A problem is a question proposed for solution. A valid problem, for purposes of a scientific conference, implies four attributes of the solution: (a) it is not known, (b) it is worth knowing, (c) it can be known, and (d) it cannot be known easily. The solution of a valid problem implies an increase in relevant information, and accelerates the production and transmission of knowledge.

It is seldom possible to guarantee in advance that all the conditions are satisfied; search is necessary before it can be ascertained whether a problem posed is a valid problem. A solution may already exist, it may not be worth knowing, or, for practical or conceptual reasons, it may not be knowable. The act of formulating a problem may itself direct thinking toward a solution, while the act of presenting one may direct information toward a source where the solution exists, but where the existence of the problem is not known.

Recognition of the existence of problems has as important a place in economics as in the other sciences. Had Adam Smith explicitly recognized that he was confronted with a theoretical problem when he made the statement: "I saw reserves as a reserve against the possibility of unemployment."
distinction between value in use and value in exchange the science might have had to wait a century for the marginalist revolution. Had Cournot recognized the usefulness of a dimensionless measure of the flexibility of demand and supply the discipline would not have had to wait for Marshall to invent the concept of elasticity. Today economists may not recognize whether there is a problem in, say, capital theory either because they have a solution that evades others, or because they fail to see subtleties that others see or imagine. The existence of a problem often becomes apparent only after it has been solved and no longer exists!

A problem that is valid in the context of a sub-discipline, such as the theory of international trade, may not be a valid problem in the context of economics as a whole. There is a unity to economics that permits practical problems in one field to be reduced to a core of theory encompassing the entire discipline, just as there is a unity to science as a whole that gives a problem in economics relevance for other disciplines as well.

Having said this, however, it is necessary to recognize that communication between fields in economics is less than perfect and information is even less mobile between the clusters of knowledge identified, sometimes arbitrarily, as separate sciences. Communication barriers mean that it may take several years before it can be known whether a problem posed in one field of a science is a "valid" problem for science as a whole, and in this sense the validity of a problem can only be judged in the context of the information milieu in which it is posed.
The problems posed for solution at the Chicago Conference on International Monetary Problems were all taken from practical issues arising in the context of international monetary reform. Difficulties had come up in one form or another again and again at conferences, international meetings and in public statements. It became apparent long before this conference was organized that the practical difficulties economists and officials were experiencing in reaching consensus on important economic matters did not reflect logical errors or different value judgments but basic theoretical gaps in the systems of thought used by theorists, expects and negotiators. Simultaneously, a great deal of effort had been expended by numerous younger theorists in the United States and abroad working on many of the theoretical issues that needed solution. The purpose of the Chicago conference as it was jointly conceived by Harry Johnson and myself in the Winter of 1966 was to bring these two traditions together. The organizing principle we adopted was to seek out and identify the major problems in the area in the hope that that method would provide the greatest economies of thought and discussion. In February 1966, therefore, I prepared a list of tentative problems and presented them to the Workshops in International Economics at the University of Chicago and at Columbia University. From my original presentation as modified by these seminar discussions, we settled on twelve problems for potential discussion at the conference.

Some of the theoretical gaps had already been formulated as problems in the oral tradition that had already developed in the subject.
Thus, at the meetings of 32 economists held at Bellagio, Italy, in 1964, organized by Professor Machlup to explore bases of disagreement on the issue of international monetary reform, the group agreed to organize discussion around three major issues concerning the present international monetary system. They were:

1. **the problem of payments adjustment**, deriving from the need for correcting persistent imbalances in the payments positions of individual countries;

2. **the problem of international liquidity**, connected with the need for long-term adaptation of the total volume of world reserves of the full potentialities of non-inflationary economic growth; and

3. **the problem of confidence** in reserve media, implied in the need for avoiding sudden switches between different reserve media.

This classification of problems turned out to be a very effective first step in disciplining discussion of the different plans for reform, and it was an important contribution of those meetings to the debate on monetary reform to have made that analytical separation while recognizing the interdependence of the three problems. The questions liquidity, adjustment, and confidence fall easily into the framework of demand-supply analysis if a distinction is made between the "micro" aspects of the problems at the national level and the "macro" aspects of the problems at the global level.

From a national point of view the liquidity problem is the problem of meeting any gap between the supply and demand for international reserves, that is, the problem of financing a balance of payments deficit.
The adjustment problem is the problem of eliminating a gap between the supply and demand for foreign exchange, that is, the problem of correcting a deficit. And the confidence problem is the problem of preventing changes in the status of reserve assets from causing speculative shifts in the composition of stocks of gold or foreign exchange assets, held as reserves by the national central banks.

At the global level, the liquidity problem is to ensure the ability of the system as a whole to meet gaps between the world supply and demand for reserves on the part of private holders. The adjustment problem is that of correcting disequilibrium by bringing about equality between demand and supply of international assets. And the confidence problem is the problem of preventing speculative world-wide shifts between the stocks of different international reserve assets from causing an undesired change in their relative prices.

These problems are broadly defined syndromes and their generality, which was an important advantage in the early stages of theoretical discussion, soon became a defect for more refined debate. That was the purpose of breaking away from the earlier earth-air-fire-water tradition of these major problem areas.

THE USE OF RESERVES

Countries want to hold reserves because they do not have, or do not want to use, quick methods of correcting balance-of-payments deficits. The monetary authorities recognize the probability of future deficits
which they cannot correct instantly and so they prepare their financing in advance by holding reserves. The more reserves they own, and the greater access to borrowing they have, the larger the freedom they have in choosing among different methods of adjustment at some future time. A country in a liquid position has considerable choice over the type, pace, and timing of adjustment, whereas a country that is illiquid has little choice.

The advantage of holding reserves stems from the convenience that a wide choice of adjustment techniques offers. But reserves can be held only at a cost, so countries want to hold only limited quantities. Allowing for the interest that can be earned on certain types of reserves, the cost of holding reserves is the loss of the use of real resources given up by accumulating reserves, and can be measured by the return that could be earned by investing the reserves in earning assets. The gain from holding reserves generally declines as the quantity of reserves increases, while the cost of holding reserves itself bears a real cost that can be expressed in terms of foregone resources.

Any country's actual level of reserves depends on past balance-of-payments surpluses; and its desired level of reserves depends on (expected) future balance-of-payments deficits. When a country's reserves are considered excessive, the authorities try to get rid of reserves by stimulating their investment, usually indirectly, in other assets; and when a country's reserves are considered deficient, it tries to acquire more. In all these respects, the behavior of a country with
respect to its international reserves is very much like the behavior of an individual with respect to his cash holdings.

If world reserves are constant, the sum of the balances of payments of all individual countries is zero, so that if all countries want to accumulate reserves by running balance-of-payments surpluses, some countries' aims are necessarily frustrated; the surplus of any one country must be offset by the deficits of other countries.

Similarly, if all countries try to lose reserves, they must fail if world reserves are constant, because the attempt to realize a collective deficit for the world as a whole is in nominal terms, impossible. The attempt to realize a collective deficit can, however, encourage economic expansion in the individual countries, and, if resources are fully employed, reduce the real value of world reserves through inflation.

A collective "world" surplus or deficit is not impossible, of course, if world reserves are changing; central banks can, collectively, buy reserve assets from the private sectors and they can also create synthetic credit reserves among themselves. When world reserves are rising the sum of all measured balance-of-payments surpluses exceeds the sum of all deficits, and when world reserves are falling the sum of all measured deficits exceeds the sum of all surpluses.

This raises a question that has become known as the SEIGNIORAGE PROBLEM. Countries give up real resources in order to acquire international reserves. If international reserves consist entirely of gold the acquisition of gold involves a payment from the central banks to gold
producers, which is divided between costs of production, rents and profits. But if international reserves can be created at low cost, because they are composed partly of paper money or other forms of credit, there is a transfer of resources from central banks who acquire and hold the "paper money" to the agency or bank or government issuing it. The right to issue paper that can be used as international money therefore confers on the issuer a "seigniorage gain," and raises the Seigniorage Problem of finding a method to determine how the gains should be distributed among the using countries.

Under a system in which a national currency is used as an international reserve asset, for example, a seigniorage gain goes to the inhabitants of the reserve currency country. Let us suppose that, because of economic growth, other countries want to acquire additional purchasing power in the form of, say, dollars every year. They earn these dollars by spending less than their income and generating balance of payments surpluses. The counterpart to their surpluses is the balance of payments deficit of the reserve country, the inhabitants of which will have acquired real resources (or claims to real resources) in exchange for non-interest-bearing liabilities. Competition among the commercial banks in the reserve currency country of course will generally lead to interest payments on reserve balances and this is one means of redistributing the seigniorage profit.

The seigniorage problem arises also in connection with the creation of a world monetary authority. It can issue international reserves
by purchasing interest-bearing assets in the member countries—open market operations—but it then faces the seigniorage problem of disposing of its earned income in excess of operating expenses. Alternatively, it can directly solve the problem by issuing international money as grants, or by the purchase of non-interest-bearing "dead" assets of the national countries.

We can turn now to the implications of excess and deficient liquidity. A liquidity shortage arises when countries want more liquidity than is being created, and a liquidity surplus arises when countries want less liquidity than is being created. When all countries want liquidity that they cannot collectively get, and there is a liquidity shortage, all countries act like deficit countries and a world contraction of trade and employment, or general competitive depreciation, begins. The contraction does not help the liquidity situation (except insofar as it reduces the desire for liquidity), and individual restrictive measures may be intensified, but to no avail. A liquidity shortage can be beneficial, however, if the world is in such a state of inflation that it is desirable to induce countries to introduce restrictive monetary or fiscal policies.

When all countries have liquidity they do not want, and there is a liquidity surplus, all countries act like surplus countries and try to expand trade and employment. This is generally regarded as beneficial if there is general depression throughout the world, but harmful if the world is already fully employed. If the world is in a state of depression, an excess of liquidity promotes desirable world expansion; if it is already
fully employed, it merely causes undesirable inflation of prices. Since surpluses tend to promote more expansive trade and monetary policies, while deficits promote more restrictive policies, increases in liquidity are beneficial or harmful depending on whether more expansive, or more restrictive, policies are needed in the world as a whole. Although actual changes in world reserves do not necessarily measure the changes in the desire of nations to hold them, reserves are more likely to exceed wants when reserves are increasing than when they are declining.

Only rarely, however, is the world in such a state of balance that all countries want to accumulate reserves at the same rate. Normally, some countries will be in deficit while others are in surplus. A normally distributed increase in liquidity makes surplus countries act more like surplus countries by increasing their discomfort with respect to continued balance-of-payments surpluses, stimulating more expansive policies; whereas it makes deficit countries act less like deficit countries by decreasing the discomfort they experience as a result of a continuation of their deficits. The ability of a deficit country to sustain a continued deficit is increased by a world-wide increase in reserves, while the willingness of a surplus country to continue its surplus is decreased.

Both deficit and surplus countries may also recognize that the other group can be encouraged to adapt more rapidly or less rapidly, and hence they may delay or accelerate their own adjustment on that account. For example, why should the United States contract if it believes Europe will expand; or why should Europe expand if it believes the United States
will contract? This question points to the **SPEED OF ADJUSTMENT PROBLEM.** How rapidly should a country adjust its policies to correct a given balance of payments deficit? The adequacy of liquidity has to be judged by the appropriateness of the division of the adjustment and the relative speeds at which it is effected between deficit and surplus countries. Other things being equal, an "equitable" sharing of the burden and timing of adjustment would indicate that liquidity is just about right; a situation in which the excess of the burden fell on deficit countries would indicate a dearth of liquidity, and an excess of the burden on surplus countries would indicate a surplus of liquidity. These matters will become clearer when we look at the problem of adjustment.

**BALANCE OF PAYMENTS DISEQUILIBRIA**

Countries get rid of reserves or reduce their rate of increase over time by running deficits or reducing surpluses in their balance of payments. **Possible ways to reduce reserves, or "adjust" to surpluses, include** appreciating the exchange rate, allowing wages and prices to rise, adopting more liberal import policies, relaxing exchange controls, or reducing export subsidies. **A country may adopt any combination of these measures when its stock of reserves is thought to be too large or when its reserves are increasing at too rapid a rate.**

Countries acquire reserves, or prevent their decrease over time, by running balance-of-payments surpluses or eliminating deficits. To establish surpluses or "adjust" to deficits, they can devalue, lower wages and prices, tighten money market conditions, impose tariffs or quotas,
introduce or tighten exchange controls, or any combination of these policies.

A country has to use one or another of these instruments when its reserves are considered deficient or falling at too rapid a rate. The use of an instrument to correct the balance of payments, however, means that its use for alternative targets of policy is correspondingly restricted.

For a deficit country experiencing inflationary pressure, monetary contraction is conducive, achieving both external and internal balance; conversely, for a surplus country experiencing deflationary pressure, monetary expansion is desirable. But in other cases, monetary policy can be used effectively only when employed in concert with other policy instruments.

Thus, in a deficit country with unemployment, tight money might improve the balance of payments, but at the expense of employment; for a surplus country with inflationary pressure, easy money might have the desired effect on the balance of payments, but at the risk of greater inflation. These situations are thought to represent the most suitable disequilibrium situations for exchange-rate changes.

Under fixed exchange rates, however, additional policy tools must be developed. One possibility is to split financial policy into its components of monetary and fiscal policy and use them separately for external and internal balance. In this case, it is generally agreed that monetary policy must be aimed at achieving equilibrium in the balance of payments, while fiscal policy must be aimed at internal balance. This is a short-run technique, however, since in the long run wage rates have to be kept
In line with productivity if full employment is to be maintained without excessive international borrowing. I have referred to the problem of determining the appropriate mix of policies as the problem of effective market classification; for this application of it at the Chicago conference the term ASSIGNMENT PROBLEM, first used by Richard Cooper in this context, has been adopted.

In economic systems instruments of policy typically affect all targets. Thus a change in the money supply or tariffs will typically change the equilibrium values of all variables in a system. But this does not mean that the "assignment problem" can be disposed of by the vacuous statement that all targets and instruments must be taken into account. There are two questions that need to be kept analytically separate.

One is the existence and location of an equilibrium solution. If it exists, and its location is known, instruments need merely be put at their equilibrium values for the targets to be reached, after due account is paid to time lags. If the location of the equilibrium is known there is no assignment problem at all.

The assignment problem arises in the context of dynamics and limited information. Certain disequilibria symptoms are observed, such as unemployment or inflation and a balance of payments surplus or deficit. There are, presumably, a set of instruments available to correct the disequilibrium. The assignment problem is the problem of establishing rules or guidelines indicating the direction in which particular instruments should be adjusted in order to lead to equilibrium. It is, in
other words, the problem of devising a dynamic system that has a convergent solution. One of the most relevant international monetary problems is that of devising a practical mechanism of ensuring internal balance, external balance and the desired rate of economic growth in the context of a fixed exchange rate system.

Another problem connected with the use of monetary and fiscal policy as the sole instruments of achieving internal and external balance is that it does not leave enough scope for specific targets within the concept of the balance of payments. There is, implicit within the assignment problem, a COMPOSITION PROBLEM, the problem of finding instruments to determine the desirable mix between the capital account and the current account in the balance of payments. Expressed in an alternative way, the composition problem can be regarded as the problem of determining the appropriate rate of foreign lending.

The choice of national adjustment policies has obvious international ramifications. Insofar as one country's surplus is another country's deficit, except for the continuing growth of reserves, adjustment could be achieved by deflation or devaluation in the deficit country, by inflation or upvaluation in the surplus country, or by some division between the two methods. It is at this point that we see the intimate connection between the desired level of reserves in the world as a whole and the adjustment policies of national economies. In an n-country world, n-1 adjustment instruments are sufficient to achieve world equilibrium because of the mutual interdependence of the balances of payments, giving
rise to a possibility of an over-determinacy. Only $n-1$ countries in an $n$-country world need have balance of payments policies, and this gives rise to a REDUNDANCY PROBLEM. The extra instrument can be allocated to fixing the price of a metal such as gold, or fixing the level of world prices.

If surplus countries inflate while deficit countries maintain stability of their own price levels, there will result an upward trend to the world price level; the system is said to have an inflationary bias. If on the other hand deficit countries deflate while surplus countries maintain stability of their domestic price levels there will result a downward trend to world prices or, if wages and prices are rigid downward, unemployment; the system is then said to have a deflationary bias. The system will only result in a stable world price level if the burden of adjustment is shared between deficit and surplus countries.

The extent to which the adjustment burden should be shared between deficit and surplus countries depends on the world price index it is desired to stabilize. If the world price index is a weighted average of national prices of home-produced goods, the burden of adjustment should be shared roughly in inverse proportion to the sizes of the countries. For example, if a very large country is in surplus inflationary policies, to correct that surplus would be conducive to inflation in the world as a whole, whereas the same percentage price changes in smaller countries would have a smaller effect on world prices because the weight of small countries in the world price index is low.
An analogous problem would exist in the context of exchange rate adjustment. With n currencies there are n-1 exchange rates and there is a choice of adjustment policies is a question of whether surplus countries appreciate or deficit countries depreciate. If there is no outside money reserve unit such as gold, it makes no substantive difference what happens to the weighted index of "par values," but if currencies are directly or indirectly tied to gold or domestic money supplies, appreciation by surplus countries will lower the currency value of gold reserves and thus exert a deflationary force in the world as a whole, whereas devaluation by deficit countries, implying an increase in the price of gold, will exert an inflationary influence.

These considerations illustrate the intimate connection between the world supply of international money and the adjustment policies of national countries. The final link in the connection is supplied by the influence of changes in liquidity on adjustment policies.

Thus increases in liquidity, distributed in a given way over the world as a whole, allow deficit countries to postpone adjustment and encourage surplus countries to accelerate it, imparting a more inflationary, or less deflationary, bias to world prices; whereas decreases in liquidity will have an opposite effect. Excess liquidity, world inflation, and an undue adjustment burden of surplus countries go hand in hand, just as do a liquidity scarcity, world deflation, and an undue adjustment burden on deficit countries.
The realities of economic life may, however, make it impossible to adhere to a strictly automatic rule for determining the appropriate division of the burden of adjustment. One consideration of importance will be the state of internal demand in the surplus and deficit countries. If there is inflationary pressure in the deficit country, it is clear that the deficit country should contract to prevent inflation; or if there is unemployment in the surplus country, it is obvious that the surplus country should expand; and if there is both unemployment in the surplus country and inflation in the deficit country, the surplus country should expand and the deficit country contract simultaneously. The solutions in these cases are obvious and easy because the monetary action necessary to bring about international adjustment is consistent with the monetary actions required for the restoration of internal balance (full employment and a stable price level) in the two countries.

The actions needed in these cases may not, however, suffice to bring about internal balance and international equilibrium at the same time. The expansion necessary to achieve full employment in a surplus country may be insufficient to restore external balance even when combined with the actions needed to stop inflation in the deficit country.

If the monetary policies needed to bring about internal balances are insufficient to restore international equilibrium, should the surplus country continue expanding, in the interests of international balance, at the expense of inflation at home, while the deficit country continues
contracting and forsakes its internal goal of full-employment? Should the distribution of the burden of adjustment be divided so that the deficit country suffers some unemployment and the surplus country some inflation? The answer, of course, depends on the sizes of the countries since a given percentage rate of inflation in a large country would have a correspondingly large impact on any world price index.

Apart from the question of relative size, economists would be inclined to say that it depends on the relative cost of inflation in the surplus countries compared to the cost of excess unemployment in the deficit countries. If, for example, the cost of unemployment were greater than the cost of inflation, maximum income would be preserved by the burden of adjustment falling mainly on the surplus countries, and if inflation were more costly, the reverse would be true.

VARIABLE EXCHANGE RATES

A number of problems arise when we depart from the context of a fixed exchange rate system. One problem raised by a system of flexible exchange rates is an ambiguity about the domain over which exchange rates are supposed to be fixed. This raises the Optimum Currency Area Problem, the problem of ascertaining the appropriate domain of a fixed exchange rate area. Should each national currency fluctuate with respect to one another? Should large blocs be formed? What is the criterion by which an optimum currency area is to be defined and what are the criteria by which the conditions of optimality are to be met?
This is only one approach to the question of flexible exchange rates, although it is both theoretically interesting and practically important. Alternative approaches to the problem of flexible exchange rates are to ask, which exchange rates (spot or forward) should be allowed to float, or how wide should exchange rates be allowed to fluctuate? "Fixed" exchange rates mean in practice today, for the major countries, spot exchange rates that fluctuate within narrow exchange margins of less than one per cent on either side of parity. The Exchange Margins Problem is the problem of finding criteria to determine how wide spot or forward exchange rates should fluctuate, given the goals implicit within the idea of a fixed exchange rate system. Should forward rates be fixed as well as spot rates? Should forward rates be subject to exchange margins?

Yet a third question that is involved, and is as yet unsolved, is the nature of the exchange-pegging arrangements that are desirable. Should each currency be pegged to an ultimate reserve asset such as gold, as under the gold standard as it operated in the nineteenth century, or should a major currency like the dollar be pegged to gold while other currencies are pegged to the dollar, the system currently prevailing. Or should gold be demonetized? This is called, for the purposes of the conference, the Gold-Pegging Problem.

Closely related to the gold-pegging problem is a Currency-Chain Problem. When dollars are attached to gold, pounds and francs are attached to the dollar, and other currencies are attached to pounds and
francs, all within specified exchange margins, what mechanisms, if any, should be used to restrict the variation of exchange rates between the "satellite" currencies? Current International Monetary Fund rules allow a two per cent margin on either side of parity to avoid this problem, justifying its rule under the Articles of Agreement, as a "multiple currency" practice. But what theoretical justification exists for this kind of exchange-pegging arrangement?

INTERNATIONAL ASSETS

Under a pure gold standard, central banks hold only gold as international reserves. Under a bimetallic standard central banks may hold both gold and silver. Under the gold standard as it developed in the 1920s, and as it exists today, countries hold gold and foreign exchange. The choice between gold and foreign exchange, and between different types of reserve assets, depends on the yield they offer and the relative safety of the assets. But tradition and banking law also play an important role.

When countries or individuals lose faith in the convertibility of one reserve asset into another at a given price, they are inclined to change the composition of their reserves. For example, when after the 1934 increase in the price of gold in the United States, hot money flowed to the United States, there was speculation that the United States authorities and might lower the price of gold, many countries and individuals shifted from gold assets to dollars. In the early post-war period, during the
era of the dollar shortage, European countries built up large dollar holdings.

In the late 1920s, there had been mass conversions of foreign exchange into gold. These shifts in demand can be accounted for in part by lack of confidence in the reserve currencies, in part by a belief in the political leverage of gold (including its strategic value as a war chest), in part by a desire to force discipline on the reserve countries, and also change the system based on the use of national currencies as international reserves. Since 1958 European countries have been raising the proportion of gold holdings in total reserve assets for reasons similar to those prevailing in the 1920s.

The confidence problem concerns the exchangeability of one reserve asset for another at a fixed price. It can only arise if there is more than one international reserve asset, and if the mechanism for ensuring convertibility of the two assets at a fixed price is not adequate. The problem arising from bi-metallism in the nineteenth century is the classic example of confidence problems. The demonetization of silver in the United States, for example, had a profound impact on those countries that had adopted silver as their standard of value. Under the present system the confidence problem is largely a problem of the relation between gold and the reserve currencies.

If there are two international reserve assets, say gold and a reserve currency, and if there is complete confidence that the reserve currency country can buy and sell gold freely at a fixed price, countries
would be indifferent between holding gold or the reserve currency—unless there are extra incentives for holding currency or gold. For example, if currency deposits yielded a rate of interest, or gold bore a storage cost, currency deposits would be preferred. Foreign countries may still wish to hold gold, however, for traditional reasons, or because they do not want to provide the reserve country with the benefits of a low interest loan.

Confidence is not, however, a matter of complete certainty, so that when international reserves are composed of both a reserve-currency and a gold component, peripheral countries have an incentive to diversify their assets. Thus it was that, during the gold standard period, countries that were not on a strict gold standard typically held both currency reserves (especially sterling) and gold. Similarly, in the postwar period countries have held dollars, sterling, and gold, while some sterling area countries hold both sterling and dollars.

Whenever the exchange ratio between gold and a reserve currency is not believed to be permanent, speculation—both private and public—goes in one direction or another. When there is a substantial probability of a fall in the gold price, countries shift more of their balances toward currencies, as during the period following the increased United States gold price in 1934. And when the probability of a rise in the gold price, in terms of the reserve currency is believed to be high, the demand for gold by a public and private institution goes up. These speculative demands are self-reinforcing, since sufficient gold sales during a time
of bearishness about the gold price (bullishness about the currency price) may embarrass the reserve currency country sufficiently to force the price change; and similarly, speculation about a rise in the gold price, with consequent gold purchases, may embarrass the reserve country (by drawing down gold stocks) to bring about revalorization. Problems of confidence can thus easily turn into a Crisis Problem, the problem of determining the appropriate policies in the event of a run on one or another of the reserve assets.

It has long been recognized, of course, that one possible solution to the confidence problem as it exists at the present time has been an increase in the price of gold. If gold is undervalued its price can be raised as provided for in the Articles of Agreement of the International Monetary Fund, which allows for a uniform change in the par values of all currencies. This solution has not proved an attractive one to many economists, for a number of well known reasons, but it does raise an intriguing theoretical question: If practical difficulties associated with increasing the price of gold are overcome what theoretical considerations would determine what its price should be? This is the Price of Gold Problem.

The international exchange rate system is one which has \( n \) par values where \( n \) is the number of member countries in the system. The par values are expressed in terms of units of gold (or 1944 gold dollars). If gold were merely a fictitious unit of account the balance of payments equations of the system would be homogeneous of degree zero in the par
values; thus if all par values were changed no exchange rates would be altered. But because gold is a commodity used as an asset in the system, the balance of payments equations are not homogeneous of the zero-th degree. Doubling the price of gold in terms of all currencies would affect the real value of gold reserves. More exactly, when gold is an asset in the system, the equations are homogeneous in the first degree in the par values, the domestic currency prices of commodities and the national money supplies. In this sense there is a practical meaning to the theoretical question, how high should the price of gold be? Adjustment of stocks may allow a disequilibrium to prevail for a long time, as can the use of gold substitutes such as the dollar or a new reserve unit. But if the price of gold is a disequilibrium price there arises the question, often brought up in practical discussions, of whether an increase in the price of gold would generate new inflation in the world or simply prevent a deflation that would otherwise occur. Because gold is the only "outside money" in the system as a whole its price has definite economic significance, and cannot be assumed to be an entirely arbitrary element.

CONCLUDING NOTES

One final question that was thought to be in need of clarification relates to the role of the institutions in the system. The International Monetary Fund is an actor in the international monetary system, and it is also the senior forum around which discussions for reform are
centered. But time and again suggestions had been made for resolving questions of reform of the system along lines that would contribute to the provision of aid to less developed countries. Proposals of this type would involve linking the problem of monetary reform with the question of development aid, and links between the IMF and, say, the IBRD. This possibility raises the more general institutions-theoretic problem of whether functional problems in the international system like the provision of liquidity, balance of payments adjustment, freer trade, supervision of exchange rates, development planning, and so on, should be matched by separate institutions or whether these institutions would be more efficiently united under a more centralized control system. Since each of the functions overlaps—tariffs, capital flows, exchange rates, exchange controls, rules of balance of payments adjustment, and provision of liquidity have to be looked at as instruments in a general arsenal of policy weapons—what relations ought to be developed between the institutions—GATT, IBRD, IMF, BIS—having responsibility for one or more of the functions. For purposes of the conference this problem was referred to as the INSTITUTIONAL MIX PROBLEM.

In the selection of papers for the conference an outline of the problems, printed here as an appendix to this chapter, was circulated. For obvious reasons it was not possible to match papers with problems in any precise fashion in such short notice; there is much overlapping and numerous omissions. Nevertheless, most of the participants did attempt to make an explicit contribution to one or more of the problems
outlined. It is up to the reader to judge the relevance of the problems and the success achieved by the participants at resolving them. The purposes of the conference will have been served, however, if it helps to direct attention to gaps in state of current knowledge and promote further theoretical research in areas where new ideas in theory have immediate practical interest.
The problems formulated for discussion at the conference, as circulated to participants, are reproduced below.

I. The Assignment Problem

How should (monetary, fiscal, wage, tariff, exchange rate) instruments of policy be assigned to (employment, price level, indebtedness, growth) targets of policy? Should instruments and targets be used in the same way in each country?

The major stumbling block is the assignment problem in the case of fixed exchange rates when the targets include internal balance, external balance and economic growth.

II. The Speed-of-Adjustment Problem

How rapidly should adjustment to balance of payments disequilibria be effected? Is slow adjustment preferable to fast adjustment? What are the costs of deficits (surpluses) and how do they compare with the costs of correcting them? What precise relationships exist between the amount of available international finance and the speed of adjustment?

III. The Redundancy Problem

Only N-1 countries in an N-country world need achieve balance of payments equilibrium (because of Cournot's Law). Which country,
if any, should be the N-th country that is spared a balance of payments constraint; and if all countries are required to share in the adjustment what institutional means can be exploited to exploit the extra degree of freedom for world employment or price stability? The problem is closely related to the problem of determining the distribution of the burden of adjustment between countries.

IV. The Seigniorage Problem

Seigniorage is the difference between the value of produced money and the cost of producing it. Historically it meant the mint charge for turning gold or silver into money (often reflecting, besides cost, the degree of debasement of the currency), but in the modern context of paper money, the term can be used to refer to the command over resources (created at negligible printing cost) acquired by the authority with monopoly over the note issue. In unitary national states the seigniorage "goes to the government," and thus creates few important political problems; but in the international context the seigniorage must be "disposed of" in alternative ways.

The seigniorage problem needs much more study. How much does it amount to and who gets it? Precisely how would the seigniorage be distributed under alternative schemes to improve the international monetary system, and how should it be distributed in an ideal monetary system? If a world central bank were created what formula could be found for distributing the seigniorage gains equitably, efficiently and in a politically acceptable way?
V. The Optimum Currency Area Problem

Which exchange rates (if any) should be allowed to fluctuate?

How is the optimum currency domain related to the optimum political domain? What criterion of optimum currency area is most relevant?

VI. The Currency-Chain Problem

When dollars are attached to gold, pounds and francs are pegged to the dollar, and satellite currencies are pegged to the pound and franc, all within exchange margins, what mechanisms should be used to restrict the variation of exchange rates between satellite currencies?

VII. The Gold-Pegging Problem

Some economists have proposed that European countries should peg their currencies to gold rather than the dollar. What criteria should be used to determine optimal pegging attachments? Should gold-pegging countries hold only gold reserves; should gold-holding countries peg to the dollar? Who should perform the arbitrage operation if two areas peg to gold when private gold-arbitrage is illegal?

VIII. The Exchange Margin Problem

How wide should exchange margins (or gold margins) be and should the central parity be fixed or allowed to "slide?" Should forward rate be pegged within the same margins as spot rates? Should forward rates be pegged and spot rates be allowed to fluctuate (freely or within wider margins)?
IX. The Gold Price Problem

Gold has several unique qualities as an international money; inter alia, nobody owes it and nobody can print it. Should its role be strengthened or weakened in designing a world money? Should its price be allowed to go up, down or remain constant?

X. The Composition Problem

The composition of the balance of payments matters to most countries. If the balance of payments statement is divided into a current account, a capital account and a reserve account, and if adjustment is defined as correction of the reserve account, should adjustment be achieved by improving the capital account or the current account? What criteria should determine the appropriate composition of adjustment?

XI. The Institutional Mix Problem

At present, GATT looks after tariffs, the IBRD looks after long term lending and IMF looks after balance of payments problems and exchange rates. Yet each institution invades the jurisdiction of another especially in the areas of multiple exchange rates, capital flows, import substitution and exchange control; economic problems cannot realistically be so neatly separated. This raises the question of the appropriate division of labor between institutions and, in relation to the international monetary system, the merits or disadvantages of a joint attack on lending and debt problems, commodity problems and liquidity problems. A related problem concerns the merits of regional solutions.
XII. THE CRISIS PROBLEM

Most current proposals for international monetary reform that appear to have much chance of success are directed at making marginal changes in a fair-weather system. The most neglected problem of all is the appropriate action to take in the event of a sudden crisis, when individual central banks will be tempted to act unilaterally. What contingency plans for action in a crisis are available?