

## Eurodollar Creation: Comments on Prof. Machlup's Propositions and Developments

### 1. Introduction

Professor Fritz Machlup, with his well known clarity and pungent wit, has recently reposed the issue of the logical foundation underlying the flows of funds denominated in dollars and other "strong" currencies which are traded in the so-called Eurodollar (or Eurocurrencies) market.<sup>1</sup> Machlup's methodological position is explicitly stated in the following affirmation: "We cannot intelligently talk about these matters before engaging in an extensive conceptual and theoretical preparation".<sup>2</sup>

The kind of theoretical effort required emerges clearly in the body of the article when, without an explicit reference, Professor Machlup seems to lead the reader onto the familiar methodological grounds of modern monetarists typified by the Friedman-Schwartz<sup>3</sup> and Brunner-Meltzer<sup>4</sup> school. This is clear when he uses the terms "high-powered money", "reserve fund", and "monetary base", even though his analysis of the Eurodollar market is entirely based on the distinction between primary and derivative deposits which modern theories of money supply have clearly superseded.

The aim of the paper is to show that Machlup's study picks out only some of the aspects of a more general theory presented

1 F. MACHLUP, "Eurodollar Creation: A Mystery Story", *Banca Nazionale del Lavoro Quarterly Review*, September 1970, pp. 219-260.

2 *Ibid.*, p. 219.

3 M. FRIEDMAN and A. JACOBSON SCHWARTZ, *A Monetary History of the United States, 1867-1960*, Princeton University Press, Princeton, 1963.

4 K. BRUNNER and A.H. MELTZER, "Some Further Investigations of Demand and Supply Functions for Money", *The Journal of Finance*, 1964, pp. 240-283.

elsewhere<sup>5</sup> and underestimates the possibilities to empirical research opened up by the present statistical endowment.<sup>6</sup>

The central thrust in our analysis is the incorporation of the demand for and the supply of international liquidity within a unified framework. In the liquidity market, we identify that portion which functions as a perfectly liquid reserve for international economic operators. In analogy with the concept of a country's monetary base, the financial instruments designed to perform such a role have been defined international monetary base (or international high-powered money, or international liquidity base).<sup>7</sup>

As a starting point, we have deemed it worthwhile to discuss the relationship between the U.S. balance of payments and the Eurodollar market, a subject which is not satisfactorily analyzed by Machlup. After a brief review of the difficulties encountered in measuring *the* disequilibrium of the U.S. balance of payments and the methods currently followed, we shall propose an alternative measure based on the amount of international monetary base (abbreviated as IMB) created or destroyed by the United States.

In the third section of the paper we shall suggest an interpretation of the empirical content to assign to the reserve position of Eurobanks, the knowledge of which is considered by Machlup himself as an essential step for an understanding of the multiplicative process occurring in the Eurodollar market. The most important conclusion reached there is that the liquid assets of Eurobanks can be approximated at present by a subset of the total short-term foreign indebtedness of U.S. banks.

Lastly, we have postponed to an appendix the discussion of Machlup's six propositions in terms of a more general framework

5 M. FRATIANNI and P. SAVONA, "The International Monetary Base and the Eurodollar Market", in K. Brunner (ed.) *Konstanz-Symposium I on Monetary Theory and Monetary Policy*, Proceedings of the Seminar held in Konstanz (W. Germany), on June 24-26, 1970.

6 This is clearly brought out in G. CARLI, *Eurodollars: A Paper Pyramid?* this "Review", pp. 95-109.

7 Under the present institutional arrangement of world markets, the international monetary base is composed of monetary gold, IMF gold tranche, plus credits granted by IMF to member countries, special drawing rights, credit lines with the Federal Reserve System and IMF, dollars and any other currency which acts as international reserve (e.g., the pound and the German mark), and in principle any financial asset, whatever, which can be transformed into vehicle currency at sight and without capital loss and where such a transformation represents an addition to the existing stock of international monetary base.

of international financial flows. For the interest of a wider audience, a major effort has been made to keep the analysis at an elementary level.

## 2. The Relationship Between the U.S. Balance of Payments and the Eurodollar Market

The United States, for obvious economic and historical reasons, act, even though not alone, as the central banker of the world. More precisely, they supply a large portion of the vehicle currency used in international trade. Consequently, this country's balance-of-payments disequilibrium is not calculated in accordance with the customary criteria, but with ones which underscore the creation or absorption of liquidity in the international context.<sup>8</sup>

Depending on the emphasis one wants to give to the U.S. role of world banker, the "line" in the balance of payments can be drawn in such a manner as to quantify the phenomenon to which it is desired to call attention. If it is intended to capture the evolution of official reserves in dollars of the rest of the world, we look for all the items in the balance of payments which affect this side of the international financial market; by summing them algebraically one obtains the balance on the basis of "official reserve transactions", or more concisely on the basis of "official settlements". If on the contrary, one desires to capture the addition of liquidity supplied to the rest of the world, and hence not only to the governmental authorities, we identify all the dollar "liquid" items in the hands of non-residents; by summing them algebraically one obtains the balance on the basis of "liquidity".<sup>9</sup>

The second method of grouping some of the components of the balance raises the problem of the empirical content to assign to the term "liquidity". On the elusive nature of the latter, Machlup has

<sup>8</sup> Cf. C. P. KINDLEBERGER, "Measuring Equilibrium in the Balance-of-Payments", *Journal of Political Economy*, November-December 1969, pp. 873-891.

<sup>9</sup> The two measures of balance-of-payments disequilibria and its composing elements can be found in the quarter-end issues of the *Survey of Current Business* published by the U.S. Department of Commerce. The reader may want to consult, for example, tables 1 and 7 on pages 34-35 and 52, respectively, of *Survey* No. 6, 1970. A fuller exposition of the contents and philosophy of the two balances is presented in the *Report of the Review Committee for Balance of Payments Statistics to the Bureau of the Budget*, "The Balance of Payments Statistics of the United States: A Review and Appraisal", April 1965.

dwelt at considerable length in an earlier work to which the reader is referred.<sup>10</sup> Kindleberger acutely suggests that the concept of liquidity is "appropriate to a crisis but not to the steady state".<sup>11</sup>

Our fundamental objection to the "liquidity balance" approach is that it groups by definition a class of United States liabilities irrespective of their degree of liquidability and of the reasons which induce people to acquire and hold them. For example, the purchase of government securities has a different economic content from the acquisition of deposit balances which are available on demand at New York banks. The former operation is an investment decision, whereas the latter may reflect primarily the demand of economic operators for money balances induced by the well-known Keynesian trilogy of motives. This is all the more true the higher are the yields of the former with respect to those of the latter.

An increase in the deficit on liquidity basis could thus conceal an unaltered demand for international base money with a simultaneous shift in the demand curve for long-term securities included in the balance; this may be caused by changes in any one of the arguments, neglected so far in the analysis, of the relative behavioral equations. The balance, as such, would not be capable to draw attention to such a phenomenon. It should be also added that the method in question deals at a highly aggregative level with the whole indebtedness of the United States banks on the Eurodollar market which, as we shall see below, is the outcome of a complex network of relationships.

To better assess the limited explicative powers of the balance on liquidity basis, we have reproduced in Table 1 its main components for the years 1967 through 1969. The minus sign indicates an outflow of funds from the United States, or an increase in the liquid assets owned by non-residents.

A cursory analysis of the data set out in the table suggests to us that in the three years in question there has been:

— a slight change in the demand for long-term government securities;

— a rapid increase in the liquid positions held by the banks of the rest of the world with the United States banking system;

<sup>10</sup> F. MACHLUP, *International Monetary Economics*, G. Allen and Unwin, London, 1969, Chapter XII.

<sup>11</sup> C. P. KINDLEBERGER, *op. cit.*, p. 880.

TABLE I

MAJOR COMPONENTS OF THE U.S. BALANCE-OF-PAYMENTS  
DISEQUILIBRIA MEASURED ON "LIQUIDITY BASIS"  
(billion dollars)

	1967	1968	1969
<i>Balance on liquidity basis</i>	-3.5	0.2	-7.2
1. Changes in liquid liabilities held by all foreigners . . . . .	-3.4	-0.7	-8.4
1.1 Long-term government bonds . . . . .	-0.4	0.5	0.2
1.2 Liquid liabilities to foreign banks, including foreign branches of U.S. banks . . . . .	-1.2	-3.4	-9.4
1.3 Bills and other money market instruments	-1.8	2.2	0.8
2. Changes in U.S. official reserves . . . . .	-0.1	0.9	1.2

SOURCE: U.S. Department of Commerce, *Survey of Current Business*, June 1970, Table A1, p. 24, Table 1, pp. 34-38, and Table 7, p. 52.

— a fall in the demand for liquid assets by non-residents, exclusive of banks;

— a positive growth in the official reserves of the United States.

The balance on liquidity basis as a whole is clearly in no position to bring out any of the aforementioned developments. Thus, keeping together heterogeneous items such as those set out in the table is of little analytical usefulness. It follows that we must re-examine the problem of the balance of payments in terms of the specific aspects the research intends to bring to the fore by analyzing the interactions of the United States with other countries. In a study of this kind one cannot avoid singling out the existing connections between the disequilibrium of the U.S. balance of payments and the Eurodollar market; up to now, such connections have been examined at an analytically unsatisfactory level.

The balance of payments of the United States, in the particular sense of a country whose basic currency also functions as international monetary base, is the expression of a vast network of transactions

which, roughly speaking, can be divided into three categories. The first and most important group of operations results from the interaction of the supply of and the demand for IMB by non-resident official organizations, banks, and the public, as well as U.S. banks. The latter, mainly through their foreign branches, are potentially able to transform IMB into domestic monetary base, and vice versa.

The second group of operations arises out of the demand for and supply of Euroloans and Eurodeposits, which in turn are the end product of the multiplicative power of the IMB within the international banking system for which it functions as reserve fund.

Finally, the third group of transactions deals with the market of investment assets whose "raison d'être" lies, among other things, in the existence of yield differentials.

Quite broadly, we visualize the Eurodollar (Eurocurrencies) system to consist at least of the markets for (1) the IMB, (2) deposits and (3) loans to the non-banking public, (4) interbank loans and deposits, (5) credits extended to the U.S. banking system, and (6) Eurobonds. All of these markets, with the exception of the fourth one, affect the U.S. balance of payments (as well as, we recall, the balance of payments of key-currency countries). If each flow to and from abroad recorded in the United States balance of payments is reassigned to the respective market, we arrive at a clarification of the relations between this balance and the Eurodollar market. Since we desire to emphasize the supply aspect of international money, we propose to measure this balance disequilibrium according to an "IMB basis". The latter represents the creation of international base money generated by the U.S. balance of payments and held as perfectly liquid reserve by (a) governmental agencies, (b) private operators, and (c) commercial banks whose financial intermediation, together with the public's behavior, produces the endogenous component of international money. The balance on IMB, accordingly, must exclude operations in long-term bonds, short-term bonds and notes which are not completely liquid (i.e., whose expected value of a capital loss is not zero), and bank deposits which cannot be withdrawn on sight. For obvious analytical reasons, it would have to exclude ideally any item which reflects the end product of the multiplicative power of the IMB.

To place the balance on "IMB basis" in perspective within the historical-economic evolution of the various meanings assigned to

the disequilibrium of the U.S. balance of payments, it should be emphasized that our concept cannot logically invalidate the usefulness of the other current definitions, whose objectives are quite different from those inherent in our analysis. As an example, a net worth definition of the balance may perfectly well coexist with the one on "IMB basis". In fact, the former intends to offer, following a microview, a panoramic assessment of the growth of the net assets (or net liabilities), both real and financial, which have emerged out of the country's relations with the rest of the world and ascertain in this way whether the evolution has been positive or not.<sup>12</sup> Our definition, on the contrary, is the analogical extension to the international community of the concept of monetary base within one's own country.

Nonetheless, certain relationships can be underscored between our balance on "IMB basis" and those computed according to either "official settlements" or "liquidity". The balance on "official settlements basis", once investments in non-liquid assets have been subtracted from it, is in a position to yield useful information with respect to the addition of IMB supplied to and demanded by foreign central banks. Its basic theoretical shortcoming, however, is the implication of the compartmentalization of the IMB market between official operators, on the one hand, and commercial banks and other operators, on the other. In other words, a definition based on official transactions implies that the IMB in the hands of the public and the banks is exogenous in a model of international financial flows. What counts, according to the philosophy underlying this definition, are in fact the shifts in the demand for dollar reserves of the central banks. The observations available, instead, suggest exactly the opposite. Namely, that there is a pronounced interdependence between the behavior of the public and that of the central and commercial banks, for these groups compete with one another for the acquisition of IMB. The central banks, to be sure, enjoy a privileged position which, because of the breadth and efficacy of the instruments of monetary policy, allows them to satisfy their requirements of IMB with absolute priority over the two other classes of users.

Consequently, it is deemed advisable not to restrict the analysis to the demand for IMB by foreign governmental agencies, but to

<sup>12</sup> Cf. C. P. KINDLEBERGER, *op. cit.*, pp. 886-887.

capture, via a quantity such as the balance on IMB, information as to the total international base money created or destroyed by the United States.

The second measure of disequilibrium currently used, the balance on "liquidity basis", can also be of some analytical usefulness, provided it is purged of discrepancies between measurement procedures and the phenomena such procedures intend to capture. Thus, if such a balance is to reflect a state of crisis or potential crisis, then we must proceed to group all financial assets denominated in dollars held by non-residents, since, were these to be sold against cash, they would bring about an increase in the supply of high-powered money in the international monetary system. More generally and quite ideally, assets should be classified according to their various degree of liquidability should the holders of such assets decide to convert them into base money. We are perfectly aware of the Gargantuan task involved in roughly estimating liquidability coefficients during "steady states", let alone during times of crises.

The picture which emerges from the foregoing discussion is quite complex. However, short of (a) applying direct controls over capital movements in and out of the United States and (b) imposing structural changes to the international banking community, the possibility to shoot for proximate target levels of international money rests on a knowledge of free market forces and the mechanisms through which IMB is created or destroyed. In this study we have restricted ourselves to the analysis of only one source item of IMB, referring the reader to footnote 7 for a list of the source components of the IMB and to other works for a discussion thereof (cf. footnotes 5 and 6).

On the side of the demand for IMB, the demand schedule of Eurobanks deserves the most careful attention. To that we shall now turn.

### 3. The Multiplicative Power of the IMB Held by Eurobanks

Having established at the analytical level what are the relationships between certain components of the U.S. balance of payments and the international monetary system, inclusive of the Eurodollar market, we can now proceed to unveil the mystery of the multiplicative power of the IMB held by Eurobanks.

We feel it is not necessary to dwell at great length on whether the Eurobanking system creates money. On this question, in addition to Machlup's essay, we must not neglect Friedman's seminal article<sup>13</sup> which clearly suggests that there is no reason to expect the Eurobanking system to behave any differently from a domestic banking arrangement.<sup>14</sup> Those who persist in denying this inherent characteristic of the international money market have to sustain the burden of proof.<sup>15</sup> Namely, they must show that the loss coefficient of the credit base in that market is equal to one hundred per cent or that Eurobanks lend only to one another, or both.<sup>16</sup> Otherwise, they ought to supply an explanation why a group of banks — often the same ones and under a common management — which is granted money-creating abilities in the domestic market, mysteriously loses these abilities when functioning in the foreign currency market.

Not only do we consider the above argument theoretically settled, but we even think it possible to initiate a constructive quantitative analysis, contrary to current opinions. Our preliminary estimates suggest that the Eurobanking system as a whole was creating 3 dollars of deposits for each dollar of IMB in its possession at the end of 1969.<sup>17</sup> In 1964, however, when the level of indebtedness of U.S. banks vis-à-vis their foreign branches was relatively small, Eurobanks were creating about 7 dollars of deposits for each dollar of IMB. Such a sharp difference in the values of the Eurodeposit multiplier over time indicates to us that the United States banking

<sup>13</sup> M. FRIEDMAN, "The Euro-dollar Market: Some First Principles", *The Morgan Guaranty Survey*, October 1969.

<sup>14</sup> The reader may find it instructive to consult J.H. WOOD, "Two Notes on the Uniqueness of Commercial Banks", *Journal of Finance*, March 1970, for a general treatment of money creation by commercial banks.

<sup>15</sup> See, for example, F.H. KLOPSTOCK, *The Euro-dollar Market: Some Unresolved Issues*, Essay No. 65 in *International Finance*, Princeton University Press, Princeton, 1968; "Euro-dollars in the Liquidity and Reserve Management of United States Banks", *Monthly Review*, Federal Reserve Bank of New York, July 1968; "Money Creation in the Euro-dollar Market - A Note on Professor Friedman's View", *Monthly Review*, Federal Reserve Bank of New York, January 1970.

<sup>16</sup> See the appendix for a proof of the statement. Elsewhere we have considered the inconsistencies of certain quantitative assessments of the loss coefficient and the interbank activity of Eurobanks with explicit assertions about the credit multiplier being less than one. Cf. M. FRATTANNI - P. SAYONA, "Una struttura formale per l'analisi della capacità moltiplicativa del mercato dell'eurodollaro", *L'Industria*, September 1970, pp. 345-356 and works cited in previous footnote.

<sup>17</sup> This section draws quite heavily on the empirical work carried in our "Proposta per una ridefinizione del problema della liquidità internazionale", forthcoming.

system has acted on the Eurodollar market as its central bank by means of what must be regarded as compulsory reserve in the form of deposits that foreign branches must keep with their head offices. The increase of the latter since 1964 has contributed to the decline of the multiplier and to the rise of interest rates. We don't intend to consider our results as definitive. There is every reason to believe that these values will change as the statistical endowment improves and, more important, as we will eventually become more informed about the reserve position of the Eurobanking system and the size of the market net of interbank operations. At the moment it suffices to say that the issue at hand is not so much the existence of a multiplier, but the size of it. The latter will not be completely revealed until an effort is made in collecting data which are relevant to the suggested hypothesis. This is not the usual plea for more and better data, but rather that the present efforts of data gathering be done with a specific objective or theory in mind. We shall first discuss what variables deserve immediate attention and latter suggest a strategy for the improvement of the present statistical endowment.

*The first step is to ascertain the cash position, or better the reserve position of the Eurobanks.*<sup>18</sup> The empirical analysis of the Eurodollar market must of necessity be contingent on the knowledge of this magnitude. At present, some statistical efforts at the official level seem to proceed along a different route. We do not deny the usefulness of the production and dissemination of more detailed and rapid information on the gross and net size of the market, for both short and long-term Eurocredits and Eurodeposits. However, should this production not be accompanied by a knowledge of those items which are cash reserves for the Eurobanks, the working mystery of this market will never be totally unveiled.

To further elaborate on the subject, it behooves us to discuss the nature of the class of Eurobanks' assets which arise out of the relations between the Euro and the U.S. banking systems. As noted above, the indebtedness of U.S. banks vis-à-vis their foreign branches was used in our empirical work as a proxy for the stock of reserve assets of Eurobanks. Theoretically, however, the total claims of the Eurobanking system on U.S. banks must be divided into two

<sup>18</sup> This is quite clear in MACHLUP, "The Eurodollar...", *op. cit.*, p. 250 (*Cash Assets and Loans: An Information Gap*).

components which play different roles in our model. The first component can be described as the analogical extension at the international level of a reserve requirement *per se* imposed by U.S. banks on their foreign branches. The Eurodollar system cannot consider such reserves as readily available to meet unexpected cash withdrawals. This is so because head offices in the U.S. borrow IMB from their branches as an alternative to borrowing domestic monetary base from the Federal Reserve or the federal funds market; to the extent that this IMB borrowing brings about an international reswitching of dollars, it allows earning assets and deposit liabilities to expand in the United States, hindering the same process abroad. The second component emerges at the tail end of the credit expansion path within the Eurobanking system which extends loans to U.S. banks by applying the same criteria used in granting loans to non-bank clientele.

To distinguish more sharply the different role played by the two components of U.S. banks' short-term foreign indebtedness — empirically unidentifiable at the moment — we must inquire into the demand functions for domestic monetary base and IMB by U.S. banks and IMB by Eurobanks, and explore the channels through which IMB can be converted into U.S. monetary base and vice versa.

The demand for monetary base by U.S. banks is motivated by (a) the average reserve requirements ratio against deposits, (b) the estimated daily cash requirements, and (c) the reserve outflow due to unexpected deposit withdrawals. The demand for IMB by Eurobanks is expected to reflect similar motives, except (a) is nonexistent at the moment. Keeping the above in mind, we can make the following considerations about the deposits in IMB Eurobanks keep with U.S. banks:

(1) they cannot act as cash or risk reserves (motives b and c) against Eurodeposit liabilities so long as they are used by U.S. banks to meet reserve requirements;

(2) they cannot act as cash reserves against Eurodeposits so long as they satisfy such a role for U.S. banks;

(3) they cannot act as risk reserves so long as they play such a role for U.S. banks.

There exists the possibility, however, that to the extent that the operations of head offices and foreign branches are under a joint management, one can conceive of a reduction in (b) and (c) per

dollar of the combined deposit liabilities of banks located in the U.S. and abroad as a result of economies of scale.

Insofar as credits extended by Eurobanks to U.S. banks are concerned, the following considerations can be advanced:

(4) they cannot meet reserve requirements of U.S. banks;

(5) they can discharge the functions of cash reserves of the Eurobanks only if depositors accept checks drawn on head offices in the U.S. as a substitute for currency;

(6) they can discharge the function of risk reserves of the Eurobanks only if these can count on their head offices in the U.S. to repay on demand their loans in amount equal to the unexpected (and uncovered for) cash withdrawals. Such an occurrence will be the more likely the more favourably inclined are Eurobanks' clients to accept checks drawn on U.S. banks rather than cash. We are also assuming, of course, that the head offices permit foreign branches, under extraordinary circumstances, to write checks against outstanding loans (which is tantamount to head offices accepting the repayment-on-demand clause on part or all of their outstanding borrowings).

Excluding any pathological deviation from the principles of "sound" banking, especially considering that the banks operating in the Eurodollar market are the largest and best managed in the world, it should appear clear that U.S. bank short-term liabilities vis-à-vis their foreign branches overestimate the true but unknown dimension of the reserves of the latter. It follows that the value of our deposit multiplier is subject to two opposing biases. To the upward bias generated by the exclusion of the reserve position of banks other than overseas branches of U.S. banks corresponds a downward bias due to the fact that the variable "short-term liabilities of U.S. banks vis-à-vis their foreign branches" overstates the reserve fund of the latter. The extent to which these two biases offset each other is at present unknown.

The basic problem still remains what strategy to pursue in gathering essential information about the amount of reserve assets held by Eurobanks. One first attempt in this direction is to be found in the September 1970 issue of the *Federal Reserve Bulletin* where assets and liabilities of the foreign branches of U.S. banks are classified in the following manner (see Table 2 below).

TABLE 2

ASSETS AND LIABILITIES OF OVERSEAS BRANCHES OF MEMBER BANKS  
(year-end data expressed in billions of dollars)

	1968	1969
<i>Assets:</i>		
Cash . . . . .	3.3	8.0
Loans to: head offices . . . . .	6.2	14.3
others . . . . .	9.2	13.0
Other Items . . . . .	4.3	5.8
<i>Liabilities:</i>		
Deposits: demand . . . . .	3.5	4.1
time . . . . .	14.9	30.4
Due to head offices . . . . .	0.7	0.8
Other Items . . . . .	3.9	5.8
Total . . . . .	23.0	41.1

SOURCE: Board of Governors, *Federal Reserve Bulletin*, September 1970, p. 740.

Cursory examination of the cash position and deposit liabilities tends to corroborate the dimension of the multiplier which we have obtained via quite a different approach. An interpretation of the multiplier, given by the cash-deposits ratio, excludes by definition that loans extended by foreign branches to their head offices can be considered as voluntary reserves kept by the former with the latter. Nonetheless, the dual nature of the dollar and the resiliency of the U.S. monetary market suggest the hypothesis that loans extended to U.S. banks serve as a potential source of assets for the market which, for a given level of cash reserves, is able to supply a larger volume of deposits than is the case in a domestic market.<sup>19,20</sup>

<sup>19</sup> Differences in the value of multipliers between domestic systems and the international banking system can also stem from differences in the maturity composition of the banks' liabilities. According to a recent statistical contribution of the Federal Reserve System — "Maturity Distribution of Eurodollar Deposits in Foreign Branches of U.S. Banks", *Federal Reserve Statistical Release*, G17, October 1, 1970 — about 20 per cent only of Eurodeposits with foreign branches could be cashed at once; the rest had maturities of either one month (24 per cent) or over.

<sup>20</sup> A thesis along these lines is consistent with the logic of the multiplier process. See J.H. Wood, *op. cit.*, p. 106. The possibility that, under certain circumstances, the product of the multiplier activity of the Eurodollar market can act as reserve credit is clearly pointed out in G. CARLI, *op. cit.*, p. 104.

The international monetary arrangement, as presently conceived, provides mechanisms through which earning assets of Eurobanks may in turn be transformed into IMB. The amount which is potentially transformable into IMB depends on the incidence foreign branches of U.S. banks have in the Eurodollar market and on monetary policy in the U.S. The tighter the latter the more difficult it would be for U.S. banks to accommodate their foreign branches in their requests to obtain prompt repayment of their loans.

While the existence of a mechanism which provides additional reserves during periods of liquidity crises introduces a positive element in the international money market (where the emergence of the public's fears about the solvency of the banks may be quickly placated by the presumption that U.S. banks stand as lenders of last resort), the dependency of such apparatus on the type of policy pursued in the U.S. is a most undesirable feature. The actions of the Federal monetary authorities generate effects which go far beyond the national boundaries. The liberalization of IMF credit policy, foreign-currency swaps among central banks, and the enactment of special drawing rights must be interpreted as deliberate efforts of the international monetary community to partly eliminate the rigidities of a system in which the creation or destruction of IMB has been connected either to exogenous factors (e.g., gold production) or to the actions of the fiscal and monetary authorities of the key-currency country.

#### 4. Conclusion

The thesis set out above may be summed up as follows:

We agree with Professor Machlup that:

— analysis must be conducted in the light of a theory. In the case of the Eurodollar market this coincides with modern methodological approach to money supply analysis as developed by Brunner-Meltzer and Friedman-Schwartz. We have already extended such an approach to the international context;

— in particular, the problem of international liquidity must be set in a wider perspective so as to make it possible to deal at the same time with the various theoretical propositions which have been



analyzed so far in isolation. That is, we must dwell on the problems of both demand for and supply of international money;

— in order to understand the nature and behavior of the Eurobanks, and hence to grasp the essence of the mechanisms of the growth of the Euromarket, it is necessary to analyze their reserve position.

It has been pointed out, however, that:

— it is now possible to carry out empirical investigations into the subject, even if it is limited by statistical gaps. One investigation has already been started, and the first results confirm that the international banking system has created international means of payment;

— to analyze the reserve position of the Eurobanks it is essential to define its empirical content, or differently stated, to indicate what instruments act as international monetary base;

— in an effort to identify the IMB, we must redefine the disequilibrium of the United States balance of payments in terms of the IMB created or destroyed by it. The balance, so calculated, has been denominated *on IMB basis* which makes it possible to focus onto the basic relation between the Eurodollar market and the foreign accounts of the United States.

The main conclusion of the paper is that the analysis by monetary base enables us to repropose the problem of international liquidity with greater clarity. The productivity of this method depends very much on the improvement of the quality more than the quantity of the present statistical endowment. The initial effort should concentrate on the identification of the exact nature of U.S. banks' indebtedness, as it is imperative to quantify the relations between the U.S. banking system and that of the Eurodollar to the extent that the former acts as a central bank (i.e., it supplies monetary base) for the latter and as such can condition its activity and growth.

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APPENDIX

By the use of our model as proposed elsewhere (cf. note 5 in the text), we can show that Professor Machlup's six propositions form an integral part of a system composed of the markets of IMB, Euroloans and Eurodeposits.

Propositions 1, 4, and 6<sup>21</sup> may conveniently be grouped into the category of autonomous increments of bank-held IMB. The contents of the propositions differ among themselves as regards the channels through which monetary impulses are transmitted and the distributive effects among the three classes of IMB holders.

When examined individually, the first proposition is seen to assume that the United States deficit, measured *on IMB basis* (IMBUSB), is reflected in an increment of a like amount in the IMB held by the banks ( $\Delta IMB^b$ ). Resorting to the indicated symbols, we have  $\Delta IMB^b = IMBUSB$ ; other things being equal, it follows that the flows in question give rise to an equilibrium position characterized by an increase in the Eurocredits (CREU) and by a reduction in their rate ( $i_{CREU}$ ).

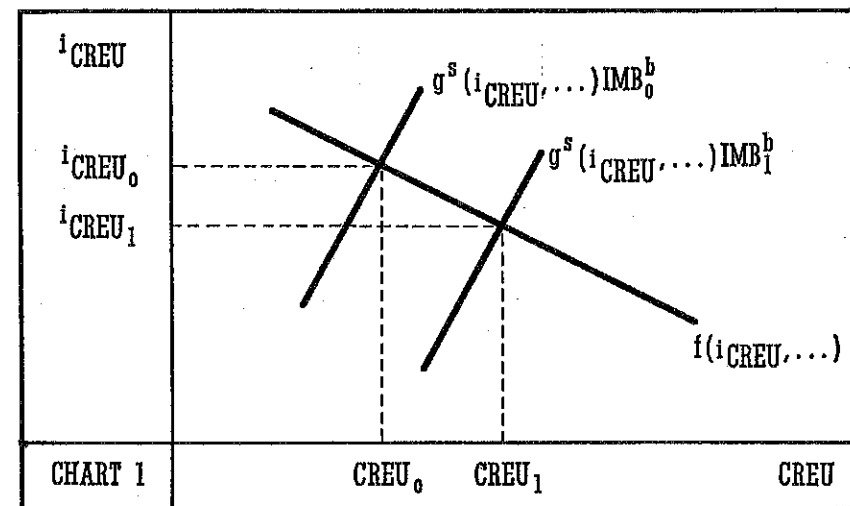


CHART 1

More formally, let

[1]  $CREU = f(i_{CREU}, \dots)$

be the public's demand function for Eurocredits, where the partial derivative of  $f$  with respect to  $i_{CREU}$ , denoted by  $f_{i_1}$ , is negative; and let

[2]  $CREU = g^s(i_{CREU}, \dots) IMB^b$

<sup>21</sup> F. MACHLUP, "The Eurodollar Creation...", *op. cit.*, pp. 253-57.



be the banks' supply function of Eurocredits, where the partial derivative of the credit multiplier with respect to  $i_{CREU}$  denoted by  $g^s$ , is positive.

By first differentiating totally [1] and [2] and subsequently equating the resulting equations, we can express the change in the rate of interest by:

$$[3] \quad \Delta i_{CREU} = \frac{g^s}{f_1 - IMB^b_0 g^s_1} [IMB^b_1 - IMB^b_0]$$

which is clearly negative.  $IMB^b_1$  and  $IMB^b_0$  are the values of bank-held IMB before and after the increase in the deficit of the U.S. balance of payments.

The dollar change in Eurocredits can be obtained by substituting [3] in either the demand or supply functions of CREU. If the differentiated form of [1] is selected,

$$[4] \quad CREU_1 - CREU_0 = \frac{f_1 g^s}{f_1 - IMB^b_0 g^s_1} [IMB_1 - IMB_0]$$

which is unambiguously positive. By rearranging [4], we obtain the essence of Machlup's proposition 1:

$$[4a] \quad (CREU_1 - CREU_0) \left[ \frac{f_1 - IMB^b_0 g^s_1}{f_1 g^s} \right] = \Delta IMB^b = IMBUSB$$

Under proposition 4 commercial banks purchase from central banks dollars against the sale of domestic monetary base. This operation may be imposed by the monetary authorities to meet the objectives of economic policy.<sup>22</sup> The dollar-domestic monetary base swap does not alter the total volume of existing IMB, but changes the distribution among its holders; namely,  $\Delta IMB^b = -\Delta IMB^{cb}$ , where  $IMB^{cb}$  stands for the IMB owned by official agencies (mainly central banks). Since the multiplicative power of IMB with respect to the international means of payment is equal to unity for the portion held by central banks and greater than unity for the portion held by commercial banks, the same results of the first proposition hold here too. In particular, equation [4a] now becomes

$$[5] \quad (CREU_1 - CREU_0) \left[ \frac{f_1 - IMB^b_0 g^s_1}{f_1 g^s} \right] = \Delta IMB^b = -\Delta IMB^{cb}$$

However, we must take account of the distributional effects of a change in the rates of interest on the net worth of the public. The portion of the balance sheet of this economic operator which finds its origin in the type of

<sup>22</sup> For example, in 1968 some central banks, through the Bank of International Settlements, deposited IMB with commercial banks to ease the pressure on interest rates whose movement was reflecting the crisis of the English pound.

international transactions considered in the study will be taken, for the sake of simplicity, to be:

$$[6] \quad IMB^p + DEU = CREU + IMB - IMB^{cb}$$

where the newly introduced symbols stand for

$IMB^p$  = public-held IMB

$DEU$  = Eurodeposits.

As a result of the sale of IMB by the central banks to commercial banks, the public's balance sheet presents the following modifications:

(a) there is an increase in the net worth originating in the international markets, that is  $IMB - IMB^{cb}$ . This is so because the total IMB remains unchanged and  $IMB^{cb}$  diminishes to the benefit of  $IMB^b$ ;

(b) the public's assets increase by a multiple of the effect in (a); in particular:

(b.1) we expect an increase in  $DEU$ ;

(b.2) we expect an increase in  $IMB^p$  as a result of a reduction in  $i_{DEU}$  (the rate on Eurodeposits).

The extent to which  $DEU$  and  $IMB^p$  increase depends on the elasticity of their demand functions relative to the rate  $i_{DEU}$  and on the elasticity of the deposit multiplier with respect to the same rate.

Proposition 6, translated into the language of our model, presupposes the following redistribution of IMB:  $\Delta IMB^b = -\Delta IMB^p$ . The public, as we have already seen, may be induced to substitute IMB with Eurodeposits as a consequence, for example, of a rise in their yield relative to that on deposits in the United States. For the rest, the analysis of this proposition does not markedly diverge from the preceding one (i.e., proposition 4). In fact, one registers an increase in the international means of payment due to the multiplicative power exerted by bank-held IMB.

Relation [4a] becomes in this case

$$[7] \quad (CREU_1 - CREU_0) \left[ \frac{f_1 - IMB^b_0 g^s_1}{f_1 g^s} \right] = \Delta IMB^b = -\Delta IMB^p$$

Professor Machlup's remaining propositions deal more specifically with the problem of the creation of international money by the Eurodollar banking system or, alternatively, with the approximate value of the multiplier with respect to Euroloans and Eurodeposits. The formulation of the Eurocredit multiplier has nothing original about it when compared with traditional formulation of domestic banking systems. For example, it is easy to demonstrate that for a continuous succession or "n" interbank loans interrupted

# The Development of Financial Institutions During the Post-War Period<sup>1</sup>

## I. Approach

After a generation in which economic analysis was unduly influenced by the famous simile of the "veil of money", it has become clear since the 1950's that money, and not only money but also other financial instruments, "matter" in the sense that the course of real economic development may be considerably influenced, even if it is not basically determined, by a country's financial structure and activities.

It is possible to envisage economic and financial development in the absence of financial institutions other than a rudimentary monetary system, a situation in which the overwhelming majority of financing is direct, i.e., takes place between ultimate savers, (mainly households) and prospective users of funds, mainly business enterprises and governments. Indeed, this is a not entirely unrealistic description of financial structure even in many now developed countries up to the mid-19th century. In the 20th century, however,

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<sup>1</sup> This article reports on some results of a more extensive international comparative study of the development of financial institutions in the post-war period, a study that in this field complements the author's *Financial Structure and Development* (Yale University Press, 1969). Because of limitations of time and space only part of the available material is utilized, the analysis is not pushed as far as it could or should be and only little attention is paid to the situation in individual countries and the historical and institutional peculiarities that have influenced it.

I am afraid that in collecting and processing the approximately 6,000 original bits of information — the current value of the total assets of one type of financial institution in one country at one date — in their combination into more homogeneous groups of institutions and in their further processing into deflated values, annual changes in current and deflated terms, ratios to national product, and averages for periods and groups of countries, errors are bound to have occurred and some may have survived to cause inconsistencies among tables shown in this article. I hope, however, that these errors are rare and small enough not to affect any important ratio or average, and I trust that they would not affect any conclusion drawn from the figures.