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THE EURODOLLAR MARKET: THE ANATOMY OF A DEPOSIT AND LOAN MARKET

PART I: MARKET STRUCTURE

The Eurodollar market is now more than ten years old, although in its infancy serious questions were raised about its ability to survive. It has been estimated that the Eurodollar market grew by 60 percent in 1969 and that the total volume approached a level of \$40 billion. The Eurodollar market is now larger than most national money markets. It has definitely come of age, having grown to its present size in periods of both credit restraint and credit ease and having survived severe crises in foreign exchange and gold markets.

The Eurodollar market is a money market that is available to a broad range of investors and borrowers throughout the world. It is widely used by banks, especially those in the United States, as a means of balancing liquidity and reserve positions. Although the Eurodollar market is basically a short-term market, borrowers have tapped its resources for periods of up to five years. The market also has ramifications for the balance of payments and for monetary and credit policies of the countries whose citizens use the market.

Nevertheless, the Eurodollar market is not fully understood. Certainly, one reason why the market seems hard to conceptualize and to have so many diverse aspects is that it is both a deposit market and a loan market. In addition, the Eurodollar market has assumed importance beyond the geographic and institutional limitations of the traditional boundaries of a deposit and loan market. Because of this, it is very difficult to select a focal point for a discussion of the Eurodollar market. This analysis will be presented in three articles in the *Economic Review*. The first article concentrates on the Eurodollar market as an example of a money market within a supranational environment. In addition, the economic and historical rationale of the development of the market, the underlying conditions of supply and demand, and the size of the market are discussed. The second and third articles will describe the interest rate structure of the market and the ramifications of the Eurodollar market for several aspects of the world economy.

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In an attempt to compromise between the obvious desire to concentrate on United States involvement in the Eurodollar market and the need to select a more international focal point, the series was written from the point of view of the overall market rather than from the point of view of any specific market participant. Because the United States dollar is the currency that is borrowed and loaned in the Eurodollar market, however, some of the discussion focuses solely on the involvement of the United States in the market.

SUPRANATIONAL CURRENCIES

Eurocurrency markets are recent examples of financial markets in which the assets traded are not necessarily denominated in the currency indigenous to the country in which the market is situated. Such markets are best described as those in which vehicle assets and vehicle currencies are traded. Although the adaptation of the theory of vehicle currencies and vehicle assets to the Eurodollar market does not, as yet, have an empirical basis, an examination of the theory helps to place the Eurocurrency markets in perspective.¹

Vehicle Currencies and Vehicle Assets. The development of a market for a currency *outside* the issuing country can be, in large part, associated with the currency's acceptance and use as a vehicle currency. A vehicle currency is one that is widely used to finance third party trade; that is, trade between countries that do not include the issuing country. The development of a market for such a currency, in turn, is predicated on certain supply and demand conditions.

Turning first to the demand conditions, both importers and exporters ordinarily need working

¹This discussion relies heavily on Alexander K. Swoboda, "The Euro-Dollar Market: An Interpretation," *Essays in International Finance*, No. 64 (Princeton, New Jersey: Princeton University, February 1968).

balances in all the currencies in which their trade is invoiced in order to cover normal transactions and seasonal needs as well as to minimize the costs of converting from one foreign currency to another. The amounts held at any one time might be greater than what would be expected solely on the basis of the volume of trade with each country, because these foreign currency assets are also used to provide a cushion for unexpected nontrade related needs, particularly when there is uncertainty in world financial markets. On the other hand, for importers and exporters who normally measure their wealth in terms of their domestic currencies, it is important to minimize the overall size of working balances denominated in foreign currencies to keep the costs of carrying the foreign currency assets at a minimum.

If importers and exporters in several countries mutually decided (implicitly or explicitly) to conduct their trade with one another in a single third currency, they would need working balances in only that specific currency—the vehicle currency. In this situation, the total amount of working balances in the vehicle currency would probably be less than the sum of the former working balances in each individual currency, because the reserve for unexpected occurrences could be substantially reduced. This argument suggests that importers and exporters tend to minimize their foreign currency assets by attempting to carry on as much business as possible in one currency. They would also attempt to minimize the amounts carried in that vehicle currency for the reasons suggested above.

A counteracting force in determining the demand for vehicle currencies is also operative, however:

To the extent that future consumption comprises goods and services sup-

plied by foreign countries, a country's residents in fact want to accumulate part of their wealth in foreign-currency assets...From this point of view a wealth owner should accumulate assets in currencies matching his future consumption needs. Assets denominated in the currency of a country which looms large in world trade will be demanded on that account.²

Such offsetting desires make it difficult to estimate the actual demand for a vehicle currency, but do establish a rationale behind the desire to hold a vehicle currency and/or vehicle assets.

The demand for vehicle currencies originates primarily from two sources, although the actual demands are generally funneled through the commercial banking system of the country issuing the vehicle currency and the banks with whom the importers and exporters deal in their own countries. The two sources are: third party importers and exporters, and importers buying from the vehicle currency country who are required to settle in the vehicle currency. The supply of such a currency, once again channeled through the banking system, comes from importers in the vehicle currency country who are asked to settle in that currency. The supply is augmented by third party traders who have excess working balances and wish to put these funds to work without exchanging them into another currency or investing in the money or capital markets of the vehicle currency country.³

²*Ibid.*, p. 9.

³Benefits accruing to the vehicle currency country, which have been labeled gains from seigniorage, play a part in determining the supply of a vehicle currency. The discussion of seigniorage is beyond the scope of this article, but will be discussed in the third article; see Swoboda, *op. cit.*, pp. 11-14.

Once the primary supply and demand conditions for a vehicle currency are established, conceptually it is only a short step to postulate the development of foreign markets in assets denominated in that currency. Such assets are known as vehicle assets.⁴ The development of a market in vehicle assets is predicated on two factors: (1) favorable rate relationships on instruments competing with those in national money markets; and (2) confidence in the vehicle currency. That is, the vehicle asset market must provide the opportunity to invest funds, denominated in the vehicle currency, at higher rates (and to borrow funds at lower rates) than are generally available in national markets. Furthermore, the vehicle currency must be readily convertible into national currencies at stable rates of exchange and without many institutional impediments.

Eurocurrency Markets. The Eurocurrency markets are good examples of vehicle asset markets. Any national currency can become a Eurocurrency if it is freely convertible into the world's major currencies. However, in practice, a country's medium of exchange becomes a Eurocurrency only when a bank domiciled in another country accepts a deposit liability (time or demand) in that medium of exchange. Usually a bank will accept a foreign currency deposit liability only if it is certain it can make use of, or can sell, that currency at any convenient time; hence, there is a need for convertibility and a relative lack of exchange controls in these markets. The Eurocurrency markets are the *mechanisms* by which Eurocurrencies are borrowed and loaned, rather than places where trading can take place. Trans-

⁴The form of these assets need not be confined to those normally traded in the Eurodollar market (i.e., money market instruments) but may also assume the form of assets normally associated with capital markets. Hence, this argument serves also as a partial justification for the recent development of the Eurobond market.

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actions are generally negotiated by telephone, cable, or Telex. Whenever a bank is willing to denominate an account in a nonresident currency, it creates a Eurocurrency account. In a general sense, the Eurocurrency markets today represent the short-term or money market portion of a supranational money and capital market; the long-term or capital market is the Eurobond market.

NATURE OF THE EURODOLLAR MARKET

Eurocurrency markets are specific examples of vehicle asset markets; the Eurodollar market is a specific example of a Eurocurrency market. The prefix Euro- is attached to the name of a currency to differentiate between that currency circulating within an issuing country and the same currency being deposited and loaned in foreign markets. For example, Eurodollars are deposits denominated in United States dollars that are placed with banks outside the United States. Although there are markets in Eurosterling, Euromarks, Eurofrancs (Swiss, French, and Belgian), Euroguilders, and Euroyen, the Eurodollar market accounts for the largest part of the Eurocurrency market. The remaining discussion focuses primarily on the Eurodollar market.

A market in a Eurocurrency implies a supply of and a demand for that currency. Both demand and time deposits constitute the supply of Eurodollars, although the vast majority of funds are placed in time deposits. Since Eurodollars are a very active Eurocurrency, daily quotations are available for overnight money; money on call, two days' notice, and seven days' notice; and for deposits of 30, 60, 90, 180, and 360 days. Rates for maturities that exceed one year are generally negotiated.

The demand side of the market is made up of Eurodollar loans and interbank deposits. Euro-

dollar loans to nonbank customers are usually either short-term (less than one year) or medium-term (one to five years). Borrowers who seek Eurodollar funds for a longer period may have the option of floating Eurobond issues denominated in dollars. Eurodollar loan rates are generally tied to Eurodollar deposit rates. Given the deposit rate, a bank negotiates the loan rate with a particular customer. The loan rate is based primarily on a set markup modified by market conditions and some rough measure of the credit standing of the borrower.

Medium-term loans are generally acquired through term loans with periodic rate adjustments or through revolving loan commitments. A revolving credit arrangement guarantees that a bank will provide the final borrower's credit needs at the going deposit rate plus some specified fraction for a stated period, generally six months, with the right of a fixed number of renewals. The bank charges the borrower a commitment fee on any unused portion of the credit line. Such agreements are generally made for large amounts and extend over a three- to five-year period.

Demands on the Eurodollar market also come in the form of interbank deposits; that is, one bank deposits Eurodollars in another bank that, in turn, may redeposit the Eurofunds in another bank. A long chain of banks may serve as intermediaries between the original depositor and the final borrower, and the original depositors and all but the final intermediary seldom know the ultimate borrower. Profit margins are very narrow, sometimes as little as one thirty-second of one percent on a deposit from one bank to another.

Among other characteristics, Eurodollar interbank transactions are usually made in round numbers in the range of one-half million to five million United States dollars. Funds are deposited

and redeposited among banks on an unsecured basis; only the reputation of the borrower is considered. However, the market has sufficient depth, breadth, and resiliency to support large deposits and withdrawals and to accommodate borrowers and lenders over a wide range of maturities. That is, the Eurodollar market, like other Eurocurrency markets, is an over the counter, wholesale market dealing in assets denominated in a nonindigenous currency.

Historical Development. Although banks have accepted nonresident currency accounts since the earliest days of banking, the name Eurocurrency is recent. It is derived from Eurodollar which, according to one story,⁵ is derived from "*Eurobank*." *Eurobank* is the international cable code of the *Banque Commerciale pour l'Europe du Nord, S. A.*, the Paris affiliate of the State Bank of the Union of Soviet Socialist Republics. In the early 1950's, many eastern European governments decided to transfer their dollar accounts from New York to the Continent, partly to avoid having their accounts attached by United States claimants and partly to establish lines of dollar credit outside the United States. The cable code *Eurobank* became associated with transactions in these dollars, and eventually, the dollars that were on deposit outside of the United States became known as Eurodollars.

Today, banks handling Eurodollars and other Eurocurrencies are referred to in general as Eurobanks. Eurobanks are located in Europe, as well as in financial centers throughout the world, including Lebanon, Singapore, and the Bahamas. The number of Eurobanks increased steadily after most European countries lifted exchange restrictions in

1958. London, however, is the center of Eurocurrency transactions because of its financial traditions and history of financing world trade. The foresight of London bankers contributed in large part to London's present preeminence. As the pound sterling began to decline from its position as a central vehicle currency, the London banks realized that they could deal in United States dollars, the emerging vehicle currency, just as easily as they had dealt in sterling. The London banks, therefore, used their traditional business as a base and became the first banks to take advantage of the Eurodollar market.

During the "dollar shortage" immediately after World War II, the United States dollar came to be used in a growing number of third party transactions, partly for reasons of confidence. During these years, the demand for dollars, primarily for covering the United States balance of payments deficits, outstripped the supply. This situation was slowly reversed, and the "dollar shortage" was replaced by a "dollar glut." The demand for United States dollars to support the postwar economic activity of Europe was satisfied by United States balance of payments deficits as a byproduct of the plan to aid European recovery. After many of the European economies regained their health, the excess demand for dollars first lessened and then nearly evaporated as European countries improved their trade balances and central banks rebuilt their international reserves. Europe continued to be supplied with United States dollars, however, as the United States continued to run deficits in its balance of payments.

The dollar shortage laid the groundwork for the development of the Eurodollar market by fostering the use of United States dollars outside the United States. The dollar surplus added to the

⁵See Joseph G. Kvasnicka, "Eurodollars—an important source of funds for American banks," *Business Conditions*, Federal Reserve Bank of Chicago, June 1969, p. 10.

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development by supplying United States dollars to (or transferring ownership to) foreigners who found that the only opportunity for profitable employment of these funds was the United States money markets. In addition, the United States had been designated as the intervention currency when the International Monetary Fund (IMF) was established in 1946.⁶ Finally, the return to general currency convertibility and the dismantling of exchange controls in 1958, coupled with continuing British sterling crises, led to greater use of the United States dollar throughout the world.

Major Market Participants. With the increased use of the United States dollar as the major vehicle currency and the rise in foreign ownership of United States dollar claims, a market for assets denominated in dollars developed outside the United States. On the supply side of the market, participants include national and international corporations, banks with and without foreign offices, insurance companies, wealthy individuals, as well as some foreign governments and supranational official organizations. Any holder of United States dollar-denominated assets who is looking for a short-term investment outlet can put money into the Eurodollar market, although various balance of payments programs now in effect prohibit or discourage such behavior by American investors. Investors with assets denominated in foreign currencies who wish to place funds in the market can obtain dollars in the foreign exchange markets, if exchange control regulations so permit. Foreign central banks make use of the Eurodollar market as an investment outlet for excess dollar

⁶That is, under the rules of the International Monetary Fund, foreign currencies are supported in relation to the United States dollar and, therefore, the majority of official business in the foreign exchange market (spot and forward) is carried on in terms of the dollar and the currency in question.

balances and as an instrument of stabilization policy in an effort to control domestic liquidity.⁷ Similarly, the Bank for International Settlements (BIS) in Switzerland is a frequent supplier of funds to the market, especially in anticipation of seasonal pressures generally associated with end-of-period window dressing activities of European banks.

Today, commercial banks undoubtedly play the largest role in supplying funds to the Eurodollar market, in contrast to the early years of the market, when foreign central banks played a more dominant role. From 1968 to early 1969, the supply of Eurodollar funds was augmented by inflows of capital raised in the Eurobond market by foreign affiliates of United States corporations. Borrowers temporarily invested large amounts of this capital in the Eurodollar market.

On the demand side, Eurodollar loan recipients are as widely varied as are the suppliers of funds to the Eurodollar market. Commercial banks, multinational corporations, and national corporations have been known to be heavy users of the market. Very rarely, foreign central banks have participated on the demand side of the market, where the purpose has been to stabilize foreign exchange markets or to obtain dollar balances. In the earlier years of the market, Eurodollar loans were chiefly used to finance trade, and the demand for dollar loans by exporters and importers (mainly the latter) still plays an important role in the Eurodollar market.

Currently, a great deal of attention has focused on the use of Eurodollars on the part of United States banks to obtain loanable funds. Liabilities

⁷The Federal Reserve System does not participate directly in the Eurodollar market, although it has provided dollars to and absorbed dollars from various foreign central banks by means of swap agreement operations.

TABLE I
Foreign Branches of United States Member Banks

End of Year	Number of United States Member Banks Having Foreign Branches	Number of Branches	Number of Countries in which Branches are Domiciled
1960	8	124	33
1961	8	135	35
1962	10	145	39
1963	10	160	42
1964	11	180	45
1965	13	211	50
1966	13	244	53
1967	15	295	54
1968	26	373	57
1969	53	459	60

Source: *Annual Report*, Board of Governors of the Federal Reserve System, 1960-1969

to overseas branches of United States banks totaled \$1.8 billion at the end of 1965 and exceeded \$2.0 billion for the first time during the last half of 1966. On November 19, 1969, liabilities to overseas branches of United States banks amounted to slightly more than \$15.0 billion, a record high that demonstrates the huge increase in the participation in the Eurodollar market by United States banks.

As an indication of the importance of United States bank participation, the number of United States member banks with foreign branches and the number of foreign offices operated by these banks has grown phenomenally in recent years (see Table I). Between 1966 and 1969, the number of member banks with overseas branches increased three and one-half times to 53 (while the number of foreign branches increased by 88 percent to 459).

Institutional Constraints. Although the Eurodollar market is based on traditional supply and demand theory, institutional constraints have influenced its growth and operation. For example, several aspects of United States monetary and

fiscal policies during the 1960's had the effect of fostering the development of the Eurodollar market as an attractive haven for short-term funds.

Two such institutional factors have served to increase the supply of Eurodollars. First, the ceiling on interest rates on time deposits in the United States that is placed by the Federal Reserve System under Regulation Q⁸ greatly increased the attractiveness of the Eurodollar market to investors who wished to hold dollar-denominated assets, especially when domestic market rates were above Regulation Q ceilings. Of course, dollars available for less than 30 days are always attracted to Eurobanks because United States banks are forbidden to pay interest on such short-term balances.

Second, central banks in countries that have had surpluses in their balance of payments, recognizing the importance of the stability of the dollar to world prosperity, have sometimes chosen not to use dollars to drain United States gold reserves. These dollars instead are often deposited in the Eurodollar market, either directly, in order to earn income for the central bank, or indirectly under swap agreements with commercial banks in their country.

Simultaneously, two institutional factors have tended to diminish the supply of Eurodollars. In 1962, Regulation Q was suspended on deposits of foreign official agencies. This action permitted United States banks to compete with the Eurodollar market for the dollar deposits of foreign central banks. United States commercial banks

⁸As of December 31, 1969, the maximum rates which could be paid by domestic banks on single maturity deposits of \$100,000 or more were:

1-29 days	no interest paid
20-59 days	5 1/2 percent per year
60-89 days	5 3/4 percent per year
90-170 days	6 percent per year
180+ days	6 1/4 percent per year

were noticeably successful in attracting such deposits during the last half of 1969. Second, in early 1965, the Federal Reserve Board announced the Voluntary Foreign Credit Restraint Program (VFCR). This program was one part of a comprehensive attack on the United States balance of payments problem and was directed toward financial institutions. The VFCR program was modified and updated on a number of subsequent occasions. The original and revised VFCR programs were designed to limit the amount of foreign credit that banks and nonbank financial institutions in the United States could extend abroad. Specifically, banks were told not to place their own funds abroad "whether such investments are payable in foreign currencies or in U. S. dollars."⁹ (An exception is made for working balances held with foreign correspondents.) The overall limitations were based on a share of the total credit each bank extended in 1964. In addition, banks were also urged to discourage their customers from investing abroad. The combined effects of these programs served to reduce the potential supply of Eurodollars.

On the demand side, two United States programs have affected the Eurodollar market. First, the Office of Foreign Direct Investment (OFDI) regulations, which went into effect on January 1, 1968, initiated mandatory compliance to the voluntary regulations, originally spelled out by the U. S. Department of Commerce in early 1965, governing the international financial transactions of nonfinancial organizations. The OFDI regulations have served to increase demands on the Eurodollar market by limiting the amount and form of investment United States businesses could

make abroad with funds raised in the United States. The credit demands of United States businesses were, therefore, focused more directly on the Eurodollar market.¹⁰ Second, the changes in Federal Reserve regulations announced in the summer of 1969 that govern member bank overnight borrowing of Eurodollars and place reserve requirements on a member bank's total Eurodollar borrowings may tend to reduce demand. Both new regulations served to increase the effective interest rate on such borrowings by United States banks.

Not only have United States policies affected the development of the Eurodollar market but so have the actions of foreign central banks. Central banks in countries with persistent balance of payments surpluses or central banks that are offered large amounts of dollars in times of foreign exchange market unrest have frequently initiated swap arrangements with their commercial banks to induce the banks to make use of dollars, thus increasing the supply of available funds in the Eurodollar market. In these cases, the foreign commercial banks are encouraged to accept the dollars because forward cover can be acquired cheaply. Foreign central banks also have found such swap arrangements a useful means to control domestic credit expansion.

The increase in demand for Eurodollars by United States banks, particularly since December 1968, has prompted some foreign central banks to establish controls to limit the flow of domestic funds into the Eurodollar market in order to protect official reserves. Several European countries have required individual commercial banks to balance their net foreign positions (generally without limiting gross positions or without regard to

⁹"Balance of Payments Program: Revised Guidelines For Banks and Nonbank Financial Institutions," *Federal Reserve Bulletin*, January 1968, p. 68.

¹⁰See Fred H. Klopstock, "Impact of Euro-Markets on the United States Balance of Payments," *Law and Contemporary Problems*, Vol. XXXIV, No. 1, Winter 1969, pp. 159-162.

maturity structure or currency) or otherwise to reduce their net foreign assets.

FLOWS OF EURODOLLAR FUNDS

Against this outline of the historical development of the Eurodollar market and the present day institutional setting, further understanding of the operation of the market may be gained by abstracting the structure of the market described above. All the organizations and institutions that are potential suppliers in the Eurodollar market have one thing in common: ownership of financial assets. The potential users of the Eurodollar market also have one thing in common: the need for a dollar-denominated asset or for credit. In the following discussion, the market participants are identified only by their motives for entering the Eurodollar market.

As in the case with other financial markets, the flow of funds within the Eurodollar market is basically circular; therefore, any discussion must necessarily break into the flow rather than starting at a well-defined beginning. Transactions in Eurodollars fall into three general phases of market activity: Phase I, the creation of Eurodollar deposits; Phase II, the pyramiding or interbank transfer of Eurodollar deposits; and Phase III, the lending of Eurodollar deposits and the accompanying opportunities for credit generation based on relationships analogous to the fractional reserve system in United States banking.

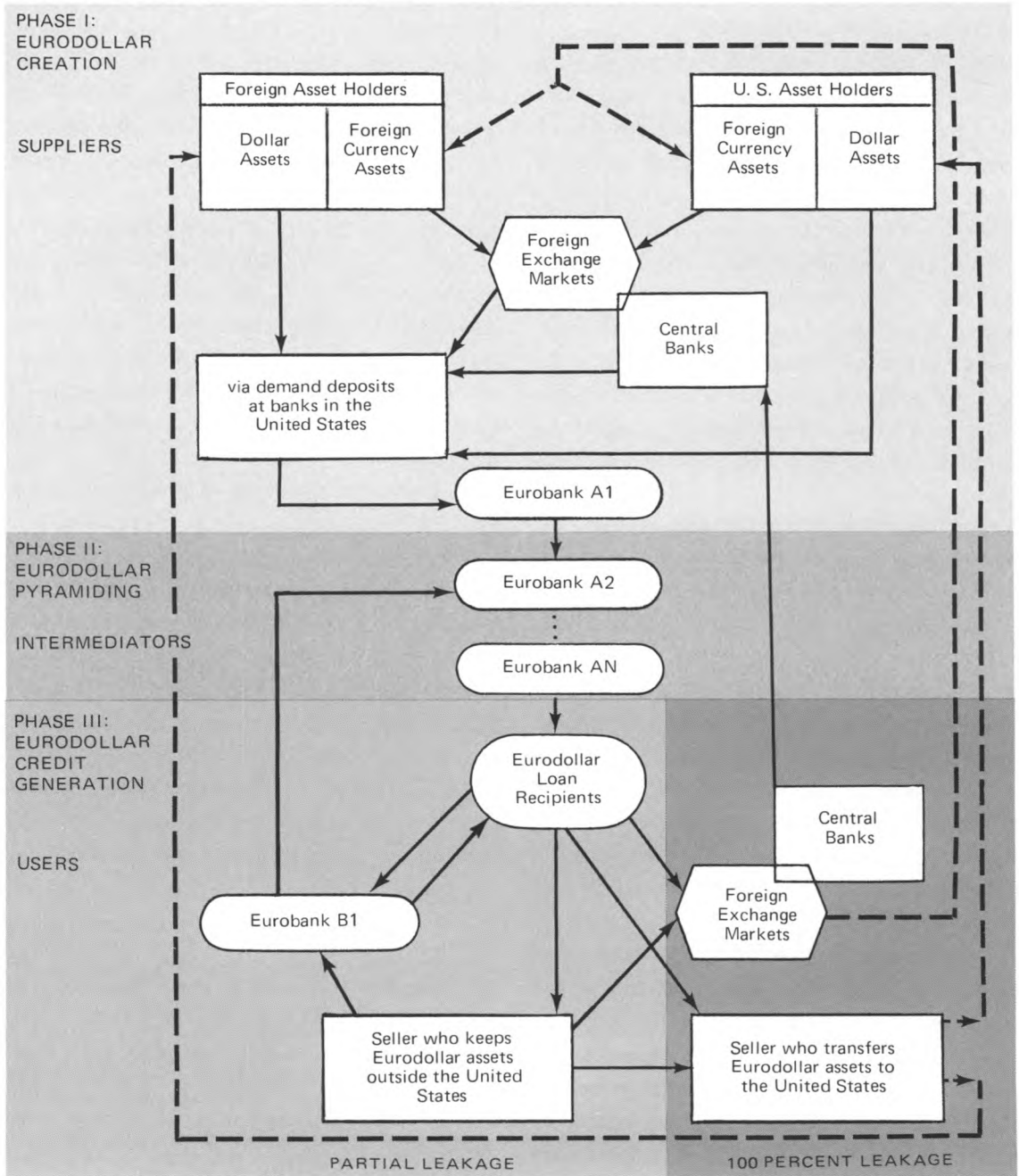
The Creation of Eurodollars. All Eurodollars have as their origin a demand deposit in a United States bank, the ownership of which has been transferred to a bank outside the United States. These demand deposits are created in various ways; for example, as a result of trade or from the liquidation of other assets denominated in dollars or in a foreign currency. As shown in the figure, United States and foreign owners of dollar assets

can transfer demand deposits in a United States bank to a Eurobank. For holders of dollar-denominated assets, the switch to a Eurodollar deposit, which is generally a time deposit, can be accomplished by means of direct commercial or investment transactions. After receiving title to a demand deposit, for example, the asset owner could transfer the ownership of that deposit to Eurobank A1, thereby creating a Eurodollar deposit. For holders of foreign currency assets, the procedure is complicated by the need to exchange the foreign currency asset; that is, the foreign currency must be sold for dollars in the foreign exchange market.¹¹ Upon receipt of title to dollars, usually in the form of a demand deposit in a United States bank, the owner can then transfer them to a deposit (demand or time) in Eurobank A1.

The United States bank continues to hold the deposit liability it created when the asset owner acquired the original demand deposit. The transfer of ownership of that deposit does not affect the size of the original liability, which remains as the only foreign claim against the United States. The transfer of the deposit's ownership to a Eurobank creates a liability for the Eurobank. The Eurobank's matching asset is ownership of a dollar-denominated demand deposit at a United States

¹¹Central banks are shown in the figure as overlapping foreign exchange markets because of the unique position such authorities have in relation to the Eurodollar market: often they provide dollars in the foreign exchange markets as "last resort" lenders. That is, a central bank that conforms to IMF regulations supports the price of its national currency in terms of the United States dollar around the currency's par value. In doing so, when faced with an excess supply of its domestic currency, the central bank would sell dollars; when faced with an excess demand for the domestic currency, it would purchase dollars. As described earlier, central banks can also place funds directly in the Eurodollar market for either investment purposes or in the implementation of monetary and credit policy.

FLOW DIAGRAM OF THE EURODOLLAR MARKET



Source of data: Federal Reserve Bank of Cleveland

bank. If the Eurobank's bank correspondent is not the United States bank from which the Eurodollar deposit was received, the Eurobank may elect to transfer its asset to its own correspondent. Such a transaction has no effect on the credit creating abilities of the United States banking system as a whole; the original bank loses reserves, while the New York correspondent of the Eurobank gains a like amount of reserves.

Thus, the process of Eurodollar creation is based solely on the transfer of a demand deposit liability from a United States bank to a Eurobank. In the process, the ownership of the United States bank's demand deposits changes, and the asset owner, who originally held a demand deposit in an American bank, now owns a deposit in a Eurobank. The Eurobank now has a new liability to the depositor (usually a time deposit) and obtains a new asset (a demand deposit in a United States bank).

Obviously, if the owner of a Eurodollar deposit eventually chooses to repatriate his funds, the Eurodollars are destroyed. For the most part, Eurodollar transactions take place entirely on paper and involve the writing of checks and drafts or the transfer of a balance without any of the participants ever gaining physical possession of the currency that serves as backing for the Eurodollars.¹²

Eurodollar Pyramiding. The second or intermediation phase of the Eurodollar market has come to be known as pyramiding. Eurobank A1, which received a Eurodollar deposit as described above, may elect to use its United States demand

deposit by shifting the funds into a Eurodollar deposit at a second Eurobank (A2). Eurobank A1 now owns a Eurodollar asset (its time deposit at Eurobank A2) and a Eurodollar liability (its own time deposit payable to the original owner of the funds). Eurobank A2 thus has gained an asset in the form of a demand deposit with a United States bank (the deposit formerly owned by Eurobank A1) and a Eurodollar liability due Eurobank A1. In this phase, in the Eurobank system as a whole both a new Eurodollar asset (at Eurobank A1) and a new liability (at Eurobank A2) are created and cancel each other out, leaving the system with one net asset (the demand deposit in the United States bank) and one net liability (the Eurodollar time deposit due the original owner). However, the ownership of the assets and liabilities has changed hands within the Eurobank system.¹³ This process can be repeated as long as Eurodollar deposits are transferred, usually at successively higher rates of interest. The effect of such pyramiding is to accommodate a lengthening chain of borrowers and lenders.

Pyramiding does not, however, increase the *net* size of the Eurodollar market, although it does increase the *gross* assets or liabilities associated with the market. The problem of using net or gross estimates of outstandings has been pointed out by the Bank for International Settlements, which publishes the most widely accepted measures of the Eurodollar market.¹⁴

Eurodollar Credit Generation. The third or credit generation phase begins with Eurobank AN

¹³For a description of T-accounts explaining the same phenomena, see Jane Sneddon Little, "The Euro-Dollar Market: Its Nature and Impact," *New England Economic Review*, Federal Reserve Bank of Boston, May/June 1969, p. 13.

¹⁴For example, see Bank for International Settlements, *Thirty-fifth Annual Report*, June 14, 1965, p. 133 and *Thirty-ninth Annual Report*, June 9, 1969, pp. 147-158.

¹²A possible exception occurs in Phase I. One method of acquiring a demand deposit is, of course, by depositing coin and currency. If the demand deposit were to be transferred immediately to a Eurobank, it could be argued that the process involved the actual cash used to back the Eurodollar deposit.

lending Eurodollars to a final borrower (see the figure). The impact of the loan in the Eurodollar market depends on the use to which the borrowed funds are put. That is, in order to trace the credit generation process, it must be determined whether the funds stay within the Eurodollar system or not. Presumably the loan recipient borrows funds to purchase goods, services, or investments. The goods, services, or investments can be purchased directly with the Eurodollars or with foreign currencies that are obtained by selling the Eurodollars in the foreign exchange market. (This distinction will be discussed in greater detail below.)

The decision of the *seller* of the goods, services, or investments also influences the process of credit generation. That is, multiple credit generation depends on the proportion of the loan proceeds that finds its way *directly* back into the Eurodollar market. The proportion of loan proceeds not recaptured by the market escapes in the form of "leakages." Leakages can range from zero, in which case all the proceeds are redeposited in the market, to 100 percent, when none of the proceeds are redeposited. In actual practice, some leakage always occurs. For one thing, sound banking practices dictate that a bank keep a certain proportion of all deposits on reserve, rather than lend the total amount. In the United States, with its fractional reserve system, the requirement to hold reserves against deposit liabilities is statutory.¹⁵ In several of the European countries served by the Eurodollar market there are similar

¹⁵In the United States banking system, required reserves are generally not considered a leakage as such, although that proportion of deposits held as required reserves does represent a "statutory leakage." Excess reserves, on the other hand, do represent a leakage in that a bank's decision to carry excess reserves is a behavioral one. In an analogous sense, since a Eurobank's decision to hold any reserves is primarily behavioral, all reserves held against Eurodollar deposits can be considered a leakage.

statutory provisions. Even in those countries without such statutory provisions, however, it is highly unlikely that any given Eurobank would lend an amount equal to 100 percent of its Eurodollar deposits. For example, if Eurobank AN considered it prudent to keep a reserve of 10 percent against its deposit liabilities, it would only lend \$90 out of every \$100 of Eurodollars deposited.¹⁶

The Eurodollar loan recipient gains both an asset (a demand deposit at a Eurobank) and a liability (a Eurodollar loan due the same Eurobank).¹⁷ In terms of the impact on the Eurodollar market, the loan recipient can dispose of his loan proceeds in four separate ways, two of which result in some leakage and two of which result in 100 percent leakage. First, in an unlikely but possible action, the loan recipient could immediately redeposit the loan proceeds in another Eurobank, say Eurobank B1. In this case, Eurobank B1 could initiate a new pyramiding process by redepositing the funds in another Eurobank (in the figure, Eurobank A2) or lend a portion of the funds (after accounting for the necessary reserves) directly to another Eurodollar loan recipient.

Second, in a more usual procedure, the loan recipient purchases goods, services, or investments from a seller who keeps his dollar assets outside the United States. Generally, the borrower instructs the Eurobank "...to transfer given amounts of the loan to dollar accounts in given banks, and the lending bank makes payments out

¹⁶For an example of the T-accounts showing this process, see Little, *op. cit.*, p. 15.

¹⁷Generally the Eurobank credits "...the entire amount of the loan to the borrower's account in their books..." or authorizes "...him to make overdrafts on his account." Both are the same as providing the borrower with a demand deposit account. See Fred H. Klopstock, "The Eurodollar Market: Some Unresolved Issues," *Essays in International Finance*, No. 65, March 1968 (Princeton, New Jersey: Princeton University), pp. 5-6.

of balances it holds in the United States."¹⁸ The ownership of the dollar deposit in some United States bank has now been transferred to the seller of the goods, services, or investments, who can elect to transfer any or all of that dollar account to the Eurodollar market. If the seller elects to transfer only part of his proceeds, this action constitutes a further leakage. That portion that finds its way back into the Eurodollar market can, of course, support another Eurodollar loan, the size of which is subject to the reserves considered prudent by the lending Eurobank. Thus, total credit generation is limited by two factors: (1) the reserves held against deposit liabilities; and (2) the amount of loan proceeds that the loan recipient or the seller of goods elects to withhold from redepositing in the Eurodollar market.

There are two further options open to the loan recipient; the impact of these actions, however, differs sufficiently from those already discussed that greater elaboration is necessary. If the loan recipient elects to exchange his dollar deposit for another currency, he may do so through the foreign exchange market. When the proceeds of a Eurodollar loan are exchanged for another currency, there can be no further *direct* expansion of Eurodollars. That is, a transfer of the Eurodollar loan proceeds through the foreign exchange market represents a complete leakage. (There is, of course, a corresponding redistribution of dollar and foreign exchange assets, and to the extent that the new asset holders are more likely to transfer their assets to the Eurodollar market, there may be increased Eurodollar market activity. This response is tenuous at best, and, therefore, any Eurodollar deposits resulting from this redistribution should not be considered part of the Eurodollar creation process.)

¹⁸*Ibid.*, p. 5.

A partially analogous development involves the behavior of foreign central banks. In the 1960's, when certain foreign central banks accumulated unwanted dollars, they established swap arrangements with commercial banks in their countries. Under these arrangements, the banks could obtain dollars in the spot market and sell them forward (at a given maturity) at an exchange rate more favorable than was obtainable in the foreign exchange markets. This action was taken in an effort to induce the commercial banks to purchase the dollars. After purchasing the dollars, the commercial banks generally placed the funds in the Eurodollar market. Although this line of causation is reasonably direct, it is a function of a behavioral decision dictated by foreign exchange or stabilization policy on the part of the central bank rather than a market-oriented decision on the part of commercial banks and, therefore, is not *directly* market determined. Consequently, flows generated in this fashion should more properly be considered part of Eurodollar creation. In the figure, such indirect flows are shown by dashed lines.

If the Eurodollar loan recipient purchases goods, services, or investments, and the seller does not deposit the dollars in the market, the leakage is effectively 100 percent (even though this increases the stock of dollar assets that could, potentially, be redeposited in the Eurodollar market). For example, Eurodollar borrowing by United States banks (whether or not such borrowing is accomplished through foreign branches) results in a 100 percent leakage.

In short, leakages occur at any point in the loan-spending (investing)-redeposit cycle whenever some portion of the original deposit or succeeding redeposit is not made available to the Eurodollar market in the form of another deposit. Any time

the loan proceeds are transferred through the foreign exchange market or the title to the Eurodollars is transferred to a seller who keeps all his assets in the United States, the leakage is complete, immediately stopping the multiple effects of Eurodollar credit generation.

The capacity of the Eurodollar market to generate credit apparently is more important on a theoretical level than on a practical level.

The weight of the evidence indicates that the process of multiple expansion terminates at a very early phase of the circuit....On the whole, therefore, it appears that the Eurobank multiplier is very low, lying probably in the approximate range of 0.50 and 0.90.¹⁹

This means that, on average, for every dollar deposited in the Eurodollar market, Eurobanks will lend \$0.50 to \$0.90 to their customers. The remaining leakages are sufficient to lower the deposit multiplier to slightly above one. That is, for every dollar deposited in the Eurodollar market, only a few cents find their way directly back into the market.

SIZE OF THE EURODOLLAR MARKET

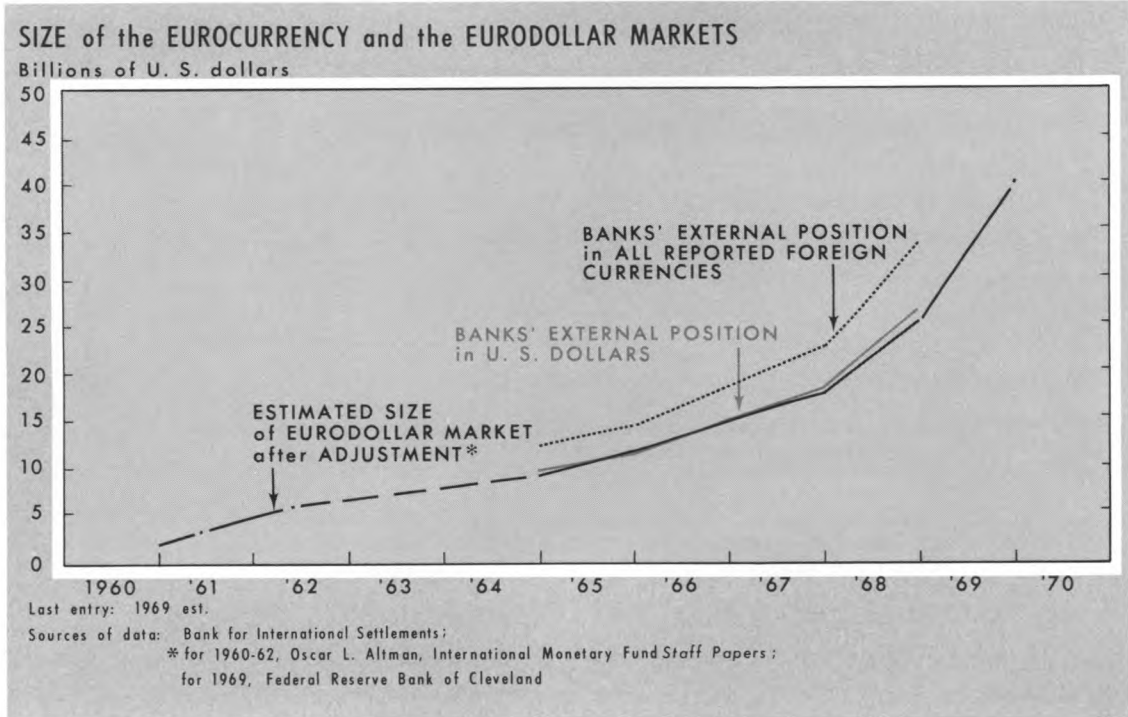
To put the various aspects of the Eurodollar market into perspective from an abstract framework is very difficult. It would be helpful if the three phases described earlier could be given some empirical content. Unfortunately, such information is not available, and instead, the discussion of the size of the Eurodollar market must be limited to an examination of the volume of funds transacted within the market and the geographical distribution of the sources and uses of these funds.

¹⁹Klopstock, *ibid.*, p. 8. Also see Fred H. Klopstock, "Money Creation in the Euro-Dollar Market—A Note on Professor Friedman's Views," *Monthly Review*, Federal Reserve Bank of New York, January 1970, pp. 12-15.

Volume of Funds. Comprehensive and consistent estimates of the size of the Eurodollar market for the entire 1960-1969 period do not exist. The Bank for International Settlements did not begin until 1966 to publish estimates of the size of the market, with back information to 1964. Moreover, the information is presented on an annual basis only and suffers from several limitations. Many United States dollars held outside the United States cannot be classified as Eurodollars; that is, some foreign-held dollar balances withheld from the Eurodollar market are kept in the form of working balances while others have been used to make investments in United States money market instruments. Furthermore, not all countries report to the BIS and the BIS does not have complete information on many of the reporting countries regarding banks' dollar assets and liabilities *vis-a-vis* their own domestic residents. Nor are there precise data on the amount of double counting due to pyramiding. Nevertheless, the available estimates indicate the recent explosive growth of the Eurodollar market, even if they cannot be considered completely accurate.

The BIS data measure the dollar and other foreign currency liabilities and assets *vis-a-vis* nonresidents of the banking systems in eight European countries.²⁰ These foreign liabilities and assets are denominated in United States dollars, German marks, Swiss francs, French francs, Dutch florins, Italian lire, and the British pound sterling and give an indication of the size of the Eurocurrency market (see the dotted line on the chart). When only liabilities denominated in United States dollars are considered, the size of the Eurodollar market in the reporting countries is revealed (see the solid green line on the chart). The annual

²⁰Belgium, France, Germany, Italy, the Netherlands, Sweden, Switzerland, and United Kingdom.



Eurodollar estimates from 1964 to 1968 are also shown in the chart by the solid black line. The BIS estimates of the net size of the Eurodollar market attempt to adjust for nonreporting and also for the double counting of interbank transactions. In an effort to provide some indication of the size of the Eurodollar market before 1964, estimates were derived by this Bank from the studies of the late Oscar Altman, one of the early experts on the Eurodollar market.²¹ Although these early figures are not strictly comparable with the BIS figures, they provide some perspective to

evaluate recent growth in the Eurocurrency markets. The usefulness of the three measures is further evidenced by the fact that over the 1964-1968 period, all three series grew at approximately the same approximate average annual rate (30 percent). On a basis similar to the adjusted BIS measure, estimates of the size of the Eurodollar market at mid-1969 ranged from \$32 billion to \$33 billion.²² Yearend estimates are in the neighborhood of \$40 billion.²³ These estimates indicate an increase of approximately 60 percent in the size of the Eurodollar market in 1969.

As shown by the solid green line on the chart, the United States dollar is by far the most

²¹See Oscar L. Altman, "Foreign Markets for Dollars, Sterling, and Other Currencies," *International Monetary Fund Staff Papers*, VIII, 3 (December 1961), pp. 313-352; "Recent Developments in Foreign Markets for Dollars, and Other Currencies," *International Monetary Fund Staff Papers*, X, 1 (March 1963), pp. 48-96; and "Euro-Dollars: Some Further Comments," *International Monetary Fund Staff Papers*, XII, 1 (March 1965), pp. 1-16.

²²See Andrew F. Brimmer, "Eurodollars and the U. S. Balance of Payments," *Euromoney* (December 1969), pp. 13-22.

²³See "The money-machine magic of Eurodollars," *Business Week*, February 21, 1970, pp. 114-120.

ECONOMIC REVIEW

TABLE II

Net Uses of Eurodollars

Selected Areas

(Yearend Figures in Billions of United States Dollars)

Area	1964	1965	1966	1967	1968	June 1969e
United States and Canada	+ \$0.7	+ \$1.4	+ \$3.3	+ \$3.2	+ \$5.7	+ \$10.5
Japan	+ 0.4	+ 0.5	+ 0.6	+ 1.0	+ 1.6	n.a.
Eastern Europe	+ 0.2	+ 0.2	+ 0.3	+ 0.3	+ 0.3	- 2.3
Western Europe*	+ 0.6	- 0.3	- 2.1	- 1.8	- 5.2	- 8.2
Other†	- 1.9	- 1.8	- 2.1	- 1.7	- 2.4	n.a.

NOTE: (+) indicates uses of funds; (-) indicates net sources of funds.

* The eight reporting countries are Belgium, France, Germany, Italy, the Netherlands, Sweden, Switzerland, and the United Kingdom.

† Principally Latin America and the Middle East.

Sources: Bank for International Settlements *Thirty-ninth Annual Report* June 9, 1969, p. 149. June 1969 estimates: Andrew F. Brimmer, "Eurodollars and the United States Balance of Payments," *Euromoney* (December 1969), p. 15

important Eurocurrency. At the end of 1968, the United States dollar accounted for 80 percent of the combined external foreign currency liabilities of banks in the reporting countries, followed by the German mark (9 percent of foreign liabilities); Swiss francs (7 percent); the pound sterling (2 percent); Dutch florins (1 percent); French francs (1 percent); and Italian lire (less than 1/2 percent). The relative importance of various Eurocurrencies has shifted over the years. For example, at the end of 1965, United States dollars accounted for 79 percent of bank-reported external foreign currency liabilities, while the Swiss franc accounted for 7 percent. The German mark and the pound sterling both accounted for 6 percent, and the Dutch florin and French franc each accounted for 1 percent. Italian lire liabilities amounted to about 1/2 percent. Although the growth in the relative importance of the German mark has not been steady, these figures indicate the notable shift to Euromarks in the past few years, primarily at the expense of Eurosterling.

Geographical Distribution. An examination of the relative importance of the foreign currencies in which banks' reported external positions are denominated is only one way to study the size of the Eurodollar market. The sources and uses of Eurodollars by country can also be examined by using data from the BIS. Table II presents the net uses of Eurodollars during the 1964 to mid-1969 period by selected geographic areas.

Several sharp changes in uses of funds are apparent from the data in Table II. First, during the 1964-1968 period, the United States and Canada increased their annual net demands on the Eurodollar market by \$5 billion. During the same period, the eight western European countries, as a group, shifted from net users to net suppliers. Although Japanese net demands grew noticeably, eastern European net demands remained nearly constant. Latin America and the Middle East increased their net supply marginally. The fact that Latin America and the Middle East are net suppliers of dollars to the market is not difficult to

explain. In both of these areas, investors have relatively limited opportunities to put their wealth to work in local capital or money markets (if such markets even exist). Consequently, this money finds its way into the Eurodollar market.

Second, there appear to have been some marked shifts in the patterns of sources and uses of Eurodollar funds. In 1966 and 1968, a sudden increase in demands by the United States and Canada apparently was satisfied by western European sources. This phenomenon was partly a function of interest rate relationships between the United States and Europe and the concurrent monetary policies on both sides of the Atlantic.

Table II also indicates that, over the five-year period, certain geographical areas were traditional suppliers, while other areas became consistent users. This pattern became more pronounced with the massive shifts in supply and demand during the 1966-1968 period. Furthermore, there is evidence that these recent patterns were even more prominent in 1969 than in 1968. For example, based on June 1969 estimates, the United States and Canada increased their net demands on the Eurodollar market by nearly \$5 billion in the first half of 1969. As has been the case since 1966, much of the increased demand from the United States was met by funds from western Europe. A shift in the eastern European countries' behavior, however, is suggested by the data; these countries appear to have become important suppliers of funds, rather than remaining marginal users.

The mid-year 1969 figures must be interpreted with caution, because the Eurodollar market flows engendered by the anticipated revaluation of the German mark should be considered transitory. The

end of year figures, when available in mid-1970, may present a different picture. It is certain, however, that United States banks continued to be substantial users of the Eurodollar market. The growth in outstanding liabilities of United States banks to their own foreign branches indicates the continued United States demand on the Eurodollar market. Recognizing that these liabilities do not represent all United States Eurodollar borrowing,²⁴ and also that they include a certain amount of funds supplied by United States residents, they still serve as a proxy measure for United States demands on the Eurodollar market. For example, the liabilities of United States banks to their foreign branches amounted to \$6.9 billion at the end of 1968. The outstanding liabilities had grown to \$13.3 billion by the end of June 1969. After reaching a record high of \$15.0 billion in November, outstanding liabilities fell to \$13.0 billion as of December 31, 1969. (The first half increase in liabilities of \$6.4 billion is comparable with the net increase in demands on the Eurodollar market by the United States and Canada amounting to \$4.8 billion, as shown in Table II.) Although there was a *net* decline of \$0.3 billion in United States liabilities to foreign branches between the June 25 and December 31 reporting dates, United States demands on the Eurodollar market can be seen to have remained at a very high level.

²⁴For example, as of December 31, 1969, the liabilities of United States banks to their own foreign branches represented 88.4 percent of the Eurodollar borrowing recorded on the books of the reporting banks. Branches in United States territories and possessions accounted for 5.4 percent, while 4.1 percent was obtained through brokers and dealers and 2.1 percent was obtained directly. Disaggregate information of this nature is available only from May 1969 and so the "liability to own foreign branches" series remains the best proxy measure.