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THE EUROCURRENCY MARKET

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INTERNATIONAL FINANCE SECTION

DEPARTMENT OF ECONOMICS

PRINCETON UNIVERSITY

Princeton, New Jersey

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International Finance Section

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CONTENTS

PREFACE

Frank Graham is probably best known for his generalization, from two to "N" commodities, of Ricardo's theorem on comparative advantage and international specialization. And his views on world monetary affairs were also influential: Witness his imaginative advocacy of a purely international money in the form of a commodity-reserve currency that would serve both as a unit of account and as a means of payment in transactions among nations.

Graham wrote during the financial chaos of the 1930s and 1940s, when exchange controls and restrictions on converting one national currency into another were rife. He saw his proposal as a way to loosen the financial logjam that was repressing foreign trade and making bilateral barter commonplace. If national currencies could not be exchanged directly, perhaps they could be converted indirectly through a genuinely international money—one whose real purchasing power was guaranteed by its instant redeemability into one or more major primary commodities.

If he were alive today, how would Frank Graham view the totally unplanned but spectacular growth of the Eurocurrency market? Would he consider this worldwide and uninhibited use of a few national fiat monies to be an adequate substitute for his commodity-reserve currency—a plan for issuing an international money whose real value was solidly anchored? Readers can make up their own minds after reading this description and interpretation of the Eurocurrency market.

The Eurocurrency Market

> . . . the volume and nature of transactions in Eurodollars, their large and active turnover, and the wide range of their employment, has constituted an institutional change of the utmost importance. It has created a truly international money market, and has developed a structure of international interest rates that is entirely without precedent.
>
> Paul Einzig (1973)

Introduction

Foreign-currency deposits—those denominated in a currency other than that of the host country—have risen spectacularly in recent years. As of December 1976, the Bank for International Settlements estimated the stock of Eurocurrency deposits to be about $310 billion—bigger than the domestic banking systems of major European countries and more than nine times the size of Eurocurrency deposits outstanding back in 1968 (see Table 1 below). The Eurocurrency system is now the focal point of the international market for short-term capital (deposits and loans of a year or less), and intermediate-term credits of three to seven years are increasingly common. Why then was this incredible growth virtually unforeseen by practical bankers or by academic observers?

In principle, the Eurocurrency market is unnecessary. The clearing of international payments, hedging forward against exchange risk, and short-term credits for trade finance can all be provided by a system in which commercial banks in each country accept deposit liabilities from foreigners and domestic nationals that are denominated exclusively in the currency of that country—one in which only Dutch banks accept guilder deposits and make guilder loans, only American banks accept dollar deposits and make dollar loans, and so on. To finance foreign trade for their customers, these commercial banks can easily obtain spot or forward foreign exchange in the interbank market that operates internationally or draw on balances of foreign currency held with correspondent banks abroad.

Let us define traditional foreign-exchange banking (TFEB) to be this conceptually simple system of "onshore" banking supported by foreign correspondents. Traditional foreign-exchange banking arises naturally

Helmut Mayer and Jürg Niehans provided particularly helpful comments—while maintaining reservations about some of the arguments presented.

from the role of domestic commercial banks as custodians of the national money supply and intracountry payments mechanism. Historically, TFEB has dominated international finance, including the twenty years of rapid growth in trade following the Second World War. For understanding the causes of exchange-rate fluctuations at the present time or the invoicing and hedging strategies of nonbank merchants and manufacturers engaged in foreign trade, the implicit assumption of TFEB is sufficient.

In a Eurocurrency market, by contrast, banks resident in country A accept deposits and make loans in the currencies of countries B, C, D, and so on, and depositors and borrowers are often nonresidents. Despite the semantic connotations, a Eurocurrency system is not necessarily located in Europe. Major Eurocurrency markets exist in Canada, Singapore, Japan, and the Caribbean, as Table 2 makes abundantly clear. Because the U.S. dollar is usually the principal currency traded abroad (see Table 1), the expression "Eurodollar market" often connotes trading in many convertible currencies. Here, however, the term "Eurodollar" is used narrowly to refer only to deposits of U.S. dollars held outside the United States. The term "Euroguilders" refers to deposits of guilders in banks not resident in the Netherlands: "offshore" markets exist in many convertible currencies other than U.S. dollars, as indicated in Table 1.

The rapid emergence in the 1960s of a worldwide Eurocurrency market that coexists and competes with TFEB resulted from the peculiarly stringent and detailed official regulations governing residents operating with their own national currencies. These regulations contrast sharply with the relatively great freedom of *nonresidents* to make deposits or borrow *foreign currencies* from these same constrained national banking systems. On an international scale, offshore unregulated financial markets compete with onshore regulated ones. Gurley and Shaw's (1960) standard analysis of unregulated versus regulated financial intermediaries[1] shows why it is not surprising that the former grow rapidly at the expense of the latter.

The quirks in foreign-exchange controls and national regulations of commercial banking that have created the huge Eurocurrency market remain to be spelled out. But their financial consequences are striking:

1. There is an important *foreign-exchange aspect*: by trading with each other in the Eurocurrency market, commercial banks can more conveniently cover the forward foreign-currency obligations undertaken on behalf of their nonbank customers and engage in covered interest

[1] Gurley and Shaw analyzed purely domestic financial intermediaries, such as tightly regulated commercial banks versus loosely regulated savings and loan associations.

TABLE 1

EXTERNAL POSITIONS IN DOLLARS AND OTHER FOREIGN CURRENCIES OF REPORTING EUROPEAN BANKS FROM EIGHT EUROPEAN COUNTRIES[a]
(*in billions of U.S. dollars*)

	Dollars		*Other Foreign Currencies*						
End of Year	*Total*	*Vis-à-Vis Nonbanks*	*Total*	*Vis-à-Vis Nonbanks*	*Deutsche Marks*	*Swiss Francs*	*Pounds Sterling*	*Dutch Guilders*	*French Francs*
Assets:									
1968	$ 30.4	$ 5.2	$ 7.3	$ 1.2	$ 3.9	$ 1.8	$0.6	$0.3	$0.2
1969	47.6	6.1	10.5	2.2	6.0	3.0	0.6	0.4	0.2
1970	60.4	11.9	17.9	4.7	10.1	5.1	0.6	0.6	0.4
1971	71.5	14.4	28.6	6.8	16.2	8.2	1.6	0.7	0.5
1972	98.0	18.3	33.8	8.0	20.4	7.8	2.2	0.7	0.7
1973	132.1	24.7	55.5	14.0	31.4	15.0	3.1	1.2	1.8
1974	156.2	34.9	58.9	18.1	35.0	14.4	2.1	1.9	1.5
1975	190.2	40.9	68.0	20.5	41.6	15.4	2.0	2.1	2.6
1976	224.0	50.8	81.3	22.7	48.7	17.9	2.2	3.8	2.6
Memorandum-item positions vis-à-vis residents:									
1975	66.5	17.4	22.8	6.6					
1976	74.7	21.3	26.9	7.6					
Liabilities:									
1968	26.9	6.2	6.8	1.5	3.0	2.3	0.8	0.3	0.2
1969	46.2	10.5	10.5	1.3	4.6	4.0	0.8	0.4	0.2
1970	58.7	11.2	16.6	2.5	8.1	5.7	0.9	0.6	0.4
1971	70.8	10.0	27.0	2.7	14.6	7.8	2.1	0.9	0.4
1972	96.7	11.8	35.2	3.6	19.5	8.8	2.2	1.4	1.1
1973	131.4	17.5	60.7	5.6	32.0	17.2	4.6	2.3	2.1
1974	156.4	22.2	64.3	8.1	34.4	18.3	3.6	2.8	2.3
1975	189.5	24.3	69.2	6.7	39.9	15.3	3.1	3.6	3.4
1976	230.0	29.6	80.6	9.0	47.2	15.9	4.0	3.5	3.2
Memorandum-item positions vis-à-vis residents:									
1975	58.2	9.4	19.8	3.2					
1976	64.1	10.7	23.7	4.3					

[a] Belgium-Luxembourg, France, Germany, Italy, Netherlands, Sweden, Switzerland, United Kingdom.
SOURCE: *47th Annual Report, 1976-77*, BIS, 1977.

TABLE 2

EXTERNAL ASSETS AND LIABILITIES OF BANKS IN INDIVIDUAL REPORTING COUNTRIES, THE UNITED STATES, THE CARIBBEAN AREA, AND SINGAPORE, IN DOMESTIC AND FOREIGN CURRENCIES

(in billions of U.S. dollars)

	Domestic Currency			*Foreign Currency*		
	1974	*1975*	*1976*	*1974*	*1975*	*1976*
Belgium-Luxembourg:						
Assets	$ 1.7	$ 1.7	$ 2.4	$ 32.2	$ 39.1	$ 49.4
Liabilities	2.5	2.7	3.4	31.3	37.9	47.5
France:						
Assets	1.1	1.2	1.5	31.8	39.0	48.0
Liabilities	3.7	4.4	3.8	32.5	38.1	48.7
Germany:						
Assets	14.2	21.0	25.9	8.4	10.6	14.3
Liabilities	11.3	13.6	17.4	7.7	9.3	13.7
Italy:						
Assets	0.6	0.4	0.3	12.5	15.0	12.3
Liabilities	1.3	1.6	1.4	13.6	15.0	15.0
Netherlands:						
Assets	2.7	3.5	4.2	13.4	17.4	22.0
Liabilities	2.1	2.2	4.1	12.6	16.4	19.6
Sweden:						
Assets	0.4	0.6	0.8	2.1	2.6	2.9
Liabilities	0.5	0.6	0.7	1.0	1.8	2.3
Switzerland:						
Assets	9.2	9.1[a]	10.9	12.3	16.3	18.4
Liabilities	8.5	4.6[a]	5.1	10.6	12.0	15.3
United Kingdom:						
Assets	1.9	1.7	1.8	102.6	118.2	138.0
Liabilities	9.5	9.2	7.1	111.5	128.2	148.6
Total:						
Assets	$31.7	$39.2	$47.7	$215.2	$258.1	$305.3
Liabilities	39.4	38.9	42.9	220.8	258.7	310.7
Canada:						
Assets	$ 0.4	$ 0.5	$ 0.5	$ 13.5	$ 13.4	$ 17.1
Liabilities	1.6	2.0	2.0	11.7	12.1	14.6
Japan:						
Assets	1.4	1.5	2.1	19.2	18.8	19.6
Liabilities	0.9	1.5	1.9	24.1	25.2	27.2
United States:						
Assets	45.0	58.3	78.8	1.3	1.4	1.8
Liabilities[b]	59.6	58.2	69.8	0.8	0.6	0.8
Caribbean area and the Far East:[c]						
Assets[d]				33.2	51.1	74.9
Liabilities[d]				33.2	51.0	74.1

[a] Break in series due to change in coverage.

[b] Excludes U.S. Treasury bills and certificates held in custody for nonresidents.

[c] Figures for 1974 relate to branches of U.S. banks in the Bahamas, Cayman Islands, and Panama; data for 1975 and 1976 cover branches of U.S. banks in Hong Kong and Singapore as well.

[d] Includes negligible amounts in domestic currencies.

SOURCE: *47th Annual Report, 1976-77*, BIS, 1977, p. 106.

arbitrage—functions that have assumed critical importance with the advent of floating exchange rates.

2. The Eurocurrency market has a purely *domestic intermediation aspect* (within the confines of a single national currency): it supplants financial intermediation between savers and investors that might otherwise flow through a purely domestic capital market, as in the case of the United States during the monetary "crunch" of 1969.

3. The Eurocurrency market is a great *international conduit* for funneling short- and medium-term capital from surplus (net saver) countries to deficit (net borrower) countries, as with the huge flow of funds arising from the formation of the OPEC oil cartel in 1973-74.

The competitive strength of the Eurocurrency market in all three roles accounts for its astonishing growth and resiliency, on the one hand, and the great difficulty academic economists have had in developing a single theoretical model to describe it, on the other. Freedom from restraint has created a paragon of international banking efficiency. Yet the underlying asymmetry vis-à-vis domestic banks has also created an acute problem of second-best optimization for any single monetary authority, and national central banks have responded differently to this problem of regulating transactions in foreign currencies.

Somewhat surprisingly, however, the unregulated Eurocurrency market does not compete with TFEB in all respects. TFEB continues to provide the actual *means of payment* in international commodity trade and in capital-account transactions.

Regulatory Asymmetry: A Potted History

Why should so much Eurocurrency transacting (about 40 per cent according to Table 2) be concentrated in London? One explanation relies on historical experience. Over many decades, financial wisdom and technical skills have accumulated in the great merchant banks, discount and acceptance houses, commodity and stock exchanges, foreign-exchange brokerages, and all-purpose insurance companies located in the City.[2] Prior to 1914, not only was Britain a huge net supplier of saving to the rest of the world, but most world trade was invoiced in sterling and the sterling bill (often discounted or accepted by a London financial house) was the prime instrument of trade finance. In contrast, Britain is now a significant international debtor and the use of sterling by third countries as an invoice currency has sharply declined. But once firmly in place,

[2] For a detailed description of the unrivaled scope of commercial and financial institutions in London serving the international markets before the emergence of a substantial Eurocurrency market, see Clarke (1965).

it is often hypothesized, the accumulated expertise and associated economies of scale in financial transactions are sufficient to allow Britain to thrive as a financial entrepôt by transacting in foreign currencies and managing the savings of foreigners.

There is an alternative explanation. Among major industrial countries, the British have imposed the least regulation of offshore transactions in *foreign* currencies. At the same time, the decline in the international role of sterling has been hastened by an increasingly complex web of exchange controls on sterling transactions. How did these two dramatic, and related, changes in British financial policy come about?

For many years after the Second World War—the era of the great "dollar shortage"—European governments tightly controlled private transactions on current and capital account that involved making payments in U.S. dollars. Purely intra-European payments were progressively liberalized, however, and as a result the City of London provided sterling finance for many individual European firms engaged in European trade. In addition, London provided trade finance for the old sterling area—a large group of ex-colonies such as Australia, Kuwait, India, and Nigeria, which also maintained an imperfect web of exchange controls vis-à-vis the "dollar area." Then, in 1957-58, two regulatory changes triggered the decline of this TFEB in sterling:

1. Partly because of the Suez crisis, but mainly because of higher inflation in Britain than in other European countries, a speculative run on sterling in 1957 threatened the Bretton Woods sterling parity of $2.80. The British authorities placed severe new restrictions on sterling credits to nonresidents and even imposed restraints on sterling credits to countries engaging in third-party transactions *within* the sterling area. Concomitantly, British monetary policy (in sterling) was made very tight, with a sharp increase in the bank rate to a "sensational" 7 per cent that was very high in view of the limited inflationary expectations of the time. In addition, direct ceilings were imposed on bank lending for domestic and foreign purposes; these were relaxed and reimposed in a cyclical fashion in subsequent years (see Yeager, 1976, pp. 441-472).

2. In December 1958, Western Europe returned to full current-account convertibility, including short-term credits incurred in the financing of foreign trade. While some countries retained restrictions on many purely capital-account transactions by nonbanking firms, overt discrimination against dollar transactions was terminated. Authorized commercial banks and major European exporters were given wide latitude to take long or short positions in U.S. dollars, or indeed in any other currency in which they had a trading interest.

These changes, taken together, suggest a shift away from financing third-party trade with sterling credits and deposits in London. The natural beneficiaries were New York banks, which financed trade between third parties using dollars, and TFEB in each of the newly convertible European currencies. Indeed, vigorous TFEB has been restored in many European centers as well as in Japan, where full currency convertibility came somewhat later.

Nevertheless, lingering restrictions on international capital movements in Europe—with the major exceptions of Germany and Switzerland—and the sometimes heavy-handed regulation of domestic banking systems in the form of high reserve requirements, interest ceilings, and arbitrary allocations of bank credit for domestic purposes often served to limit the efficiency and flexibility of European and Japanese commercial banks engaged in TFEB. While subject to much ebb and flow, such regulatory curbs remain in Europe to the present time and were even intensified by many governments (e.g., the French) during the break-up of the Bretton Woods system in 1973 and the advent of floating exchange rates.

In contrast, in 1959-60 the United States imposed no restrictions on capital movements, set modest reserve requirements on commercial banks, and ran a highly developed international market for primary securities of all kinds (including a huge stock of short-term Treasury bills, in which foreign central banks held much of their exchange reserves). Thus the decline of sterling finance in London and the restoration of dollar convertibility for European currencies left the United States well placed to be the dominant world financial center, based on the techniques of TFEB. But this idyllic development, as seen through the eyes of the New York banking community, was soon to be disrupted by the American government:

First, restraints were imposed on the flow of both long-term and short-term capital from the United States by (a) the Interest Equalization Tax, introduced by President Kennedy in 1963, which imposed a substantial levy on the sales of foreign bonds and equities in the United States; (b) guidelines imposed in 1965 on American commercial banks that limited their acquisitions of foreign assets (i.e., curtailed short-term lending to foreigners); and (c) the 1968 requirement that American multinational corporations raise funds for new direct investment (reinvestment) outside the United States.[3]

[3] For a more complete history of these controls, see Yeager (1976, Chap. 27). The imposition of exchange controls on capital account by the American authorities, despite surpluses in the current account of the balance of payments, arose partly from a peculiar accounting definition of a "deficit" in international payments to which the

Second, interest ceilings were imposed on time and savings deposits in U.S. banks. These "usury" restrictions became more onerous as nominal rates of interest rose in the uncontrolled open market because of heightened inflationary expectations, while the ceilings on nominal deposit rates of interest remained relatively inflexible.

Hence, on both the lending and the deposit sides, TFEB in the United States became distinctly less attractive in the early 1960s. While these regulatory distortions were intensified throughout the later 1960s, most were eventually terminated. In 1974, as concern for specific balance-of-payments targets diminished, the controls and levies on capital outflows were lifted entirely. Although now much less onerous,[4] these American controls undoubtedly did much to shift international finance to the Eurocurrency market during its period of rapid adolescent growth.

While the American financial system was thus tying itself in knots, the British authorities began separating deposit and loan transactions in foreign currencies from those in sterling. An important class of British merchant banks—many of which are British residents but American-owned—could accept deposits and make loans in *dollars* (or any currency but sterling) completely free of regulatory restraint. Neither interest ceilings nor reserve requirements are imposed, and only informal monitoring of these transactions is undertaken by the Bank of England. The big British clearing banks, on the other hand, were initially confined to sterling transactions and to TFEB because of their customary cash and liquidity requirements. Eventually, however, even the clearing banks were allowed to undertake Eurocurrency transactions, which are exempt from these requirements.

From the point of view of the British government, an essential element in maintaining this oasis of freedom in foreign-currency transactions is

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American authorities responded. Almost two decades later, in May 1976, the American authorities wisely discarded any formal definition that involves an implicit assessment of equilibrium or disequilibrium transactions in U.S. foreign payments, given the complex role of the American capital market as an international financial intermediary. Also, European governments at that time could and did convert their official dollar holdings so as to deplete the American stock of gold. For a more detailed discussion of the failure of the American authorities to understand their proper monetary role in the world economy, see McKinnon (1969).

[4] Because of competition from the Eurodollar market, the Federal Reserve System allowed the development of a new kind of financial instrument, the certificate of deposit, on which interest ceilings were eventually abolished and against which reserve requirements are kept low. Much like Eurocurrency deposits, certificates of deposit are confined to firms making very large financial transactions: the minimum deposit size permitted by law is $100,000. Repressive controls still exist on smaller-scale time and savings deposits in the form of interest ceilings and reserve requirements.

strict control on the conversion of sterling assets owned by British residents into assets denominated in any other currency—particularly into foreign-currency deposits that also happen to be direct claims on London banking establishments! Except for specially authorized direct investments abroad or the granting of trade credit by exporters, nonbank firms and individuals in Britain can acquire foreign-currency assets only by buying special "investment dollars" at a high premium over the regular commercial exchange rate—say, 30 to 50 per cent.[5] And when such assets are eventually liquidated, an additional 25 per cent of the proceeds must be surrendered to the exchange authorities, so that the pool available for purchases of foreign exchange diminishes continually. The purpose of this investment-dollar control mechanism is to prevent capital flight from sterling by restricting portfolio diversification by British residents into foreign-exchange securities and real estate. Only U.K. companies with a large stake in international trade can hold Eurocurrency deposits. Hence, the unregulated part of the British banking establishment serves mainly *nonresidents*—although in recent years local governmental authorities and private firms in Britain have been entering the Eurocurrency market as net *borrowers* and, as such, have incurred substantial obligations in foreign monies.

Is this remarkable freedom of foreign-currency banking from regulation sufficient to establish London as the principal center for Eurocurrency transactions? Eurocurrency markets still exist in Paris, Frankfurt, Amsterdam, and elsewhere. Why should London dominate? The answer is that, except for small countries such as Singapore, the Cayman Islands, and Hong Kong, which may be mainly tax havens, other European centers are not so free of regulation. At the other extreme, for example, Germany does not accord special treatment to foreign deposits. In normal times, the same reserve requirements and interest ceilings apply to deposits in Deutsche Marks as to deposits in foreign currency. Because the Deutsche Mark is a relatively stable currency, moreover, most banking transactions with foreigners are denominated in DM according to the canons of TFEB (see Table 2). Frankfurt has not become a major Eurocurrency center.

[5] Needless to say, strict controls also exist on Britons trafficking in foreign exchange at the ordinary commercial exchange rate. The *Economist* (May 1976, pp. 78-79) gives some of the legal constraints: All British residents must surrender immediately any foreign currency they own. That includes exporters who are paid in foreign currency. Foreign-currency payments for exports must be received no more than six months after the goods are shipped. Any businessman wishing to buy foreign currency (to pay for imports, for example) must provide his bank with documentary evidence of the underlying transaction. Further detailed and complex rules exist for forward transacting.

(The other major country that does not discriminate in favor of offshore banking is the United States, where Eurocurrency transacting is negligible.) Other European countries and Japan lie somewhere between the extreme British and German approaches to the regulation of Eurocurrency transactions, so that Eurocurrency trading predominates over TFEB except in Germany and the United States.

Countries with convertible currencies and active Eurocurrency markets, such as Belgium, France, Italy, and Japan, often insulate the purely domestic portion of their banking system by a web of exchange controls on capital-account transactions similar to the British. The logic here is straightforward. If there are no controls on capital-account transfers into foreign monies by domestic residents, the authorities tend to regulate foreign-currency deposits more severely to prevent a decline in the use of the domestic currency as domestic money. Among major countries, Britain seems to grant the greatest regulatory freedom to commercial banks accepting deposits and loans in foreign currencies. Consequently, Britain has the greatest need to protect the domain of sterling with exchange controls. The other countries mentioned, however, are not too far behind.

To summarize by returning to the question posed at the beginning of this section, financial expertise—the debris of history—is only a partial explanation of London's importance. On the supply side of financial services, freedom from reserve requirements or interest-rate restrictions gives London in particular—and Eurocurrency centers generally—a competitive advantage in providing higher deposit rates of interest and lower lending rates to each class of borrower. On the demand side, freedom from exchange controls on capital account for nonbanks is necessary in at least some countries (say, Switzerland and the Persian Gulf) to create a pool of funds to be invested in Eurocurrency markets in yet other countries (say, the Bahamas). In addition, in almost all developed countries, *domestic commercial banks*—which are also authorized dealers in foreign exchange—are generally quite free to take positions in foreign currency in these offshore centers.

Hence we can begin our analysis by presuming that banks and nonbanking enterprises which are not subject to effective exchange control and which acquire and want to hold convertible foreign monies are likely to place much of this money with a Eurocurrency bank.

The Mechanics of Transacting and the Scope of the Market

A Eurodollar claim on a London bank has an exchange rate that is exactly one-to-one with a dollar deposit located in New York or San

Francisco. This complete absence of currency (exchange-rate) risk is reflected in the fact that checks drawn on U.S. banks are the means by which payments are made (dollar claims are transferred) within the Eurocurrency system. However, "banking risk" still exists in the sense that depositors have to be worried about the solvency of London banks, mostly affiliates of U.S., Japanese, and Continental European banks.

Almost all Eurocurrency transactions are interbank, and most outstanding deposits are interbank claims, reflecting the highly developed intermediary role of the banks on behalf of their nonbank customers. Much like the spot and forward market for foreign exchange, these interbank loans "are unsecured credits, hence the importance of names attached by would-be lenders" (Einzig, 1973, p. 19). When a Eurocurrency bank receives a deposit not already committed on the lending side, the immediate placement (although not necessarily the ultimate destination) may well be with another Eurobank. The lending bank typically uses a broker, who disguises the "names" of the potential transactors until the deal is near conclusion in order to secure the best offer of an interbank deposit rate of interest. This procedure enables banks to avoid publicizing a firm bid-ask spread at which less than first-rate credit risks may ask to trade, but it ultimately allows trade among established "names" at very close to a standard rate of interest. Indeed, "LIBOR" is the acronym for this standard London interbank offer rate of interest paid by name banks of the highest credit standing. LIBOR is plotted in Figure 1 in the section on "International Capital Transfers."

Suppose now, for illustrative purposes, that Barclays' merchant Eurobank affiliate in London sets up in business with a deposit of $1,020,000 from a French exporter. Having no nonbank customer to service, Barclays then agrees to loan $1,000,000 to the Bank of Tokyo (also located in London) for a period of three months at 4½ per cent per annum (LIBOR). Suppose, for simplicity, that Barclays and the Bank of Tokyo both retain checking deposits with Chase Manhattan in New York. The way in which the transaction influences the balance sheets of all three banks is shown in Table 3. Barclays' checking account in New York declines by $1,000,000, whereas that of the Bank of Tokyo increases by the same amount.

Neither Barclays nor Chase Manhattan questions or puts restraints on what the Bank of Tokyo then does, as they would with commercial credits to their nonbank customers. Indeed, this is the meaning of the taking of names and the use of unsecured credits in the interbank market. However, if the Bank of Tokyo used its New York checking account (or at least part of it) to make payments on behalf of a Japanese commercial importer of Australian wheat, the goods themselves or other securities

TABLE 3

INTERBANK TRANSACTING IN THE EURODOLLAR MARKET

STEP ONE: PRIOR TO INTERBANK LOAN

Barclays (London)		*Chase Manhattan (N.Y.)*		*Bank of Tokyo (London)*	
Assets	*Liabilities*	*Assets*	*Liabilities*	*Assets*	*Liabilities*
$1,020,000 (Deposit with Chase Manhattan)	$1,020,000 (Deposit by a French exporter)	$1,020,000 (Domestic loans and reserves)	$1,020,000 (Deposit by Barclays)	0	0

STEP TWO: AFTER THE INTERBANK LOAN

Barclays (London)		*Chase Manhattan (N.Y.)*		*Bank of Tokyo (London)*	
Assets	*Liabilities*	*Assets*	*Liabilities*	*Assets*	*Liabilities*
$20,000 (Deposit with Chase Manhattan)	$1,020,000	$1,020,000 (Loans and reserves)	$20,000 (Deposit by Barclays)	$1,000,000 (Deposit with Chase Manhattan)	$1,000,000 (Deposit by Barclays)
$1,000,000 (Deposit with Bank of Tokyo)			$1,000,000 (Deposit by Bank of Tokyo)		

in the form of commodity invoices from the importer might be required. Indeed, while the Bank of Tokyo pays 4½ per cent interest on its Euroloan from Barclays, the interest yield normally escalates to, say, 6 per cent on the commercial loan to the Japanese wheat importer, because of the administrative cost and the increased riskiness of the commercial loan compared with the interbank deposit.

The Bank of Tokyo (London branch) is free to lend anywhere in the world at its discretion. Outside the inner group of "name" banks that provide the "wholesale" market for Eurofunds, the credit ratings of potential borrowers of Eurocredits at "retail" (those requiring credit investigations) are typically classified as so many points above LIBOR: the Polish state trading agency may be 3 points above, the central bank of Zaire perhaps 6 points above, Exxon Corporation possibly 1 point above. You and I cannot borrow at all on personal account—the minimum transaction required is simply too large. An increasing number of large loans of intermediate-term credit—three to seven years—are lent by banking consortia who pool the risks involved. To finance a large loan to Brazil, the Bank of Tokyo might team up with the Bank of America (London), Morgan Guaranty (London), the Royal Bank of Canada (London), and so on up to as many as a dozen consortium partners, one of whom usually leads in doing the credit investigation and managing the consortium.

Alternatively, the Bank of Tokyo could simply make a low-cost "quick turn" by lending the funds in a lump sum to another name bank at, say, 4¾ per cent—if LIBOR had risen by one-fourth of 1 per cent in the interim. Yet another simple transfer of checking deposits within Chase Manhattan in favor of this new Eurobank would follow, or Chase might lose the deposits if, say, Wells Fargo was the American correspondent of the new bank.

We see, therefore, that the great volume of dollar transactions among Eurobanks results in a mirror-image shuffling of dollar claims (usually demand deposits) among American correspondent banks in New York, Chicago, or San Francisco. The proximate *means of payment* within the Eurocurrency system is "M_1" in the form of American demand deposits, while the ultimate means of payment among the American correspondents is federal funds (high-powered deposits with the Federal Reserve System). Eurosterling or Euroguilder transactions work in an analogous fashion. For example, Eurosterling transactions in Paris would have their counterpart in the shuffling of sterling demand deposits among the large London clearing banks.

Thus, currency convertibility in the "mother" country whose currency is being used for offshore transacting is essential to provide the means

of payment in the system. Even when the United States imposed capital-account restrictions in the 1960s, foreigners remained free to place deposits in, or withdraw deposits from, American banks in New York or San Francisco. This freedom is essential to Eurodollar transacting. In contrast, Euroyen transacting has not developed to any substantial extent—even in natural offshore markets like that provided in Singapore. Foreigners may be too much hampered by official restrictions when turning over their yen demand deposits with Tokyo banks, and the Japanese government may prefer to keep it that way.

In summary, the popular image of Eurodollars as U.S. dollars that flee to Europe in brown leather satchels and then circulate *independently* abroad is simply incorrect.

Problems of Statistical Measurement: Some Conceptual Difficulties

Because the Eurocurrency system is largely a wholesaler that connects national money markets, it is difficult to choose an appropriate level of aggregation for measuring its size and growth. The most widely accepted statistical series on outstanding *gross* foreign-currency deposits and credits is published by the Bank for International Settlements (BIS). It is reproduced in Table 1 above, and in the middle total in Table 2 above, for a group of eight reporting European countries whose collective net position vis-à-vis outsiders defines the extent of the "market."

More revealing of the scope and nature of the Eurocurrency system is the more "net" compilation in Table 4 of sources and uses of foreign currencies for the same inner group of reporting banks. All commercial and merchant banks accepting foreign-currency deposits in eight European countries (Belgium-Luxembourg, France, Germany, Italy, the Netherlands, Sweden, Switzerland, and the United Kingdom) are included in the BIS reporting procedures. All net foreign-currency placements by nonbanks (say, a franc deposit in a German bank) with this inner circle of banks, plus payments by outside banks, are then counted as *sources* of finance to the market. Similarly, all net foreign-currency loans to nonbanks, plus deposits made in banks *outside* this inner circle, are counted as *uses* of Eurocurrency resources. Since reporting banks undertake extensive borrowing and lending among themselves, all such interbank deposits of foreign currencies are netted out for the inner eight countries to avoid double- or triple-counting the same funds passing through several institutions. Thus, much purely wholesale interbank transacting (though it may serve an important economic function) is eliminated from the BIS data presented in Table 4.

TABLE 4

ESTIMATED SOURCES AND USES OF EUROCURRENCY FUNDS
(*in billions of U.S. dollars*)

End of Year	Reporting European Area		United States	Canada and Japan	Other Developed Countries	Eastern Europe[c]	Offshore Banking Centers[d]	Oil-Exporting Countries[e]	Developing Countries	Unallocated[f]	Total
	Total[a]	Nonbank[b]									
Uses:											
1973	$49.0	$29.5	$13.5	$12.7	$14.7	$ 7.4	$18.7	$ 3.3	$11.0	$1.7	$132.0
1974	61.5	41.3	18.2	18.2	20.4	10.1	26.7	3.5	15.7	2.7	177.0
1975	63.0	43.6	16.6	20.2	25.8	15.9	35.5	5.3	19.5	3.2	205.0
1976	75.1	51.5	18.3	21.6	33.0	20.8	40.7	9.6	24.7	3.2	247.0
Sources:											
1973	50.8	27.5	9.5	9.8	17.7	3.7	12.5	10.0	14.6	3.4	132.0
1974	67.8	36.2	11.9	8.7	18.5	5.1	17.8	29.1	15.5	2.6	177.0
1975	79.5	38.5	15.4	8.3	19.9	5.4	21.8	34.6	16.2	3.9	205.0
1976	87.6	44.7	18.3	10.5	21.3	6.4	30.1	45.2	21.3	5.8	247.0

[a] Includes: (1) under "Uses" the banks' conversions from foreign into domestic currency and foreign-currency funds applied by the reporting banks to the commercial banks of the country of issue of the currency in question (such as DM funds deposited with German banks); (2) under "Sources" deposits by official monetary institutions of the reporting area, the banks' conversions from domestic into foreign currency and foreign-currency funds obtained by the reporting banks from the banks in the country of issue of the currency in question (such as funds received in Deutsche Marks from German banks).

[b] On the "Sources" side includes trustee funds to the extent that they are transmitted by the Swiss banks to the other banks within the reporting area by the Swiss banks themselves.

[c] Excludes positions of banks located in the Federal Republic of Germany vis-à-vis the German Democratic Republic.

[d] Bahamas, Bermuda, Cayman Islands, Hong Kong, Lebanon, Liberia, Netherlands Antilles, New Hebrides, Panama, Singapore, Virgin Islands, West Indies.

[e] Algeria, Bahrain, Brunei, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Oman, Qatar, Saudi-Arabia, Trinidad and Tobago, the United Arab Emirates, Venezuela.

[f] Includes positions vis-à-vis international institutions.

SOURCE: *47th Annual Report, 1976-77*, BIS, 1977, p. 109.

Yet, despite this netting out, neither the sources nor the uses of Eurocurrencies so measured ($247 billion in 1976) reflect a purely "retail" relationship with nonbank enterprises—a conceptual state of bliss for which we strive in defining domestic monetary aggregates. First, banks outside the BIS inner group are major borrowers and depositors in the market. Second, as demonstrated below, switching between foreign and domestic currencies by *any* bank can influence the total size of the "sources" or "uses" statistical aggregate. Thus, the BIS statistical concept stops well short of netting out all interbank transactions. Indeed, interbank deposits still account for 70 per cent of the BIS sources, as shown in Table 5 below. Hence, the commonly accepted BIS measure of the size of the Eurocurrency market is not comparable to domestic monetary aggregates, which measure stocks of monetary assets held by individuals and firms that are not themselves banks.

A further difficulty with the BIS "net" statistical aggregate is its parochial European nature. For example, it omits growth in the "Asian dollar" market centered in Singapore. Like its European counterpart, the Singapore market presents a mixture of wholesale transactions among banks and retail transactions with nonbank firms for which a satisfactory statistical aggregate is difficult to define. Total gross foreign-currency assets of "Eurobanks" in Singapore rose from about nothing in 1968 to over U.S. $12 billion by the end of 1975 (*Annual Report, 1975-76*, BIS, 1976).

Despite this proliferation of Eurocurrency trading in other parts of the world, the European (London) segments seem to dominate in providing a central market for interest-rate determination:

> The opening quotations in the Singapore market are the previous day's closing rates for Eurodollars in London and Europe. During the day there are only minor fluctuations in the rates until late in the afternoon when trading between Singapore and London/Europe commences. Then any difference in the rates between the two markets quickly disappears and the rates equalize at whatever level the Eurodollar market dictates (Emery, 1975, p. 15).

There would thus be some reason for the BIS to stick to its European reporting procedures even if there were sufficiently detailed statistics on other offshore centers. Nevertheless, the scope of the Eurocurrency market is worldwide, with open access to banks or commercial enterprises that are not limited by exchange controls and that feel comfortable dealing with deposits on the order of $250,000 or more. It is not a game in which individuals—the little man—can easily participate.

The Foreign-Exchange Aspect: Covering and Interest Arbitrage

Table 5 reveals the huge share that interbank trading comprises in the Eurocurrency market even when all interbank foreign-currency transactions among the eight reporting countries are netted out. This dominance is superficially puzzling. A certain amount of churning of transactions at wholesale is perhaps necessary to match lenders with ultimate borrowers, but the vast amount of interbank transacting within the Eurocurrency system seems disproportionate if treated merely as a substitute for domestic financial intermediation within the confines of a single currency. And most formal academic models have treated the Eurocurrency market as if it were merely an extension of domestic financial processes (see the commonly used model of the "money multiplier" discussed in the following section).

TABLE 5

SOURCES OF THE EUROCURRENCY MARKET, MID-1975

	Per Cent
Banks:	
1. Commercial banks in the reporting area	16
2. Banks outside the reporting area	29
3. Central banks and other official monetary agencies	25
Total banks	70
Nonbanks:	
4. Domestic nonbank depositors	6
5. Nonresident nonbank depositors	15
6. Trustee funds, including some funds placed in the market by financial holdings and investment trusts	9
Total nonbanks	30

SOURCE: Adapted from Helmut W. Mayer, "The BIS Concept of the Eurocurrency Market," *Euromoney* (May 1976), p. 63, by permission.

The statistical paradox can be resolved, however, if we consider two important economic functions of interbank transacting in Eurocurrencies other than traditional intermediation between final savers and primary borrowers. First, in countries where national capital markets are imperfect, domestic banks may find they can best adjust their reserve positions in the national currency by Eurocurrency transacting, much as the virtually perfect U.S. federal-funds market allows American banks to swap reserves. (This function is discussed in the following section.) Second, interbank transacting in the Eurocurrency market has a key *foreign-exchange* aspect. It allows banks to exchange one national currency for

another (a) in covering forward foreign-exchange commitments they make to their nonbank customers, whose need to hedge against currency risk has become more acute under floating exchange rates, and (b) in undertaking covered interest arbitrage that aligns interest differentials with forward premia or discounts in the forward-exchange markets and in turn reduces the cost of hedging for nonbanks.

To get a feeling for the statistical importance of foreign-exchange transactions, note that BIS reporting banks are counted as original suppliers (sources) when they use funds obtained in domestic currency to switch into foreign currencies and are counted as users when they switch foreign currency into domestic currency. Mayer (1976, p. 60) gives an example:

> A bank in Germany may use Deutschemarks to buy dollars and place the dollars with a bank in London; the London bank may relend the funds to a bank in France which may convert them into French francs. In such a case, the German bank would be shown as a supplier, and the French bank as an end-user of Eurocurrency funds.

Item 1 in Table 5 captures this switching between a domestic and a foreign currency by reporting banks. Of course, switching between foreign currencies by the reporting banks would be netted out and not shown.

It is also likely that banks outside the reporting area (item 2) are, in significant measure, simply covering in the Eurocurrency market the forward transactions they undertake on behalf of their nonbank customers. For example, an Austrian bank may sell DM three months forward to a commercial firm and then cover by switching schillings into DM spot and placing the proceeds in a Euromark deposit in London that matures in about three months. This last transaction would show up as a source of Eurocurrency funds under item 2, whereas the initiating forward-exchange transaction with the commercial firm would not appear. Not only do banks have the peculiar advantage that their "names" are accepted in Eurocurrency transacting, but foreign-exchange restrictions on capital account often force nonbank enterprises to work through "authorized" commercial banks in their home country—a restraint that can preclude direct Eurocurrency transacting by nonbanks.

Because forward covering operations of banks have important economic implications in diminishing the risks associated with flexible exchange rates, perhaps the BIS measure of sources and uses in Table 4 above nets out too much. At least some of the pure foreign-currency transactions among reporting banks in the BIS inner-eight group of countries may reflect hedging or covering operations, as when a German

bank switches out of francs and into U.S. dollars held in London. (Note again that switches from DM into foreign currencies would be captured as a source by the BIS.) The conceptual conflict in what the BIS is trying to do becomes readily apparent. To construct an international monetary aggregate analogous to M_1 or M_2, as applied within any national monetary system, all interbank transactions must be consolidated to get a single net position of the banking system as a whole vis-à-vis nonbanks. However, to measure the importance of *foreign-exchange* hedging and covering operations, we do *not* want to consolidate all interbank foreign-currency transactions.

In addition to the prevalence of interbank transacting, further indirect evidence of the importance of transactions *across* national currencies is the very limited amount of *maturity transformation* undertaken in trading among Eurocurrency banks. Table 6 reproduces data on the maturity structure of assets and liabilities of London-based Eurobanks as of September 1973 and separates data on interbank transacting from claims on and liabilities to nonbanks. The latter exhibit substantial transformation, the average term to maturity of loans to nonbanks (claims) exceeding that of deposits (liabilities), whereas the more prevalent interbank trading is nicely balanced at every term to maturity.

TABLE 6

MATURITY TRANSFORMATION: MATURITY STRUCTURE OF CLAIMS AND LIABILITIES IN NONSTERLING CURRENCIES, ALL U.K.-BASED EUROBANKS, SEPT. 30, 1973
(*in per cent; pound figures in millions*)

	Total		*With Banks*		*With Nonbanks*	
Maturity	*Claims*	*Liab.*	*Claims*	*Liab.*	*Claims*	*Liab.*
Less than 8 days	14.9	19.1	17.1	17.4	8.9	28.4
8 days to <1 month	18.9	19.4	20.6	19.8	13.5	17.6
1 month to <3 months	24.8	26.2	25.7	26.8	22.3	22.3
3 months to <6 months	20.8	20.9	21.6	22.0	18.8	14.9
6 months to <1 year	8.2	8.8	8.8	8.8	6.6	8.8
1 year to <3 years	4.8	2.5	2.9	2.5	9.8	2.7
3 years and over	7.7	3.1	3.3	2.8	20.0	5.4
All maturities	100.0	100.0	100.0	100.0	100.0	100.0
All maturities	£49,774	£49,664	£36,354	£42,313	£13,420	£7,351

SOURCE: *Quarterly Bulletin*, Bank of England (Mar. 26, 1974).

To interpret these data, suppose for a moment that *interbank* transactions arise exclusively form hedging by commercial enterprises. (Other reasons for interbank transacting are provided below.) Importers buy

foreign exchange forward and exporters sell it, meeting under the auspices of their banks in the Eurocurrency market. While purchases and sales of foreign exchange might take place at several maturity dates, generally one would expect no *net* hedging pressure in one direction for any given maturity in any one currency, because the flow of foreign trade is in both directions. Therefore, these purely forward foreign-exchange operations would not cause the deposit side to become more liquid than the loan side. The tremendous depth of available forward deposit and loan maturities allows Eurocurrency banks to quote forward rates of exchange tailored quite precisely to the diverse needs of their nonbank customers (unlike trading in commodity futures, where contracts are written on particular months, and on given days in those months).

A final, striking piece of evidence that the Eurocurrency market is heavily used for forward covering is provided by the measurement of covered interest differentials. National money-market instruments are still subject to various degrees of regulatory control, interest restrictions, and surveillance. Because of this asymmetrical regulation, foreigners may perceive the "political risk" incurred by investing in a domestic-currency instrument in a national money market to be higher than that incurred by investing in foreign-currency deposits in the same country. Moreover, national interest-rate structures on bank deposits and loans are often rigidified by cartel-like arrangements. Because of either exchange controls or cartels, the covered interest differential across Eurocurrency deposits should be closer to zero than across national money-market instruments with the same time to maturity. Aliber (1973, p. 1455) has provided us with empirical confirmation of this hypothesis. The evidence is reproduced in Table 7.

Aliber's example compares forward rates and interest rates on sterling and U.S. dollars. Let us consider theoretically equivalent calculations for two countries that are not Eurocurrency centers and do not provide an international vehicle currency, say, Holland and Sweden, where R_s (guilders/kronor) is the spot exchange rate; R_f (guilders/kronor) is the actual forward exchange rate; r^k is the interest rate on krona assets; r^g is the interest rate on guilder assets. Further, define $\overline{R}_f$ as that *hypothetical* forward rate such that—for given R_s, r^k, and r^g—the interest-rate parity theorem holds exactly:

$$\frac{\overline{R}_f}{R_s} \cdot \frac{(1+r^k)}{(1+r^g)} - 1 = 0 \ .$$

TABLE 7

COMPARATIVE DEVIATIONS OF PREDICTED FORWARD RATES FROM ACTUAL FORWARD RATES, JANUARY 1968-JUNE 1970
(*in per cent per annum*)

Interest Agio (1)	*Mean Deviation* (2)	*Median Deviation* (3)	*Minimum Deviation* (4)	*Maximum Deviation* (5)	*Range of Deviations* (5)−(4)= (6)	*Standard Deviation of Mean* (7)
U.S./U.K. treasury bills	1.94	1.348	−0.25	8.40	8.65	1.93
London dollars/ Paris sterling	0.273	0.168	−0.51	1.72	2.23	0.40

SOURCE: Data compiled by Robert Z. Aliber, "The Interest Rate Parity Theorem," *Journal of Political Economy* (Nov./Dec.), 1973, p. 1455. Copyright © 1973 University of Chicago.

Aliber's testing procedure amounts to comparing R_f with $\bar{R}_f$ when the two interest rates are defined first by national money-market instruments and then by LIBOR on guilder and krona deposits. In the latter case, R_f more nearly approaches $\bar{R}_f$, because freer capital mobility greatly reduces covered interest differentials across Eurocurrencies.

Perhaps one can go beyond simply relying on the relative ease of taking foreign-currency positions in the Euromarkets. The standard model of covered interest arbitrage presumes that forward rates are separately determined, and that arbitrageurs then match forward premia or discounts against intercurrency interest differentials. The real story may be simpler. It seems to be common knowledge that foreign-exchange traders actually use the Euro interest-rate quotations (LIBOR) on currencies to determine their forward bid offer quotations.[6] Since these traders know that they must cover in the Eurocurrency market anyway and that this market is deep relative to the forward market, it would seem that Eurocurrency interest rates dominate forward-exchange quotations. In general equilibrium, of course, forward exchange rates and Euro interest rates are simultaneously determined variables (see Herring and Marston, 1976, Chap. 4).

One small puzzle remains. If the Eurocurrency system has evolved into an integral part of the forward market for foreign exchange, why

[6] I am indebted for this point to Edward Aronson and Peter Naylor, two foreign-exchange traders.

should transactions in Euro*dollars* predominate (see Table 1 above)? Since most world trade takes place outside the United States, should we not observe relatively more active Eurocurrency transacting in other convertible currencies—such as kronor and guilders—by countries that are substantial exporters?

The puzzle can be dispelled by noting that the U.S. dollar is the principle *vehicle* currency in the spot or forward markets for foreign exchange.[7] Direct forward contracting by Dutch or Swedish traders would normally use the dollar as an intermediary currency anyway, because a direct market between kronor and guilders does not exist. For example, a Swedish importer of Dutch tulip bulbs that must be paid for in guilders in three months would contract with his bank to buy guilders for kronor three months hence. To cover itself, the Swedish commercial bank might well buy *dollars* forward for kronor in the interbank market and then sell the dollars forward to obtain guilders: kronor/guilders = kronor/ dollars · dollars/guilders.

This chain of transactions can take place through the forward market directly or, alternatively, by swapping Eurocurrency deposits. For example, the Swedish bank might buy (with kronor) a Eurodollar deposit maturing in three months or so, and then sell that deposit forward in the active forward exchange market between dollars and guilders. This intermediary role of the dollar in foreign-exchange operations would show up statistically as an increase in Eurodollar deposits outstanding, making the latter seem disproportionately large vis-à-vis other Eurocurrency holdings, as appears to be the case in Table 1. Effective covered interest arbitrage between interest-bearing krona and guilder assets also might take place triangularly, the vehicle currency being the dollar.

Liquidity Creation and Domestic Financial Intermediation

Most academic observers focus, not on the foreign-exchange aspect, but on whether the Eurocurrency system is an uncontrolled vehicle for the creation of "money"—a gigantic international liquidity machine under nobody's control. What are the analytical and empirical roots of this concern?

Because the term "deposit" is used to describe the placement of funds in the Eurocurrency market and also connotes the means of payment

[7] Indeed, this central role of the U.S. dollar as a vehicle currency is the main theme of Swoboda (1968). For Swoboda, banking systems in other countries are simply bidding for some of the seigniorage that would otherwise accrue to the United States because of the central role of the U.S. dollar as interbank money.

within a country, Eurocurrency deposits have often been considered a form of money competing with each national currency. And, in recent years, the absolute growth of Eurodollar claims as measured by the BIS has been of the same order of magnitude as the growth of the domestic stock of money held by firms and individuals in the United States—as measured by M_1 or M_2. Moreover, the emergence of worldwide price inflation in the late 1960s paralleled the remarkable growth of the Eurocurrency system in the world economy.

If Eurocurrency deposits are treated as money and we have fractional-reserve banking, then the old idea of multiple deposit creation from some reserve base seems relevant. Indeed, in Table 3, Barclays Eurobank in London holds only a $20,000 demand deposit in Chase Manhattan New York as a "reserve" against outstanding deposit liabilities of $1,020,000. Let us then formalize algebraically the process of increasing Eurocurrency "reserves," and multiple deposit creation arising therefrom, within the confines of a single currency.[8] Let r be total demand deposits held by Eurobanks in American correspondents, with r amounting to a small fraction ρ of deposit liabilities e:

$$r = \rho e \ . \tag{1}$$

Assuming some notion of portfolio balance between American and overseas dollar holdings, suppose that Eurodollar deposits are a linear function of *total* liquid dollar assets M^*, where M^* is defined as the U.S. money supply M (deposit claims on American banks plus coin and currency) less Euroreserves plus Eurodeposits:

$$e = \epsilon M^* + \alpha \ , \tag{2}$$

where

$$M^* = M - r + e \ . \tag{3}$$

For a given M, (1), (2) and (3) together describe the effect of a shift in asset preferences from U.S. dollars to Eurodollars—the shift being conveniently embodied in a change in the parameter α. This sets in train a multiple expansion in M^* when new Eurocredits are granted. The proportion ϵ of the proceeds of these credits is redeposited in Eurobanks. In final equilibrium, the total incremental creation of Eurodollars is thus given by the multiplier

[8] I am using the notation and analytical procedure suggested by Niehans and Hewson (1976, p. 3). Earlier seminal articles on the subject of multiple deposit creation are Friedman (1969) and Machlup (1970).

$$\frac{de}{d\alpha} = \frac{1}{1 - \epsilon(1 - \rho)} . \tag{4}$$

Clearly $de/d\alpha$ is positively related to ϵ—the redeposit rate—and negatively related to ρ—the reserve ratio. The fact that ρ is very low—on the order of 2 to 5 per cent—is offset by ϵ also being low (i.e., the leakage from the Eurocurrency system is high). Niehans and Hewson compare the broad definition of the American M_2—say $641.3 billion at the end of 1973—to the BIS estimate of "net" sources of Eurodollar deposits of over $100 billion at the end of 1973. For illustrative purposes, let $\rho = 0.033$ and $\epsilon = 0.16$. From equation (4), the total increase in Eurodeposits from an increase in α can then be calculated: $de/d\alpha = 1.18$—a relatively modest number and of the same order of magnitude as the initial transfer of dollar claims from the United States to Europe.

More revealing is the multiplier impact on M^*—the total stock of dollar liabilities—of a shift in dollar deposits from the United States to Europe. Solving equations (1), (2), and (3), but this time eliminating e, we have

$$M^* = \frac{1}{1 - \epsilon(1 - \rho)} + \frac{(1 - \rho)\alpha}{1 - \epsilon(1 - \rho)} . \tag{5}$$

From an exogenous shift in α the multiplier is

$$\frac{dM^*}{d\alpha} = \frac{1 - \rho}{1 - \epsilon(1 - \rho)} = 1.15 . \tag{6}$$

Given that ρ is "small," and accepting Niehans and Hewson's parameter estimates for ϵ, a shift from the United States to Europe increases the total stock of dollar deposits by slightly more than the amount of the transfer. Hence, multiple deposit creation from any single isolated transfer of funds from the United States is of limited importance, and this model of the market seems quite "stable" in the context of this kind of shock. However, *continual* movement from the United States to Europe would be capable of increasing the outstanding stock of dollar deposits virtually without limit, even though the multiplier impact of any one such shift is modest.

How likely is a continual shifting of dollar deposits from the United States to Europe? Unlimited multiple deposit creation from an increasing reserve base of the standard textbook kind assumes implicitly that interest rates are fixed and that there is an excess demand for bank credit at those

interest rates (see Tobin, 1971). Niehans and Hewson suggest that a flow of deposits to Europe (because of changed portfolio preferences) will bid down Eurodeposit rates of interest, which are unregulated and are ultrasensitive to demand and supply. This bidding down of interest rates in Europe will dampen the flow of deposits or drive them back to the United States, because American banks are actively providing a competing monetary asset in the form of interest-bearing certificates of deposit. Assuming that the commodity price level exhibits stability in the short run, it seems unlikely that a monetary explosion could be generated from a series of exogenous shifts in dollar deposits from the United States to Europe.

"Uncontrolled" deposit creation in Europe could occur only if misguided regulatory policy rendered American time-deposit rates of interest uncompetitive and gave undue incentive to large American business firms to hold dollar deposits overseas so as to earn much higher rates of interest. Such perverse policy did in fact occur in 1969, when nominal rates of interest on Eurodollar deposits rose sharply above the "Q" ceilings on equivalent assets in the United States and American parent banks in New York could borrow freely from their European affiliates with, effectively, a zero reserve requirement against such borrowing. The consequences are portrayed in Table 8. Multinational corporations switched their holdings on a large scale from dollar deposits in New York to dollar deposits in London. The result was a sharp and "artificial" run-up of Eurodollar deposits that were "borrowed" back by New York banks. However, the whole process was quickly reversed in the early 1970s, when certificates of deposit in large U.S. banks were freed of interest restrictions, after American reserve requirements against certificates of deposit were reduced to about 3 per cent and a 10 per cent reserve requirement on overseas borrowing by American banks was imposed by the Federal Reserve Board.

There is a more basic reason, however, for not worrying about "excess" liquidity creation in the Euromarkets. The statistical aggregates compiled by BIS, measuring the size of the Eurocurrency market, are simply not comparable to M_1 or M_2 as currently measured in the United States. Mayer (1976) makes dramatically clear that only 30 per cent of the BIS "sources" to the Eurocurrency market represents deposit claims of *nonbanks* (Table 5, items 4 to 6). Of these nonbank foreign-currency deposits, those owned by domestic residents (item 4) are already counted in the monetary aggregates of reporting countries, whereas "trustee funds" (item 6) have financial liabilities that may well be less liquid

TABLE 8

BORROWINGS BY U.S. BANKS IN THE EURODOLLAR MARKET, 1963-71
(*in billions of U.S. dollars*)

Years	*Size of Eurodollar Market*[a]	*Borrowings from Branches by U.S. Banks*
1963	$ 5.0	$ 1.04
1964	9.0	1.18
1965	11.5	1.35
1966	14.5	4.04
1967	17.5	4.24
1968	25.0	6.04
		Maximum 14.35 in Sept. 1969
1969	37.5	12.81
1970	46.0	7.68
April 1971	47.0	5.17

[a] As measured by the BIS for the U.K., Belgium, the Netherlands, France, Germany, Italy, Sweden, and Switzerland.

SOURCES: From BIS *Annual Reports* and *Federal Reserve Bulletin*, compiled by Patricia Decoster.

than their Eurocurrency claims. Only the stock of nonresident deposits held by nonbanks (item 5) is a strong candidate to be classified as an alternative monetary asset that is now *not* counted in national monetary aggregates. As of mid-1975, item 5 represented only 15 per cent of the BIS "sources" aggregate; in any case, it is quasi-money, more akin to certificates of deposit than to demand deposits.

Nevertheless, allowing banks in any one country to adjust their liquidity positions in the Euromarket may also be important when national money markets are imperfect. If a domestic bank in country A found itself with a reserve shortage, it could (by raising interest rates) bid for Eurodeposits directly in currency A. If a Euromarket in currency A was not well established or regulations prohibited taking offshore deposits in domestic currency, the domestic bank could bid for Eurodollars and swap them for domestic reserves. In a floating-rate system, where A's central bank is not obligated to purchase dollars and provide domestic reserves on demand, there would be no net increase in domestic bank reserves or any loss of monetary control.

Once it is understood that Eurocurrency deposits are primarily of an interbank character and that little maturity transformation takes place between deposits and loans (Table 6 above), it can be seen that relatively little *net* liquidity is created. The liabilities of the Eurobanks are about

as liquid as the claims. The Eurocurrency market is therefore mainly a vehicle for readjusting the liquidity positions of financial institutions (for domestic reasons or because of foreign-exchange transactions) rather than a net creator of liquidity. As such, the direct inflationary consequences of its growth need not induce indigestion or heartburn.

As Mayer points out, however, the *indirect* consequences may well be important if the Eurocurrency system speeds the transmission of monetary disturbances from one country to another, as happened in the last years of the old fixed-rate Bretton Woods regime. If the expansionary effects in some countries are only slightly offset by contractionary effects in others, as may be the case, inflationary impulses will show up in the rapid growth of *domestic* monetary aggregates in most participating countries.

International Capital Transfers

Minimizing the importance of the Eurocurrency market as a net creator of liquidity in no way detracts from its role as a great international conduit for transferring capital net from one country to another. The enormous recycling of funds made necessary by the formation of the OPEC oil cartel in 1973 would not have proceeded so smoothly in the absence of the Eurocurrency system. However, one must carefully distinguish *gross* from *net* capital flows. The spectacular growth of the market's size, as measured by the BIS statistical aggregates in Tables 1 or 4 above, does *not* reflect a one-to-one correspondence with net international transfers of capital:

1. The forward covering of foreign-exchange positions assures us that importers and exporters—as represented by their banking intermediaries —will normally take somewhat offsetting positions in the Eurocurrency market. For example, "liquid" importers from country A may be holders of Eurodollar deposits against forward-exchange obligations; so might liquid importers from country B. Exporters from both countries might then be borrowers of Eurodollars—either directly or indirectly. Any number of such gross flows of capital may arise from granting or receiving trade credits that are then covered against foreign-exchange risk.

2. The unregulated Eurocurrency market extends financial intermediation between savers and investors within the same country, often within the domain of the domestic currency. The sharp increase in Eurodollar deposits in 1969 by American firms, which were simply withdrawing their certificates of deposit from New York, did not reflect any international net transfer of capital. Insofar as the regulation of domestic capital mar-

kets in convertible-currency countries remains onerous, the Eurocurrency market will continue to grow at the expense of purely domestic financial intermediaries.

However, a substantial but unknown proportion of what remains undoubtedly represents a net transfer of claims on real resources from one country to another. For the oil-exporting countries alone, the excess of exports over imports in 1972 was about U.S. $13 billion; it then rose to a peak of over $86 billion in 1974. Subsequently, in 1975, this trade surplus declined to about $58 billion (see *International Financial Statistics*, various issues). Of course, a trade surplus is not the same as the total surplus to be financed on current account, but the order of magnitude and ebb and flow are indicative. On the other side of the same coin, we note that the most liquid part of OPEC's claim on foreigners—what are called OPEC's "International Reserves" by the IMF—rose from $8.5 billion at the end of 1972 to about $43.0 billion at the end of 1975. Perhaps as much as two-thirds were held as Eurocurrency deposits.

The complex layering of financial intermediaries in the Eurocurrency market and the latter's close connection to purely domestic capital markets make it next to impossible conceptually and statistically to ascribe definite amounts of the recycling to the Eurocurrency market, to the American capital market, to official international institutions such as the IMF or the World Bank, and so on.[9] Nevertheless, it is clear that the anonymity, the flexibility in swapping among various currencies (the foreign-exchange aspect), and the ultra-sensitivity of short-term Eurodeposit rates of interest to demand and supply make the Eurocurrency market valuable at the margin to those creditworthy borrowers or depositors without access to other well-defined financial channels. And, judging by the very rough BIS estimates of the deployment of OPEC's investible surpluses in 1974-76, reproduced in Table 9, the Eurocurrency system was particularly important in 1974, when the magnitude of the oil surplus seemed to take both importers and exporters by surprise.

The flexibility of the Eurocurrency system is important in preventing two kinds of mismatching in the recycling process:

1. Mismatching across currencies, where the mix of convertible-currency assets desired by OPEC investors differs from the mix of currencies

[9] This layering of financial intermediaries also makes the assets of any one country more difficult to expropriate and thus reduces the political risk within the Eurosystem. For example, if relationships between Russia and the United States were to deteriorate, Russia might default on those loans that come directly from the United States but could not identify the sources of funds channeled through London. On the other hand, the United States might freeze direct Soviet dollar deposits in New York but would have little control over indirect dollar claims channeled through the Bahamas.

TABLE 9

OIL-EXPORTING COUNTRIES: ESTIMATED DEPLOYMENT OF INVESTIBLE SURPLUSES
(*in billions of U.S. dollars*)

Items	*1974*	*1975*	*1976*
Bank deposits and money-market placements:			
Dollar deposits in the U.S.	$ 4.0	$ 0.6	$ 1.6
Sterling deposits in the U.K.	1.7	0.2	− 1.4
Deposits in foreign-currency markets	22.8	9.1	12.6
Treasury bills in the U.S. and U.K.	8.0	− 0.4	− 2.2
Total	36.5	9.5	10.6
Long-term investments:			
Special bilateral arrangements	11.9	12.4	10.3
Loans to international agencies	3.5	4.0	2.0
Government securities in the U.S. and U.K.	1.1	2.4	4.4
Other[a]	4.0	7.4	8.0
Total	20.5	26.2	24.7
Total new investments	57.0	35.7	35.3

[a] Includes equity and property investment in the United States and the United Kingdom, and foreign-currency lending.

SOURCE: *Annual Report, 1976-77*, BIS, 1977, p. 92.

in which oil-importing countries wish to borrow. As a practical matter, countries with inconvertible currencies cannot issue acceptable debt in domestic money to foreigners; even most debtor countries with convertible currencies find the credit market limited unless they borrow in well-known currencies such as DM, U.S. dollars, Swiss francs or—in an earlier era—British sterling. Among these internationally acceptable currencies, loans must still be matched to deposits. Fortunately, the interest sensitivity of the Euromarket can fairly easily balance net supply and demand in each currency for given expectations of future exchange-rate movements on the part of both depositors and lenders. Even if primary depositors and ultimate borrowers are rather interest insensitive, a highly developed forward market for foreign exchange permits banks to engage in covered interest arbitrage across currencies. Hence, the menu of currency obligations of final borrowers can differ from the menu of currency assets held by primary savers—with banks acting as financial intermediaries in this "currency transformation."

2. Mismatching across countries, where OPEC depositors hold claims on some convertible-currency countries in excess of their oil deficits (say, Switzerland, Germany, and the United States), while other creditworthy

countries with large oil deficits do not receive such a direct capital inflow from abroad (say, Sweden, Korea, and Brazil). But capital is fungible. Eurobanks in London can use the proceeds from dollar deposits to lend to Brazil. Either London banks can offer a higher rate of interest than American or German banks, or they can borrow dollars from their American affiliates (in the absence of U.S. exchange controls) if OPEC depositors are determined to hold their funds in the United States. Of course, American banks—even if regulated—have been able to compete by providing the same intermediary service, since exchange controls fortunately were largely removed in 1974. It can be seen from Table 2 above that dollar claims of American banks on foreigners also increased rather sharply from 1974 to 1976. Thus, the world capital market facilitates both currency transformation and country transformation in the international recycling of oil revenues and other monies—always in the context of the convertible-currency system. What might have been major bottlenecks in a world of rigidly controlled national monetary systems in 1973-77 are nonproblems in free Euromarkets—supplemented by greatly improved regulatory conditions in the United States. (Of course, countries with little or no debt-service capacity cannot borrow in a free market and must rely on government-to-government grants or loans from official international agencies.)

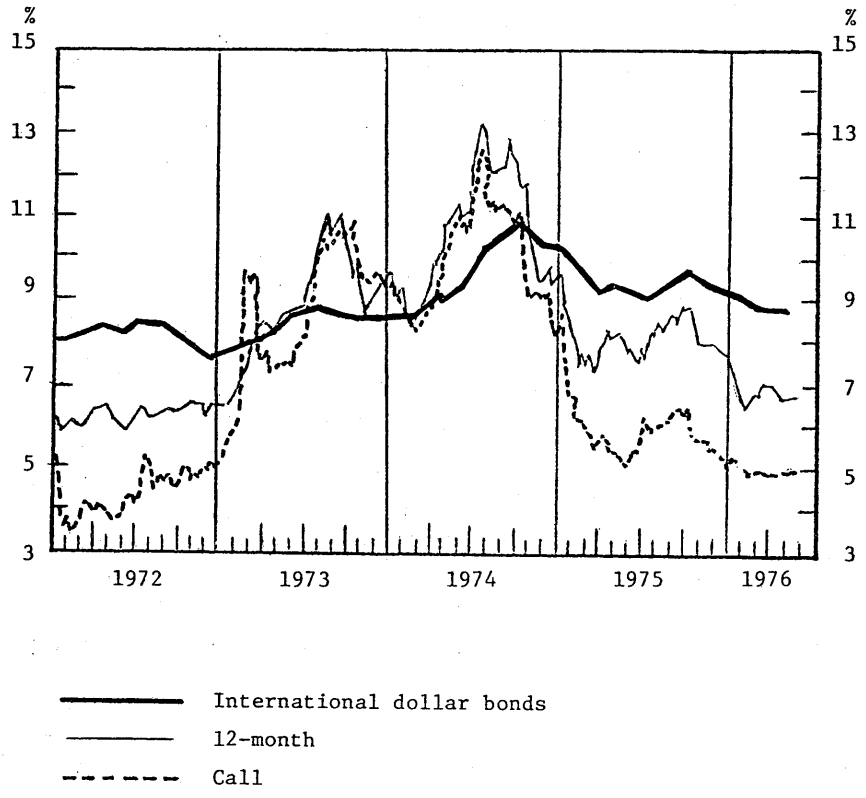
Flexible as it was, why then did the international capital market appear temporarily to seize up in mid-1974? Stories appeared in the financial press in 1974 that some Eurobanks refused to accept large OPEC deposits, some creditworthy borrowers were being turned away, and there was insufficient equity capital in the Eurobanking system to service the oil transfers. The situation was exacerbated at the time by the failure of two large banks, Herstatt and Franklin National, because of unsuccessful speculation in foreign exchange. This temporarily dampened interbank trading on the basis of "names"—the very heart of Eurocurrency transacting. The disappearance of this seeming financial incapacity by the end of 1974 was due, I believe, to a realignment of short- and long-term rates of interest in the Eurocurrency market (and in the United States) and to the restoration of general confidence in the major "name" banks.

What caused the initial misalignment in the term structure of interest rates? Business activity in the United States and in much of Europe culminated in a cyclical peak in 1973 and 1974, at a time when the monetary authorities were determined to slow inflation. As a result, a situation of "tight money" drove short-run deposit rates of interest extraordinarily high relative to longer-term bond rates (see Figure 1). Call interbank lending (deposit) rates of interest—those based on first-class credit

"names"—rose to 12 or 13 per cent in the Eurocurrency market in 1974, while comparable long-term rates remained at 9 to 10 per cent, as shown in Figure 1. This unusual conjunction of interest rates also occurred in the United States and other major national money markets. Thus short rates exceeded long when the full force of the oil shock—the need to transfer huge funds from OPEC to oil-importing countries—struck in 1973-74. I hypothesize that *this inverted maturity structure of interest rates*, arising out of a particular stage in the business cycle, *was precisely wrong for matching the portfolio preferences of OPEC depositors (lenders) to final borrowers*—firms and governments in the rest of the world

FIGURE 1

EURODOLLAR DEPOSIT RATES AND EURODOLLAR BOND YIELDS
(*end-of-month rates and weekly averages*)



SOURCE: *Annual Report, 1975-76*, BIS, p. 91.

that were net importers of oil. It also accentuated the crisis in bank confidence, because many commercial banks ran at a bookkeeping loss in paying more on their short-maturity deposits by nonbanks than they were earning on their older, but longer-term, loans to nonbanks.

Unaccustomed to the deluge of revenue and nervous about both possible retaliation through expropriation of their convertible-currency assets and significant fluctuations in exchange rates, the OPEC investors tried to invest mainly at very short term. Indeed, time deposits for seven or eight days—or simply overnight money—in relatively large discrete lumps were commonplace. In contrast, governments and enterprises in the oil-importing countries wanted to borrow at much longer term, because several years might elapse before their exports expanded sufficiently to cover the amortization costs of current borrowings. These inconsistent preferences were greatly accentuated by the unusual inversion of the interest-rate structure. It prevented banks from engaging in their normal limited amount of maturity transformation: borrowing at short term and lending long to nonbanks. Banks became unwilling to transact at the inverted interest rates, and both potential depositors and borrowers were turned away.

Fortunately, however, interest rates were not pegged. The pressure from depositors drove down short-term rates of interest rather sharply by early 1975 to less than half their former levels (Figure 1), whereas the demand for the longer-term Euro and other credits maintained long rates of interest. (This unraveling of the interest-rate inversion was accentuated by the cyclical downturn in business activity in late 1974.) When short-term rates of interest fell, the portfolio preferences of depositors for longer-term assets were enhanced, as was the willingness of the private banking system to engage in maturity transformation. The apparent impasse in the deposit-lending process was resolved, and talk in the financial press of the inadequate capacity of the international banking system simply disappeared. The flexibility of the Eurocurrency system undoubtedly contributed to this successful resolution of the financial aspect of the transfer problem, as did the fall in yields on American certificates of deposit.

This brief interest-rate impasse did not cause even a temporary breakdown in the recycling process! OPEC countries receive oil revenues in convertible foreign currencies—largely U.S. dollars. This means of payment ensures that financial recycling will occur automatically irrespective of whether such funds are successfully "invested" in Eurocurrency deposits or in national money markets in Germany, the United States, or other countries. The interest-rate impasse did complicate the problem of

TABLE 10

INTERNATIONAL BOND ISSUES[a]

(in millions of U.S. dollars)

Borrowing Countries or Areas	*Eurobond Issues*				*Foreign Issues*			
	Total	*U.S. Dollars*	*Deutsche Marks*	*Private Placements*	*Total*	*In U.S.*	*In Switzerland*	*Private Placements*
Western Europe:								
1974	$ 1,430	$ 430	$ 370	$ 800	$ 1,400	$ 360	$ 650	$1,130
1975	4,570	1,350	1,770	1,450	2,840	840	1,760	1,360
1976	5,440	3,750	1,200	850	4,860	1,180	3,210	2,730
Canada:								
1974	440	380	—	350	1,960	1,930	30	800
1975	1,150	610	—	310	3,380	3,100	280	830
1976	3,010	1,570	40	150	5,870	5,530	340	3,850
U.S.:								
1974	110	100	—	10	80	—	80	30
1975	310	220	—	80	140	—	40	120
1976	410	400	—	120	30	—	—	30
Other developed countries:[b]								
1974	330	220	110	10	150	30	120	130
1975	2,220	1,340	700	610	1,010	380	600	650
1976	2,070	1,510	510	310	1,480	690	790	660
Rest of the world:[c]								
1974	140	120	—	10	790	650	20	520
1975	470	230	80	150	480	460	20	240
1976	1,040	450	300	160	810	600	110	200
International institutions:								
1974	2,070	1,830	160	1,780	3,410	620	90	2,650
1975	1,480	1,060	340	840	3,980	1,980	670	1,340
1976	2,960	2,050	730	1,710	4,960	2,270	770	1,650
Total issues placed:								
1974	4,520	3,080	640	2,960	7,790	3,590	990	5,260
1975	10,200	4,810	2,890	3,440	11,830	6,760	3,370	4,540
1976	14,930	9,730	2,780	3,300	18,010	10,270	5,220	9,120

[a] Based on IBRD and OECD sources. [b] Australia, Japan, New Zealand, and South Africa. [c] Includes Eastern European countries. SOURCE: *Annual Report, 1976-77*, BIS, 1977, pp. 118.

distributing OPEC resources to "needy" borrowers, but not the aggregate transfer itself. In making payment to Saudi Arabia, one can imagine Exxon's checking account in Chase Manhattan (New York) falling by $1 million and Saudi Arabia's checking account in the same American bank rising by $1 million. The funds have been automatically recycled the instant that payment is made. Of course, the Kingdom of Saudi Arabia may not be happy holding a non–interest-bearing checking account in New York, and Chase may not be able to lend immediately to an oil importer outside of Chase's normal commercial ambit. The portfolios of all participants are hardly in equilibrium. But recycling has occurred nevertheless. Talk in 1974-75 that private channels in the international financial system were incapable of effecting such an enormous financial transfer was based on a misconception of how the system works. (Again, one should mention that the treatment of countries that are worthy, but not creditworthy, potential borrowers is necessarily more the concern of government and official agencies.)

An important consequence of eliminating the inverted structure of interest rates of 1973-74, and of dampening inflationary expectations over 1975-77, was to lengthen the term structure over which international borrowing and lending take place. Confidence is still somewhat fragile and can easily be upset by renewed inflationary expectations. Yet the lengthening term structure of the international capital market is rather well reflected in the increased importance of new international bond issues. Although still small in comparison to bank deposits and loans, total bond placements increased from about $12 billion in 1974 to about $33 billion in 1976, as indicated in Table 10. Besides the large increase in Eurobond issues from $4.5 billion to $14.9 billion, foreign bond issues in domestic capital markets—almost wholly confined to the United States and Switzerland—also increased remarkably from 1974 to 1976 (see Table 10).

A Concluding Note on Regulation

My analysis suggests

- that the "uncontrolled" Eurocurrency system is not now directly an engine of inflation—of excess liquidity creation—as is often posited.
- that the foreign-exchange aspect of the market is particularly valuable in a regime of floating exchange rates.
- that the growth of the market would slow down naturally if onerous regulation of domestic money markets was relaxed.

· that the flexibility of the Eurocurrency system has at times served the world economy extraordinarily well in transferring capital, and no *prima facie* case for joint international regulation or supervision exists under current institutional arrangements.

· that countries and islands should continue to set policy individually regarding the use of exchange controls to shield differential regulation of domestic- and foreign-currency deposits or bond issues if and only if at least some major international currencies remain freely convertible on both current and capital accounts.

Besides the more general third-party benefits they confer to socialist and less developed countries, freely convertible national currencies remain the life blood of the Eurocurrency system. Valuable though it is, the Eurocurrency market by itself provides no substitute for using a few widely accepted national monies to organize international trade.

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