributed somehow between countries. Even if the initial recipients of these reserves are few, the reserves will tend sooner or later to be diffused throughout the generality of countries as a result of adaptations in balance-of-payments policies. The strength and character of the effects, however, will depend to some extent on the initial distribution of reserve additions.

Broadly speaking, the more the distribution of newly created reserves favors countries in balance-of-payments difficulty and countries where demand and imports can be easily expanded—notably the less developed countries—the more powerful will be the expansionary effects that reserve creation will have on demand and trade. Indeed, after a time lag, even the countries that do not participate in the initial distribution may well experience stronger expansionary effects than if they had received reserves directly, for they will earn the reserves through the balance of payments, which directly affects money supply, and possibly through the trade balance, which directly affects incomes as well.

A concentration of newly created reserves on countries that are in payments difficulty would tend to perpetuate payments disequilibria and increase the distortion of capital flows. A concentration of newly created reserves in less developed countries would also tend to produce a movement of funds that would be unjustified by market criteria, though it might well be justified by social criteria when account is taken of externalities and of the facts of international income distribution.

FACTORS AFFECTING OPTIMAL RESERVE GROWTH

In considering the path of optimal reserves through time, one has to take account of changes in four main groups of factors:

(1) As the value of international transactions grows, the normal magnitude of potential payments imbalances may be expected to grow also—other things being equal, at the same proportionate rate. Any increase in the relative importance of the more volatile types of international transactions, such as capital movements, might be expected to raise the level of potential imbalances relative to the value of international transactions. Any once-for-all increase in the relative level of potential payments imbalances, in turn, would tend to give rise to a temporary increase in the optimal rate of reserve growth.

(2) Among countries with similar propensities to react to given degrees of balance-of-payments ease, one would expect to find a gradual drift toward equality in the degree of ease, a circumstance which would tend to reduce the need for reserve growth. However, all sorts of disturbing factors—military, social, cyclical—together with the disturbance created by the delayed and “lumpy” character of exchange-rate adjust-

ment under the par-value system, give rise to erratic and short- to medium-run changes in such distribution.

(3) Cyclical and longer-run changes in autonomous demand pressures can bring about very large changes in the optimal level of reserve growth.

(4) Finally, and importantly, changes can occur in the attitudes of national authorities toward balance-of-payments goals as compared with domestic goals, and toward different techniques of bringing about balance-of-payments adjustment. To take an easy case, the lower the rate of reserve growth (given the level of reserves relative to international transactions) at which countries were prepared to give balance-of-payments considerations a given degree of weight relative to domestic goals, the lower would be the optimal rate of reserve growth. A special example of this relationship would occur in a country which desired to keep a given proportion of reserves as backing for its domestic money supply and in which the money supply grew more slowly than its international transactions. More common, and more difficult to assess in terms of the effects on optimal reserve growth, are cases in which countries alter their preferences between different techniques of balance-of-payments adjustment. In such cases, the concept of "degree of balance-of-payments ease" loses any semblance of precision.

QUANTIFICATION OF NEED FOR RESERVE GROWTH

It is clearly no easy matter to derive a quantitative estimate of needed reserve growth over a given period from the conceptual framework we have elaborated. In the first place, any such estimate must rest on value judgments as to the relative importance of different economic objectives—price stability, full employment, exchange-rate stability, freedom of trade, freedom of capital movements, and the like; still worse, it involves value judgments as to the relative importance of welfare changes in different countries. Again, it is extremely difficult to derive from the rather tumultuous experience with balances of payments of the past three or four decades any quantitative relationships between reserve changes of various kinds and the behavior of national governments, or even between the actions of governments and their effects at home and abroad.

On the other hand, if we are to formulate any arrangement for deliberately supplementing or damping down the rate of reserve growth, we must find some method of arriving at a numerical estimate. What is to be done?

First of all, payments imbalances vary so much from year to year that it seems pretty hopeless to try to arrive at any estimate of needed reserve growth for periods of less than four or five years at a time. This

limitation is mitigated by two considerations: (1) the organizational problem of getting international agreement on any estimate of need is such that decisions could in any case be made only at fairly lengthy intervals; (2) short-term variations in the need for reserves are reflected to some extent in the demand for balance-of-payments credit in the form of drawings from the Fund, use of swaps, etc., and such variations in the demand for balance-of-payments credit lead not only to desirable redistribution of reserves but also to responsive—and on the whole desirable—variations in their over-all supply.

Secondly, it helps to pose the quantitative question in terms of the need for reserve growth rather than the need for reserve stocks. The two are, of course, interconnected, but even if the level of reserves were well above the dynamic optimal equilibrium level, it seems unlikely that the optimal rate of aggregate reserve growth would be less than zero. Catastrophes such as wars and general devaluations aside, reserve levels seldom get very far out of line. This is because an excessive rate of reserve growth, by promoting inflation and price increases, is likely to result in an increase in the level of prices, in the magnitude of payments imbalances, and hence in the optimal equilibrium level of reserves.

Thirdly, in seeking to determine an optimal rate of reserve growth, there is some advantage in pursuing two different approaches and seeing to what extent they confirm each other. One approach is global, the other starts by considering individual countries or groups of countries.

GLOBAL APPROACH

First the global approach. If we had at our disposal empirically tested propositions about the probable economic effects of increases in the rate of reserve growth *plus* a reliable projection of the state of the international economy at the prospective rate of reserve increase, we could decide, in accordance with some given value system, whether and to what extent that rate of reserve increase should be supplemented. In practice, one has to fall back on an inferior method involving comparison between the prospective period and one or several base periods. The base period should have certain qualities. It should be a period in which the over-all degree of balance-of-payments ease appears to have been fairly satisfactory—meaning not that it was satisfactory in every country but that a higher rate of reserve growth would have done about as much harm (through increasing unrequited transfers of real resources, delaying exchange-rate adjustments, and intensifying inflationary pressures) as it would have done good (through mitigating restrictions and expanding employment and economic activity). The period should also be as recent as possible and should comprise a reasonable number of years. The proportionate rate of reserve growth in this period will then serve

as the starting point of the calculation. This reserve growth should be measured gross, but with an allowance—on a fractional basis, as explained in an earlier section of this essay—for any growth in liquid external liabilities.

Next, we must adjust the growth of reserves in the base period to allow for changes in reserve stocks since that period; this adjustment should be expressed as a proportion of some factor, such as the volume of international trade, which serves as a measure of potential payments deficits, and to allow for changes in reserve distribution. Unfortunately, we cannot derive from experience any very plausible estimates of the trade-off between reserves and reserve growth as to their effects on balance-of-payments ease. Perhaps one has to content oneself with some guess at the marginal rate of substitution between the two, such as that a decline of $5x$ in the stock of reserves, relative to trade, would have to be offset by an excess of x in the annual growth of reserves, relative to trade. Quantification of the effect of a change in reserve distribution is even more difficult.

Finally, we must allow, in theory, for the effect on optimal reserve growth of changes in official attitudes toward different types of policy. In practice, however, it is doubtful whether needed reserve growth has on balance been greatly affected by changes that have taken place in recent years. Most of these, such as increased willingness to resort to restrictions, particularly capital restrictions, and reduced willingness to adjust demand pressures to the balance-of-payments situation, tend on the whole to raise the optimal rate of reserve growth. On the other hand, such effect as "multilateral surveillance" may have in inducing deficit countries to correct inflationary pressures and surplus countries deflationary pressures at an early stage would tend to reduce the need for reserves (or reserve growth). The same would probably be true of any enhanced flexibility of exchange rates that might result from the currently popular advocacy of wider margins.

INDIVIDUAL-COUNTRY APPROACH

The second approach to the estimation of world needs for reserve growth begins by asking *for each country* the following question: Given the actual level of reserves, what rate of reserve growth would produce the "best" effects on policy as to the goals of full employment, price stability, and liberalization of international transactions, etc.? This "best" is judged more from an international than from a national standpoint. Restrictions on external transactions, for example, are evaluated for their effects on world real income rather than on national real income. (On the other hand, it is difficult, in practice, to decide to what extent the demand policies of each country should be expected to contribute towards

the stimulation, or damping down, of demand pressures abroad; and, in practice, one would be content with a rate of reserve growth that would remove any constraints on domestic full-employment policy while avoiding any stimulus to domestic inflation.) After these figures are estimated for each country, they can be aggregated, subject to an adjustment to be mentioned below, to provide an estimate of the global optimal rate of reserve growth.

The estimation of these national optimal rates of growth involves the same sort of considerations as have been mentioned above in connection with global estimation, but, since we may expect to find more consistency in the behavior of the authorities of individual countries than of heterogeneous groups, each member of which is exposed to very different rates of reserve growth at any given time, the coefficients necessary to the making of these estimates may be somewhat easier to arrive at. However, some of this greater ease in the initial stages of the estimation is bought at the price of difficulty at the final stage—when the national optimal rates of growth have to be combined into a global estimate. For reasons analogous to those already indicated in discussing the bearing of inequalities of balance-of-payments ease on the amount of optimal reserve growth, the optimal rate of growth of aggregate reserves will usually be greater than the sum of the national optima. Imbalances of international payments of greater or lesser magnitude are inevitable, and the countries whose payments balances are in deficit (or at less than their optimal surplus) are likely to react more vigorously to this discrepancy—and in ways probably harmful to economic welfare—than are countries whose payments surpluses exceed their national optima. To what extent world reserve growth should be raised above the figure arrived at by adding together the optimal rates of growth of the individual countries, in order to mitigate these deficit-country reactions, is very difficult to determine. Even if no such adjustment is made, however, the “national” approach to the estimation of needed reserve growth in the world has the merit of providing a somewhat less unreliable estimate of the *minimum* needs for such growth.

NEED FOR SUPPLEMENTARY RESERVES

The practical purpose of estimating optimal reserve growth is to know by how much, if at all, the rate of growth of reserves from existing sources should be supplemented by deliberate reserve creation. There are really two questions here. How should the planned supplementation of reserve growth vary with differences in the prospective growth of existing types of reserves? And to what extent should year-to-year supplementation vary with deviations of actual from prospective growth in existing types of reserves?

In answering both questions, we must take account of differences in the "effectiveness" of different types of reserve creation, existing and new. Thus, the part of reserve growth generated by gold production exercises the most powerful effect, since it enters into the income stream from the very moment of its creation. The negative contribution to reserve growth that results from gold hoarding (or the positive contribution that results from dishoarding) is less powerful, since it does not affect the income stream, but it does affect the supply of money and the reserves of the banking system. The part of reserve growth generated by additions to currency reserves and accruing in the first instance to reserve centers exercises a much less powerful effect. Not only is it offset from the standpoint of the reserve center by a corresponding increase in liquid liabilities, but it enters below the line in the balance of payments, has no effect on the income stream, and little, if any, on the money supply. Reserve growth generated by a growth in reserve positions in the Fund resulting from an expansion in drawings outstanding in the conditional tranches falls somewhere between that generated by gold production and that generated by increases in official holdings of foreign currencies. Though accompanied, like the latter, by liabilities, the liabilities are medium-term. Moreover, they accrue to drawing countries that usually need to spend the reserves received at once. Subsequent recipients of the reserves earn them in the form of additional exports or an improved capital account.

Similar considerations arise as to the type of reserve increase that is likely to be associated with deliberate reserve creation. Deliberately created reserves, unless they are put into circulation through an investment institution such as the World Bank, are likely to make their first appearance as a financing item rather than as earned reserves, though they are unlikely to be associated with a corresponding increase in the liquid liabilities of the countries to which they are initially distributed. Newly created reserves, though not entering from the start into the income stream, may nevertheless exercise almost as strong an effect on the world economy as would an addition to gold production if they are directed in the first instance toward countries in balance-of-payments difficulty or toward less developed countries averse to investment capital. In both of these cases, the recipient countries are likely to increase their balance-of-payments deficits with little delay to nearly the full extent of the additional reserves they have received, thus exercising a strong expansionary influence on other countries.

Any plan for supplementing reserves should take into account the prospective growth of all forms of existing reserves, with proper allowance for degrees of effectiveness of different forms of reserve growth.

It appears reasonable to ignore deviations of actual from expected

reserve growth if these deviations result from short-term variations in the growth of Fund reserve positions, as these deviations may be considered to correspond to variations in need for such growth. Other types of variations, however—due, for example, to variations in gold hoarding or in greater foreign-exchange reserves—should probably be offset by variations in deliberate reserve creation. For reasons already explained, the quantitative degree of offsetting required would differ in the two cases. It is also arguable that since both types of variation are liable to affect reserves of particular countries—in the second case, obviously, reserve-currency countries—any offsetting variations in reserve creation should be of a special type, likewise affecting the reserves of particular countries, rather than the normal type of deliberate reserve creation, which is spread over a wide range of participating countries.

MATHEMATICAL APPENDIX

Let y_t be the level of required reserves at time t , and \bar{y}_t be the value of y_t for which $\frac{dy_t}{dt} = 0$.

Let each contour on Figure 1 be represented, over its linear portion, by the equation

$$\frac{dy}{dt} = -a (y_t - \bar{y}_t), \quad (1)$$

where $-a$ is a negative constant representing the slope of the contour.

Now Figure 2 is based on the assumption that the relationship in Equation (1) remains valid through time and that

$$\bar{y}_t = b, \text{ a constant.}$$

Then $\frac{dy}{dt} = -a (y_t - b)$ and

$$\therefore y_t = b + Ae^{-at},$$

where $A (= y_0 - b)$ is an arbitrary constant representing the amount by which the initial value of y_t exceeds the equilibrium value.

As $t \rightarrow \infty$,

$$y_t \rightarrow b = \bar{y}_t.$$

Figure 3 also is based on the assumption that Equation (1) remains valid through time but that

$$\bar{y}_t = ce^{ft} \text{ (as represented in Figure 3 by the BB curve),}$$

where $c = \bar{y}_0$ is a constant

and also f is a constant.

$$\text{Then } \frac{dy_t}{dt} = ace^{ft} - ay_t$$

$$\text{and } y_t = \frac{ac}{a+f} e^{ft} + Be^{-at},$$

where $B (= y_0 - \frac{a}{a+f} \bar{y}_0)$ is an arbitrary constant (represented in

Figure 3 by the excess of OC^2 over OD).

$\frac{ac}{a+f} e^{ft}$ is represented in Figure 3 by the DD curve which, if f is positive, lies below the BB curve.

As $t \rightarrow \infty$,

$$y_t \rightarrow \frac{ac}{a+f} e^{ft}.$$

PUBLICATIONS OF THE INTERNATIONAL FINANCE SECTION

The International Finance Section publishes at irregular intervals papers in four series: ESSAYS IN INTERNATIONAL FINANCE, PRINCETON STUDIES IN INTERNATIONAL FINANCE, SPECIAL PAPERS IN INTERNATIONAL ECONOMICS and REPRINTS IN INTERNATIONAL FINANCE. All four of these may be ordered directly from the Section.

Single copies of the ESSAYS and REPRINTS are distributed without charge to all interested persons, both here and abroad. Additional copies of any one issue may be obtained from the Section at a charge of \$0.25 a copy, payable in advance. This charge may be waived to foreign institutions of education or research.

For the STUDIES and SPECIAL PAPERS there will be a charge of \$1.00 a copy. This charge will be waived on copies distributed to college and university libraries here and abroad. In addition, the charge is sometimes waived on single copies requested by persons residing abroad who find it difficult to make remittance.

For the convenience of our British customers, arrangements have been made for retail distribution of the STUDIES and SPECIAL PAPERS through the Economists' Bookshop, Portugal Street, London, W.C. 2, and Blackwells, Broad Street, Oxford. These booksellers will usually have our publications in stock.

A mailing list is maintained for the distribution of ESSAYS and REPRINTS as they are issued and of announcements of new issues in the series of STUDIES and SPECIAL PAPERS. Requests for inclusion in this list will be honored, except that students will not be placed on the permanent mailing list, because waste results from frequent changes of addresses.

The following is a complete list of the publications of the International Finance Section. The issues of the four series that are still available from the Section are marked by asterisks. Those marked by daggers are out of stock at the International Finance Section but may be obtained in xerographic reproductions (that is, looking like the originals) from University Microfilms, Inc., 300 N. Zeeb Road, Ann Arbor, Michigan 48106. (Most of the issues are priced at \$3.00.)

- †No. 1. Friedrich A. Lutz, *International Monetary Mechanisms: The Keynes and White Proposals.* (July 1943)
- † 2. Frank D. Graham, *Fundamentals of International Monetary Policy.* (Autumn 1943)
- † 3. Richard A. Lester, *International Aspects of Wartime Monetary Experience.* (Aug. 1944)
- † 4. Ragnar Nurkse, *Conditions of International Monetary Equilibrium.* (Spring 1945)
- † 5. Howard S. Ellis, *Bilateralism and the Future of International Trade.* (Summer 1945)
- † 6. Arthur I. Bloomfield, *The British Balance-of-Payments Problem.* (Autumn 1945)
- † 7. Frank A. Southard, Jr., *Some European Currency and Exchange Experiences* (Summer 1946)
- † 8. Miroslav A. Kriz, *Postwar International Lending.* (Spring 1947)
- † 9. Friedrich A. Lutz, *The Marshall Plan and European Economic Policy.* (Spring 1948)
- † 10. Frank D. Graham, *The Cause and Cure of "Dollar Shortage."* (Jan. 1949)
- † 11. Horst Mendershausen, *Dollar Shortage and Oil Surplus in 1949-1950.* (Nov. 1950)
- † 12. Sir Arthur Salter, *Foreign Investment.* (Feb. 1951)
- † 13. Sir Roy Harrod, *The Pound Sterling.* (Feb. 1952)
- † 14. S. Herbert Frankel, *Some Conceptual Aspects of International Economic Development of Underdeveloped Territories.* (May 1952)
- † 15. Miroslav A. Kriz, *The Price of Gold.* (July 1952)
- † 16. William Diebold, Jr., *The End of the I.T.O.* (Oct. 1952)
- † 17. Sir Douglas Copland, *Problems of the Sterling Area: With Special Reference to Australia.* (Sept. 1953)
- † 18. Raymond F. Mikesell, *The Emerging Pattern of International Payments.* (April 1954)
- † 19. D. Gale Johnson, *Agricultural Price Policy and International Trade.* (June 1954)
- † 20. Ida Greaves, *"The Colonial Sterling Balances."* (Sept. 1954)
- † 21. Raymond Vernon, *America's Foreign Trade Policy and the GATT.* (Oct. 1954)
- † 22. Roger Auboin, *The Bank for International Settlements, 1930-1955.* (May 1955)
- † 23. Wytze Gorter, *United States Merchant Marine Policies: Some International Implications.* (June 1955)
- † 24. Thomas C. Schelling, *International Cost-Sharing Arrangements.* (Sept. 1955)
- † 25. James E. Meade, *The Belgium-Luxembourg Economic Union, 1921-1939.* (March 1956)
- † 26. Samuel I. Katz, *Two Approaches to the Exchange-Rate Problem: The United Kingdom and Canada.* (Aug. 1956)
- † 27. A. R. Conan, *The Changing Pattern of International Investment in Selected Sterling Countries.* (Dec. 1956)
- † 28. Fred H. Klopstock, *The International Status of the Dollar.* (May 1957)
- † 29. Raymond Vernon, *Trade Policy in Crisis.* (March 1958)
- † 30. Sir Roy Harrod, *The Pound Sterling, 1951-1958.* (Aug. 1958)
- † 31. Randall Hinshaw, *Toward European Convertibility.* (Nov. 1958)
- † 32. Francis H. Schott, *The Evolution of Latin American Exchange-Rate Policies since World War II.* (Jan. 1959)
- † 33. Alec Cairncross, *The International Bank for Reconstruction and Development.* (March 1959)
- † 34. Miroslav A. Kriz, *Gold in World Monetary Affairs Today.* (June 1959)
- † 35. Sir Donald MacDougall, *The Dollar Problem: A Reappraisal.* (Nov. 1960)

- † 36. Brian Tew, *The International Monetary Fund: Its Present Role and Future Prospect.* (March 1961)
- † 37. Samuel I. Katz, *Sterling Speculation and European Convertibility: 1955-1958.* (Oct. 1961)
- † 38. Boris C. Swerling, *Current Issues in International Commodity Policy.* (June 1962)
- † 39. Pieter Lieftinck, *Recent Trends in International Monetary Policies.* (Sept. 1962)
- † 40. Jerome L. Stein, *The Nature and Efficiency of the Foreign Exchange Market.* (Oct. 1962)
- † 41. Friedrich A. Lutz, *The Problem of International Liquidity and the Multiple-Currency Standard.* (March 1963)
- † 42. Sir Dennis Robertson, *A Memorandum Submitted to the Canadian Royal Commission on Banking and Finance.* (May 1963)
- † 43. Marius W. Holtrop, *Monetary Policy in an Open Economy: Its Objectives, Instruments, Limitations, and Dilemmas.* (Sept. 1963)
- † 44. Harry G. Johnson, *Alternative Guiding Principles for the Use of Monetary Policy.* (Nov. 1963)
- † 45. Jacob Viner, *Problems of Monetary Control.* (May 1964)
- † 46. Charles P. Kindleberger, *Balance-of-Payments Deficits and the International Market for Liquidity.* (May 1965)
- † 47. Jacques Rueff and Fred Hirsch, *The Role and the Rule of Gold: An Argument.* (June 1965)
- † 48. Sidney Weintraub, *The Foreign-Exchange Gap of the Developing Countries.* (Sept. 1965)
- † 49. Tibor Scitovsky, *Requirements of an International Reserve System.* (Oct. 1965)
- † 50. John H. Williamson, *The Crawling Peg.* (Dec. 1965)
- † 51. Pieter Lieftinck, *External Debt and Debt-Bearing Capacity of Developing Countries.* (March 1966)
- † 52. Raymond F. Mikesell, *Public Foreign Capital for Private Enterprise in Developing Countries.* (April 1966)
- † 53. Milton Gilbert, *Problems of the International Monetary System.* (April 1966)
- * 54. Robert V. Roosa and Fred Hirsch, *Reserves, Reserve Currencies, and Vehicle Currencies: An Argument.* (May 1966)
- * 55. Robert Triffin, *The Balance of Payments and the Foreign Investment Position of the United States.* (Sept. 1966)
- * 56. John Parke Young, *United States Gold Policy: The Case for Change.* (Oct. 1966)
- * 57. Gunther Ruff, *A Dollar-Reserve System as a Transitional Solution.* (Jan. 1967)
- * 58. J. Marcus Fleming, *Toward Assessing the Need for International Reserves.* (Feb. 1967)

PRINCETON STUDIES IN INTERNATIONAL FINANCE

- †No. 1. Friedrich A. and Vera C. Lutz, *Monetary and Foreign Exchange Policy in Italy.* (Jan. 1950)
- † 2. Eugene A. Schlesinger, *Multiple Exchange Rates and Economic Development.* (May 1952)
- † 3. Arthur I. Bloomfield, *Speculative and Flight Movements of Capital in Postwar International Finance.* (Feb. 1954)
- † 4. Merlyn N. Trued and Raymond F. Mikesell, *Postwar Bilateral Payments Agreements.* (April 1955)
- † 5. Derek Curtis Bok, *The First Three Years of the Schuman Plan.* (Dec. 1955)
- † 6. James E. Meade, *Negotiations for Benelux: An Annotated Chronicle, 1943-1956.* (March 1957)

- † 7. H. H. Liesner, The Import Dependence of Britain and Western Germany: A Comparative Study. (Dec. 1957)
- † 8. Raymond F. Mikesell and Jack N. Behrman, Financing Free World Trade with the Sino-Soviet Bloc. (Sept. 1958)
- † 9. Marina von Neumann Whitman, The United States Investment Guaranty Program and Private Foreign Investment. (Dec. 1959)
- † 10. Peter B. Kenen, Reserve-Asset Preferences of Central Banks and Stability of the Gold-Exchange Standard. (June 1963)
- * 11. Arthur I. Bloomfield, Short-Term Capital Movements under the Pre-1914 Gold Standard. (July 1963)
- * 12. Robert Triffin, The Evolution of the International Monetary System: Historical Reappraisal and Future Perspectives. (June 1964)
- * 13. Robert Z. Aliber, The Management of the Dollar in International Finance. (June 1964)
- * 14. Weir M. Brown, The External Liquidity of an Advanced Country. (Oct. 1964)
- * 15. E. Ray Canterbury, Foreign Exchange, Capital Flows, and Monetary Policy. (June 1965)
- * 16. Ronald I. McKinnon and Wallace E. Oates, The Implications of International Economic Integration for Monetary, Fiscal, and Exchange-Rate Policy. (March 1966)
- * 17. Egon Sohmen, The Theory of Forward Exchange. (Aug. 1966)
- * 18. Benjamin J. Cohen, Adjustment Costs and the Distribution of New Reserves. (Oct. 1966)

SPECIAL PAPERS IN INTERNATIONAL ECONOMICS

- *No. 1. Gottfried Haberler, A Survey of International Trade Theory. (Sept. 1955; Revised edition, July 1961)
- † 2. Oskar Morgenstern, The Validity of International Gold Movement Statistics. (Nov. 1955)
- * 3. Fritz Machlup, Plans for Reform of the International Monetary System. (Apr. 1962; Revised edition, March 1964)
- † 4. Egon Sohmen, International Monetary Problems and the Foreign Exchanges. (April 1963)
- † 5. Walther Lederer, The Balance on Foreign Transactions: Problems of Definition and Measurement. (Sept. 1963)
- * 6. George N. Halm, The "Band" Proposal: The Limits of Permissible Exchange Rate Variations. (Feb. 1965)
- * 7. W. M. Corden, Recent Developments in the Theory of International Trade. (March 1965)

REPRINTS IN INTERNATIONAL FINANCE

- * 1. Fritz Machlup, The Cloakroom Rule of International Reserves: Reserve Creation and Resources Transfer. [Reprinted from *Quarterly Journal of Economics*, Vol. LXXIX (Aug. 1965)]
- † 2. Fritz Machlup, Real Adjustment, Compensatory Corrections, and Foreign Financing of Imbalances in International Payment. [Reprinted from Robert E. Baldwin et al., *Trade, Growth, and the Balance of Payments* (Chicago: Rand McNally and Amsterdam: North-Holland Publishing Co., 1965)]
- * 3. Fritz Machlup, International Monetary Systems and the Free Market Economy. [Reprinted from *International Payments Problems: A Symposium* (Washington, D.C.; American Enterprise Institute, 1966)]
- * 4. Fritz Machlup, World Monetary Debate—Bases for Agreement. [Reprinted from *The Banker*, Vol. 116 (Sept. 1966)]
- * 5. Fritz Machlup, The Need for Monetary Reserves. [Reprinted from Banca Nazionale del Lavoro *Quarterly Review*, Vol. 77 (Sept. 1966)]

SEPARATE PUBLICATIONS

- † (1) Klaus Knorr and Gardner Patterson (editors), A Critique of the Randall Commission Report. (1954)
- † (2) Gardner Patterson and Edgar S. Furniss Jr. (editors), NATO: A Critical Appraisal. (1957)
- * (3) Fritz Machlup and Burton G. Malkiel (editors), International Monetary Arrangements: The Problem of Choice. Report on the Deliberations of an International Study Group of 32 Economists. (Aug. 1964)

