

ESSAYS IN INTERNATIONAL FINANCE

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AN INCREASING ROLE FOR THE ECU:  
A CHARACTER IN SEARCH OF A SCRIPT

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RAINER STEFANO MASERA



INTERNATIONAL FINANCE SECTION

DEPARTMENT OF ECONOMICS  
PRINCETON UNIVERSITY  
PRINCETON, NEW JERSEY

## ESSAYS IN INTERNATIONAL FINANCE

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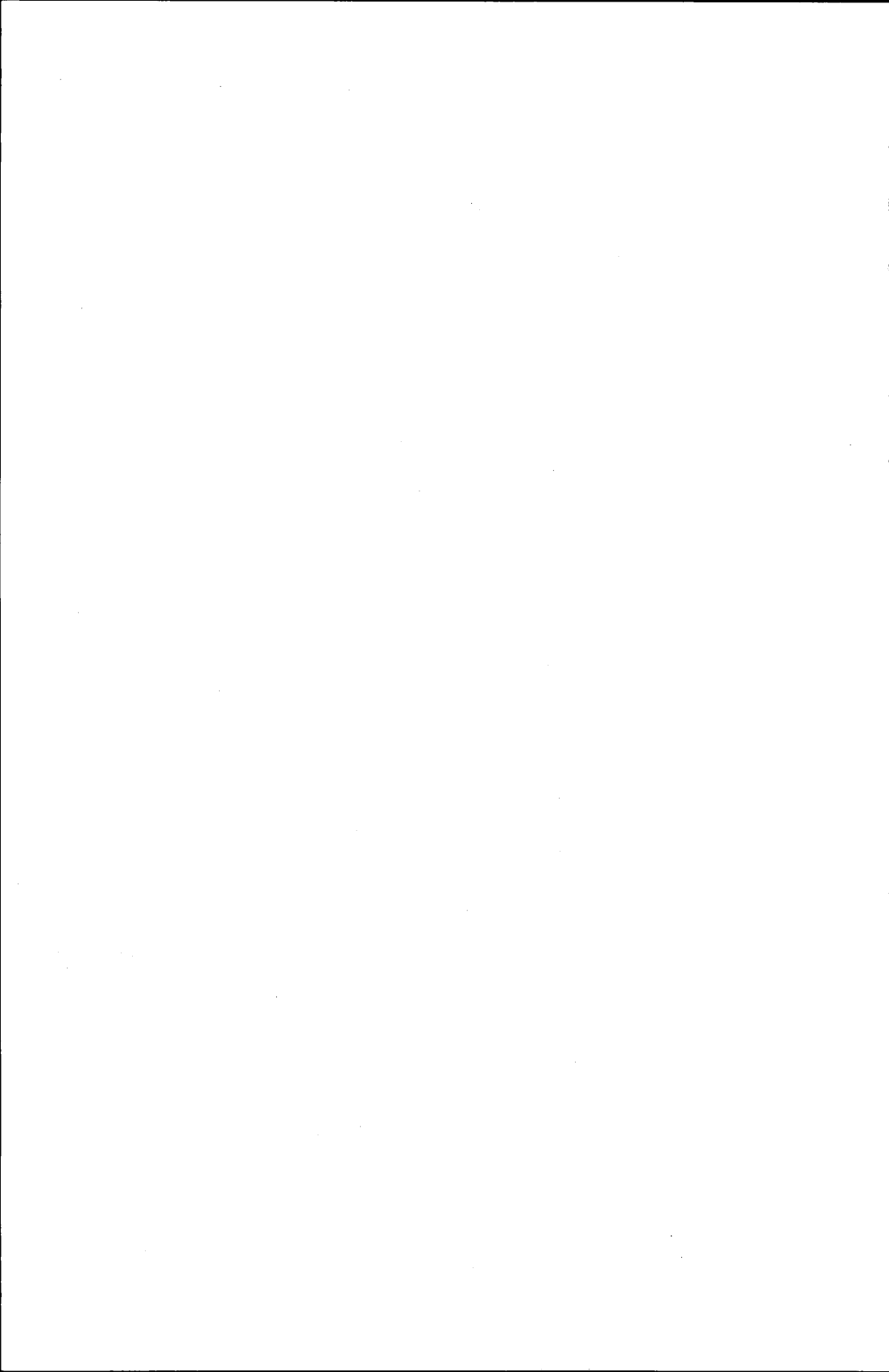
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## GLOSSARY

BIS	=	Bank for International Settlements
EC	=	European Community
ECU	=	European Currency Unit
EMCF	=	European Monetary Cooperation Fund
EMS	=	European Monetary System
ERM	=	Exchange Rate Mechanism
EUA	=	European Unit of Account
MESA	=	Mutual ECU Settlement Account
SWIFT	=	Society for Worldwide Interbank Financial Telecommunications
VSTF	=	Very-short-term financing



## AN INCREASING ROLE FOR THE ECU: A CHARACTER IN SEARCH OF A SCRIPT

### 1 Introduction

The European Currency Unit has two aspects—official and private. The link between the two is that the value of both is fixed to the same basket of European Community (EC) currencies. They differ, however, with respect to the way they are created, the credit standing of the issuing entities, the returns they offer, and their usability. The official ECU, which is governed by the rules of the European Monetary System (EMS), is used as an international financial instrument, but only in a restricted sense and only by EC central banks, which hold official-ECU positions vis-à-vis the European Monetary Cooperation Fund (EMCF). The private ECU is basically a Eurocurrency that has acquired the character of an international currency, especially for EC market operators, albeit still on a relatively modest scale. Recently, some EC central banks have also built up holdings of ECU deposits with the international banking system. Although these are clearly part of the foreign-exchange reserves of the central banks, they must still be regarded as “private” ECUs and not “official” ones as previously defined.<sup>1</sup>

This essay focuses on the growing use and future prospects of the ECU. It points out the advantages of establishing a more direct link between the official and the private sides of the ECU so that the ECU can acquire more of the attributes of both a reserve asset and a common European currency, and it explores the ways and means of doing so.

Section 2 briefly reviews the development of the ECU in the official field and section 3 its development in private markets. The advances made so far by the official ECU have fallen short of the original objective of making the ECU “the center of the EMS.” Nevertheless, its role has been far from insignificant, and a potentially important package of measures designed to improve its usability has recently been adopted. By contrast, the development of the private ECU in both credit and foreign-exchange markets has exceeded the expectations of most observers.

While a number of factors help explain the rapid growth of the private-ECU market, section 4 argues that the main one is the rational portfolio behavior of European operators engaged in international financial transactions. Standard “efficient portfolio” analysis covering the period of operation of the

<sup>1</sup> See facing page for a glossary of acronyms used in this essay.

EMS shows that the ECU has attractive properties, especially for risk-averse investors, in countries with strong currencies as well as in countries with weak ones.

Section 5 assesses the two most important suggestions now under consideration for giving the ECU a central role in the EMS, (1) that the ECU be developed into a full-fledged international reserve asset, and (2) that it gradually acquire the status of a true European currency, functioning in parallel with domestic currencies. My contention is that the two schemes should be viewed as complementary.

International reserve assets must be liquid and fully convertible into other currencies, represent a stable store of value, and provide a competitive return. The portfolio results reported in section 4 suggest that the private ECU has some of these properties while the official ECU has important defects, notably in terms of transferability and convertibility. Following an approach originally suggested by Kenen (1983) for the SDR, section 6 presents a scheme that could be carried out without institutional changes to improve the properties of the ECU by making the official and private ECUs interchangeable.

The counterpart of an expanding use of the official ECU would be its increasing role as a substitute for domestic-currency borrowing and lending, leading to its use as a parallel common currency. Section 7 discusses problems of money and credit control that might arise and points out major differences between the Euromarkets and the ECU.

Section 8 concludes that the proposed two-pronged development of the ECU could become an important instrument with which to foster European monetary integration without threatening monetary stability and credit control. It stresses, however, that this would be so if, and only if, EC governments and citizens did not see such advances as *alternatives* to the necessary adjustment of domestic monetary conditions.

## **2 A Brief Overview of the Development of the Official ECU**

According to the December 5, 1978, Brussels resolution of the European Council that established the EMS, its purpose was the "creation of closer monetary cooperation leading to a zone of monetary stability in Europe." The resolution also stated that the ECU would be at the center of the EMS. It would be used as the numeraire for the exchange-rate mechanism, as the basis for detecting divergencies between Community currencies, as the unit of account for the operations of intervention and credit mechanisms, and as a means of settlement between monetary authorities of the European Community. To serve the last function, a stock of "primary" ECUs would be created through revolving swap arrangements. Participating central banks

would obtain ECUs by depositing 20 percent of their gold and dollar reserves with the EMCF (Committee of Governors, 1985, pp. 13 ff.).

The 1978 Brussels resolution was a compromise between two models of the EMS that had been explored in the technical discussions preceding the establishment of the system. The first model would have used the ECU as the parameter for defining central rates and intervention obligations around prescribed margins. Under this scheme, only one currency at a time would have reached the prescribed margin. The second model, based on the workings of the earlier exchange-rate mechanism known as the "snake," relied on bilateral central and intervention rates. The second approach was adopted, but as a compromise a "divergence indicator" was introduced to single out the deviating currency upon which the burden of adjustment would primarily fall (EC Monetary Committee, 1978, and Ludlow, 1982, Chap. 6.2).

In spite of the considerable technical ingenuity that went into its construction, the divergence indicator gradually lost importance, in part as a result of increased reliance on discretionary unilateral intervention before exchange rates reached the margins for compulsory intervention. The system has therefore evolved *de facto* in the direction of the second model, but there has been a decline in the importance of obligatory interventions at the points defined by the margins around the bilateral central exchange rates. From a formal point of view, devaluations and revaluations are still arranged in terms of the ECU, but this has no economic significance. It is impossible *ex ante* to define all central rates in terms of the ECU.

To make possible the use of Community currencies for compulsory intervention at the margins, the central banks of the countries participating in the Exchange Rate Mechanism (ERM) of the EMS arrange mutual very-short-term credit facilities (VSTF) in unlimited amounts. (These countries are Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, and the Netherlands. The United Kingdom and Greece are part of the EMS but not of the ERM.) Spot sales and purchases of Community currencies are credited or debited against the central banks' ECU accounts with the EMCF as of the "value date," or day of intervention. In this way, "secondary ECUs" are created in the form of net creditor and net debtor positions.

A financing operation falls due for repayment forty-five days after the value date, with the possibility of an automatic three-month extension of the settlement date at the request of the debtor central bank. If settlement is not made by means of holdings in the creditor's currency, it is accomplished entirely or in part by transferring "primary ECUs," with the proviso that a creditor central bank is not generally obliged to accept ECUs in settlement of more than 50 percent of its claim.<sup>2</sup> If settlement is only partially effected through ECU

<sup>2</sup> Note that the EC central banks can hold working balances in Community currencies within

transfers, the balance is settled by transferring other reserve assets in accordance with the composition of the reserves of the debtor central bank.

While the official ECU has had some importance in the actual operation of the EMS, it has not played the pivotal role some originally envisaged. It has been confined to serving as an official reserve asset and as a unit of account for the VSTF and settlement. Even in this respect, its use has been somewhat limited, largely because dollar interventions have predominated, accounting for two-thirds of total interventions, while mandatory marginal interventions have accounted for only about 10 percent (see Table 1 and Micossi, 1985, for a detailed analysis).

Since the general exchange-rate realignment of March 1983, recourse has not often been made to interventions at the margin and to the VSTF arrangement. To explain why, I must first draw a distinction between two types of intervention in Community currencies:

- *Symmetric monetary-base interventions* occur whenever the intervening central bank uses reserves held at the central bank of the country whose currency is being used, thereby causing simultaneous opposite movements in the monetary bases of the two countries. Interventions at the margin that resort to the VSTF mechanism or spot settlements in official ECUs have this property. Unless sterilized, they imply a contraction of the monetary base in the weak-currency country and an expansion in the strong one.
- *Asymmetric monetary-base interventions* occur when one central bank uses private-market reserves—Eurocurrency or domestic private banking assets—in the other currency. In this case, apart from absorbing or releasing commercial-bank reserves held against domestic deposits subject to reserve requirements, these interventions affect only the monetary base of the country that initiates them, not of the country whose currency is being used.

Since the 1983 realignment, all central banks have sought by preventive intramarginal interventions to avoid the tensions that necessarily arise when exchange rates reach their bilateral margins. This has led some central banks to suggest extending use of the VSTF to finance intramarginal interventions. Any such automatic extension has been firmly resisted by strong-currency central banks, however; presumably they want to maintain control over their domestic monetary policies, which would be impaired by symmetric monetary-base interventions.

These contrasting preferences led to a compromise solution. A “mobilization clause” was introduced as part of a larger package adopted in 1985 to im-

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limits laid down by the Committee of Governors. These limits may be exceeded only with the consent of the central banks concerned.

TABLE 1  
FOREIGN-EXCHANGE INTERVENTION BY COUNTRIES IN THE ERM  
(in billions of U.S. dollars)

	March 1979- March 1983	April 1983- Dec. 1985
U.S. dollars:		
Purchases	34.8	18.8
Sales	107.0	49.1
ERM currencies:		
At the limits <sup>a</sup>	28.0	7.9
Intramarginal:		
Purchases	11.8	27.9
Sales	22.5	15.7
Other currencies: <sup>b</sup>		
Purchases	0.1	3.2
Sales	2.4	0.7
Total:		
Gross	206.6	123.3
Net <sup>c</sup>	-85.2	-15.6
Memorandum items:		
Recourse to VSTF	20.9	3.4
Use of ECU for settlements of interventions	6.9	0.1

<sup>a</sup> Interventions at the limits involve balanced purchases and sales; the two are therefore taken together.

<sup>b</sup> The figures for 1985 include some interventions in the private ECU market.

<sup>c</sup> A minus sign indicates net sales.

NOTE: According to BIS recording practices, intervention figures do not include operations such as customer transactions, swaps with commercial banks, and forward settlements or other transactions that constituted a significant source of positive changes in gross official reserves. This explains why the recorded total change is a high negative figure.

SOURCE: Updated figures from Micossi (1985).

prove the usability of the official ECU. In view of the potential importance of this package for expansion of the ECU in the private markets, I briefly describe its contents (for more detail, see Committee of Governors, 1985, Instrument of 10th June 1985):

a. The mobilization mechanism enables EC central banks in need of intervention currencies to mobilize their net creditor positions in the EMCF, together with some of the ECUs that the EMCF allocated to them against the deposit of gold and dollar holdings. The EC central banks have agreed to facilitate such mobilization operations by providing dollars in proportion to their outstanding ECU swaps with the EMCF (but not in excess of those swaps). The dollars provided in this way may be exchanged for EC currencies with the approval of the central banks issuing those currencies. Mobilization

operations run for three months, are renewable for a further three-month period, and bear interest at market rates. In exceptional circumstances, a central bank may opt out partly or entirely from participation in such operations.<sup>3</sup>

b. The payments ratio limiting settlements in official ECUs of obligations arising from the use of the VSTF (the acceptance limit) remains at 50 percent as a general rule, but this limit can now be waived to the extent that the recipient central bank is itself a net debtor in ECUs.

c. The return on net positions in ECUs and on ECU-denominated claims under the VSTF has been improved. The interest rate was previously the weighted average of the official discount rates of the member countries; it is now a weighted average of representative money-market rates in those countries.

d. Central banks of nonmember countries and international monetary institutions such as the BIS, which are accorded the status of "other holder" by the EMCF Board, may obtain official ECUs from EC central banks by means of repurchase agreements or reversible swap transactions. "Other holders" are entitled to the same return on their ECU holdings that EC central banks receive on their net ECU positions.

### **3 The Rapid Development of the Private ECU**

In March 1975, before the inception of the EMS, a new European Unit of Account (EUA) was introduced by the Community with a basket-type definition like that subsequently adopted for the ECU (see Allen, 1986, pp. 3-4). It was used in private financial markets as an indexation device for credit contracts (see Aschheim and Park, 1976, and Committee of Governors, 1985, pp. 73-75). But it was not until the inception of the EMS and the establishment of the ECU that its use grew substantially in these markets. The ECU market has shown remarkable growth in terms of both credit and exchange transactions. Because excellent reviews of recent developments are available (see, e.g., BIS, 1985, pp. 127-133, and Allen, 1986), I will deal briefly here only with what I regard to be the key features of this expansion.

#### *The Private ECU Banking Market*

The private ECU banking market has grown very significantly compared with other currency sectors of the international banking market, especially from 1982 to 1985. By the end of 1985 it ranked fifth, with a share of more than 3 percent (Table 2). The expansion was mainly the result of borrowing by nonbank residents in Italy and France (see Table 3); expecting broad exchange-rate stability within the EMS, they were attracted by the lower inter-

<sup>3</sup> The first activation of the mobilization scheme took place in December 1985 at the request of the Bank of Italy.

TABLE 2

GROWTH OF THE ECU BANKING MARKET COMPARED WITH OTHER SECTORS OF THE INTERNATIONAL BANKING MARKET IN EUROPE:  
 AMOUNTS OUTSTANDING, END 1982-END 1985  
*(in billions of U.S. dollars)*

Currency <sup>a</sup>	1982		1983		1984		1985	
	Assets	Liabil- ities	Assets	Liabil- ities	Assets	Liabil- ities	Assets	Liabil- ities
U.S.\$	832.4	869.5	869.2	908.5	893.4	943.9	924.8	978.6
DM	155.9	141.6	150.0	135.6	142.9	132.6	204.1	191.2
SwF	79.0	71.5	77.0	70.7	67.6	62.1	103.1	92.8
¥	30.6	31.8	28.9	33.4	32.6	32.0	71.6	68.3
ECU	6.5 <sup>b</sup>	5.5 <sup>b</sup>	11.9	10.0	28.2	22.3	54.2	48.2
£	15.5	18.0	14.8	16.4	16.6	17.6	26.1	29.1
Other	63.8	67.4	70.2	69.8	63.9	64.7	88.1	94.9
Total	1,183.7	1,205.3	1,222.0	1,244.4	1,245.2	1,275.2	1,472.0	1,503.1

<sup>a</sup> See the Table of Currency Symbols on p. 34.

<sup>b</sup> Estimated.

NOTE: Domestic and foreign positions of banks in Europe only.

SOURCE: BIS quarterly statistics on international banking developments.

TABLE 3  
STRUCTURE OF THE ECU BANKING MARKET: AMOUNTS OUTSTANDING AT END-1985  
(in billions of ECUs)

	Belgium	Luxem- bourg	France	Italy	Nether- lands	United Kingdom	Other Countries <sup>a</sup>	Total	M.I. <sup>b</sup>
Assets of banks from:									
Nonresidents:									
Banks	6.9	3.2	8.5	4.7	3.1	7.5	1.1	35.0	31.1
Nonbanks	1.4	1.8	1.5	—	0.5	1.5	1.1	7.8	6.9
Residents:									
Banks	2.0	1.8	4.3	0.8	0.3	2.7	0.2	12.1	10.8
Nonbanks	<u>0.1</u>	<u>0.2</u>	<u>1.7</u>	<u>2.7</u>	<u>0.2</u>	<u>0.5</u>	<u>0.7</u>	<u>6.1</u>	<u>5.4</u>
Total	10.4	7.0	16.0	8.2	4.1	12.2	3.1	61.0	54.2
Liabilities of banks to:									
Nonresidents:									
Banks	5.6	2.6	7.4	7.6	1.4	8.2	2.3	35.1	31.2
Nonbanks	0.8	1.3	0.5	0.2	0.6	0.2	0.1	3.7	3.2
Residents:									
Banks	1.9	2.0	4.3	0.8	0.3	2.4	0.2	11.9	10.6
Nonbanks	<u>0.3</u>	<u>0.8</u>	<u>0.1</u>	—	<u>1.5</u>	<u>0.6</u>	<u>0.3</u>	<u>3.6</u>	<u>3.2</u>
Total	8.6	6.7	12.3	8.6	3.8	11.4	2.9	54.3	48.2

<sup>a</sup> Austria, Denmark, Germany, Ireland, Spain, and Sweden.

<sup>b</sup> Memorandum item in billions of U.S. dollars.

NOTE: "Banks" includes other entities not explicitly identified as nonbanks by the banks reporting to the BIS.

SOURCE: BIS quarterly statistics on international banking developments.



est cost of ECU borrowing. It can be estimated that at end-1985 Italian enterprises accounted for ECU 5.4 billion of the ECU 13.9 billion in total loans granted by banks to nonbanks, of which ECU 2.7 billion were from Italian banks and ECU 2.7 billion from banks located in other countries. The corresponding figures for French enterprises were ECU 2.4 billion, of which ECU 1.7 billion were from French banks and ECU 0.7 billion from other banks. Italian and French final borrowers thus accounted for 55 percent of total ECU bank loans to nonbanks.

On the deposit side, funds have traditionally come primarily from Belgium and Luxembourg. It is worth noting, however, that in 1985 Dutch residents were major suppliers of funds—an important development, since it refutes the argument that the ECU cannot be attractive to residents of strong-currency countries. Indeed, there is no reason why the expectation of relative intra-EMS exchange-rate stability that probably led Italian and French residents to borrow in ECUs should not induce Dutch and German residents to lend in ECUs.<sup>4</sup> At end-1985 banks in Belgium and Luxembourg accounted for ECU 3.2 billion (44 percent) of total nonbank deposits in ECUs, but nearly two-thirds of these deposits came from nonresidents, mainly of Dutch and German nationality. If an estimated ECU 0.5 billion of Dutch deposits with banks domiciled in Belgium-Luxembourg is added to the ECU 1.5 billion of Dutch deposits held in domestic banks, the total amounts to nearly 30 percent of the ECU bank-deposit base.

To put the expansion of the ECU market into perspective, a comparison should also be drawn between the ECU-denominated assets and liabilities of Community nonbank residents and their overall assets and liabilities vis-à-vis banks. As Table 4 shows, in spite of the recent very rapid growth of the private ECU, ECU loans and deposits still represent only a small proportion of total liabilities and assets—0.7 and 0.2 percent respectively.

In all Community countries, with the notable exception of Germany, the ECU is treated—*de jure* or *de facto*—as a foreign currency. ECU transactions are permitted, but they fall under foreign-exchange restrictions against capital outflows, which, although declining, still exist in Denmark, France, Greece, Ireland, and Italy. Thus the controls impede the ability of residents to establish ECU deposits with banks in other countries.

Capital movements are unrestricted in Germany, so its citizens can acquire ECU deposits with banks not domiciled in Germany. Nevertheless, Article 3, paragraph 2, of the Currency Act prohibits residents from entering into indexed debts unless explicitly authorized by the Bundesbank, and the ECU falls under this provision, because it is treated in Germany as a unit of

<sup>4</sup> Market operators point out also that unless a realignment is anticipated in the short term, certain categories of savers in strong-currency countries show a preference for nominal yields higher than those available on their domestic currencies.

TABLE 4  
 COMMUNITY NONBANK ECU-DENOMINATED ASSETS AND LIABILITIES VIS-A-VIS  
 BANKS AND THEIR OVERALL SUPPLY AND RECOURSE TO BANK CREDIT MARKETS:  
 AMOUNTS OUTSTANDING AT END-MARCH 1985  
 (in billions of ECUs)

	Outstanding Borrowing			Outstanding Deposits		
	In ECUs (1)	Overall <sup>a</sup> (2)	(1) as % of (2) (3)	In ECUs (4)	Overall <sup>b</sup> (5)	(4) as % of (5) (6)
Domestic banks	7.7	1,488.3	0.52	1.9	1,465.7	0.13
Foreign banks	<u>3.0</u>	<u>155.3</u>	<u>1.93</u>	<u>1.3</u>	<u>71.6</u>	<u>1.82</u>
Total	10.7	1,643.6	0.65	3.2	1,537.3	0.21

<sup>a</sup> Domestic bank lending to the private sector in EC countries and international bank lending to EC residents (excluding Greece).

<sup>b</sup> Broad money stock in EC countries and externally held bank deposits of EC residents.

SOURCE: BIS (1985) and quarterly statistics on international banking developments; Committee of Governors of the EEC Central Banks, monthly statistics.

account rather than a foreign currency. Accordingly, German banks cannot issue ECU deposits to residents and German residents cannot incur ECU liabilities.<sup>5</sup> The main objections commonly raised by the Bundesbank to declaring the ECU to be a currency or placing it on an equal footing with a currency are as follows: (a) the ECU is not backed by any independent monetary authority responsible for its internal and external value; (b) there is no guarantee of the ECU's continuity of value as long as changes in the weights in the basket can be decided upon by the competent authority; (c) there is no institution or arrangement ensuring ready convertibility of the ECU into reserve currencies; (d) there is no clear way to establish a role for the ECU as an intervention currency. A strict line on these points is reported by Whalig (1985), and a somewhat more open one by Poehl (1985). For an opposite view

<sup>5</sup> The Currency Act was passed in 1948 as part of the currency reform carried out by the occupying powers with a view to establishing and guaranteeing the DM's monopoly as legal tender. Under the Currency Act, residents must be authorized by the Bundesbank if they wish to use currencies other than the DM. With the introduction of the Foreign Trade and Payments Act in 1961, residents were allowed to enter into foreign-currency commitments with nonresidents. In that year, moreover, the Bundesbank issued a general authorization permitting foreign-currency commitments between residents. This general authorization does not apply to the ECU, which is governed by the regulations on indexation clauses. Over the years, in the interest of a stability-oriented monetary policy, the Bundesbank Central Council has always avoided giving authorizations of this sort in connection with money or capital transactions.

and the legal arguments supporting it, see Carbonetti (1987) and Harlandt (1986). See also the discussion of these points in section 7 below.

Largely in view of these institutional factors, the private ECU market continues to be dominated by nonbank *borrowers*. As can be seen from Table 3, only about half of total ECU loans granted by banks to nonbank final borrowers (ECU 13.9 billion) are accounted for by nonbank deposits (ECU 7.3 billion). The banking system covers the rest (a) by borrowing the corresponding basket currencies directly, (b) by borrowing a single currency and simultaneously covering in the forward market, or (c) by borrowing private ECUs from central banks, which hold ECU bank deposits as foreign-exchange reserves.<sup>6</sup>

These factors and the complex web of lending and borrowing that links final savers and users of funds help explain the importance of interbank transactions. Interbank claims and liabilities in other currency sectors of the international banking market correspond to some 70 percent of overall claims and liabilities. Interbank claims and liabilities in ECUs comprise about 75 percent on the assets side and 85 percent on the liabilities side.

#### *The Private ECU Bond Market*

In 1985, for the first time, the ECU rose to fifth place among currencies in which foreign bond offerings were denominated (Table 5). Italy, France, and the EC institutions were the largest borrowers. In Italy, especially, ECU issues to residents have become significant. In 1984 and 1985, however, there was increasing participation by non-EC countries and institutions, and notably by operators based in the United States and Japan.<sup>7</sup> In 1982, over 90 percent of total ECU issues were accounted for by EC borrowers; by 1985, the share had declined to some 60 percent.

#### *The Private ECU Exchange Market*

The private ECU exchange market has also expanded significantly. The aggregate daily turnover in Community countries can be roughly estimated at ECU 2.5 to 3 billion. Of this, Belgium and the United Kingdom account for ECU 0.8 to 1 billion and Italy for 0.5 billion. Turnover in Denmark, France, and the Netherlands is between ECU 0.2 and 0.4 billion. In every country except Italy, interbank transactions exceed trade-related transactions.

<sup>6</sup> The perception of many market operators is that the imbalance is progressively narrowing, not only because of central-bank deposits but also because of the issue of new instruments, such as certificates of deposit, to raise funds from nonbanks directly in ECUs.

<sup>7</sup> While Japanese borrowers are tapping the market for genuine diversification purposes, it appears that prime U.S. borrowers have been attracted to the ECU market mainly to benefit from the marginally lower cost they enjoy compared with European borrowers. The ECU funds raised are then often swapped against dollars with European borrowers.

TABLE 5  
CURRENCY DISTRIBUTION OF EXTERNAL BOND OFFERINGS  
(in percent)

Currency <sup>a</sup>	1982	1983	1984	1985
U.S.\$	63.9	57.0	64.2	61.0
SwF	15.0	17.5	11.8	8.9
¥	5.0	5.3	5.4	7.7
DM	7.1	8.6	6.0	6.7
ECU	1.1	2.8	2.6	4.2
£	2.6	3.9	5.0	4.0
A\$	...	0.3	0.3	1.8
Can\$	1.6	1.4	2.0	1.7
DGlr	1.1	1.2	0.8	0.6
Other	<u>2.6</u>	<u>2.0</u>	<u>1.9</u>	<u>3.4</u>
Total	100.0	100.0	100.0	100.0
Memorandum item:				
Total issues (in billions of U.S.\$)	75.5	77.2	111.5	167.8

<sup>a</sup> See the Table of Currency Symbols on p. 34.

SOURCE: Organization for Economic Cooperation and Development.

As a result of the growth of the ECU exchange market, spreads between buying and selling rates of the Community currencies compared with the ECU are, on average, not too different from those recorded by the Community currencies compared with the dollar. The ECU is now quoted officially in Amsterdam, Athens, Brussels, Copenhagen, Lisbon, Milan, Oslo, Paris, and Rome. Forward markets are still limited, however, although future contracts in ECUs have been launched in Chicago and New York, and options have recently been introduced.

A potentially important development for the private ECU exchange market is the previously mentioned involvement of some EMS central banks (see Table 6). Before 1985, interventions in private ECUs (i.e., market purchases or sales of ECUs against domestic currencies) were prompted by the desire to maintain orderly conditions in the ECU market. In 1985, however, interventions also aimed in some instances at stabilizing the domestic currency. Total interventions amounted to some ECU 2.4 billion on a gross basis, the bulk of which were conducted by the Bank of Italy.

In December 1985, net holdings of private ECUs by Community central banks amounted to 1.7 billion, or 2 percent of their foreign-exchange holdings. One-third of these reserves were held by the Bank of Italy, accounting for 5 percent of Italy's total foreign-exchange reserves. The structural imbalance between final borrowers and final lenders in the ECU market is thus partly offset by central-bank deposits.

TABLE 6  
CENTRAL-BANK TRANSACTIONS AND HOLDINGS IN PRIVATE ECUS,  
JANUARY 1984–DECEMBER 1985  
(in millions of ECU<sup>s</sup>)

	Total European Community		Italy	
	1984	1985	1984	1985
Purchases against domestic currency <sup>a</sup>				
On the Market	61	1,530	57	275
Off the Market	1,078	1,589	898	1,071
Sales against domestic currency <sup>a</sup>				
On the market	...	870	...	759
Off the market	43	165	25	103
Purchases against foreign currency	33	151	...	50
Sales against foreign currency	1,026	1,358	819	760
Other transactions (net) <sup>b</sup>	36	-177	25	...
Increase-decrease in ECU net holdings	130	708	136	-226
Net holdings at end of period				
In absolute terms	953	1,662	776	550
% of foreign-exchange holdings	1.12%	2.22%	4.49%	5.10%

<sup>a</sup> Purchases and sales by each central bank of private ECUs against domestic currency on the market (i.e., interventions) and off the market (e.g., transactions with customers or uptake of the proceeds of government borrowing abroad).

<sup>b</sup> Other receipts and payments in private ECUs (e.g., interest received and paid on outstanding assets and liabilities in private ECUs).

SOURCE: Committee of Governors of the EEC Central Banks.

Recall that private-ECU interventions have “asymmetric” monetary-base properties, in contrast to official-ECU interventions. Furthermore, since a purchase or sale of ECUs is also a purchase or sale of the domestic currency, to the extent of its weight in the basket, ECU interventions must be larger than other interventions to achieve the same exchange-rate effect.

#### 4 Reasons for the Growth of the Private-ECU Market

A number of explanations have been advanced for the growing use of the ECU by private operators. In my view, the explanation must be sought in the synergistic interaction of these factors: (a) the basket properties of the ECU; (b) the effects of the exchange-rate and economic-policy commitments made

by the countries participating in the ERM; and (c) the general process of financial innovation (the latter point was made by Poehl, 1985, and convincingly developed by Levich, 1986).

For many European operators, the ECU's total yield—exchange rate plus own interest—reduces exposure in international asset and liability management. At the same time, the ready-made basket reduces transactions costs compared with the costs of transactions in individually mixed currency cocktails.

Since the inception of the system, participants in the ERM with traditionally weak currencies have generally more than offset the expected depreciation of their currencies by offering higher nominal interest rates. Thus, particularly from March 1983 to July 1985, importers and exporters in Italy and France were attracted to the ECU as an instrument for international borrowing by its relatively low interest rate and its limited anticipated appreciation against the domestic currency. By contrast, savers in the Benelux countries were moved to buy ECU bonds by yields higher than those available on domestic bonds and by the lower exchange-rate risk compared with the acquisition of assets in high-interest currencies. Moreover, residents of France and Italy seeking portfolio diversification found that purchases of ECU bonds were a partial substitute for purchases of assets in foreign currencies, which were discouraged by foreign-exchange restrictions.

There is some truth to the argument that the growth of the private ECU owes much to the uncertainty about Community exchange and interest rates arising from its unsatisfactory progress toward monetary integration, but this should not be overrated. It is no coincidence that the years 1982-85—a period of relative stability in intra-EMS exchange rates and sharp fluctuations in quotations against the dollar—saw the most significant expansion of the private-ECU market.

The explanation of the growth of the private-ECU market can be subjected to empirical analysis by examining the role of the ECU in a rational portfolio strategy for the European resident engaged in international financial transactions.<sup>8</sup>

First, the usual mean-variance model can be used to assess the relative attractiveness of the various currencies. In this approach, a meaningful comparison must be made sequentially, by taking each currency in turn as the "domestic" currency and comparing each foreign currency as a mutually exclusive option. (The variability of the domestic currency against itself reflects the variability of the domestic interest rate and is typically much lower than

<sup>8</sup> Important technical contributions along these lines have been made by Hamaui (1985) and Jorion (1986). As Ciampi (1981) explains, the fixed-quantities definition of the official ECU was chosen to allow private operators to replicate the official basket, thereby fostering private use of the ECU and exploiting its portfolio properties.

the variability of a foreign currency, which includes the variation in the relevant exchange rate.)

The analysis covers the entire period of floating, March 1973 to December 1985. Two subperiods are also considered, March 1973 to March 1979 and the period since the inception of the EMS. In order to extend the analysis to the entire period, the present currency definition of the ECU is carried back to 1973. In addition to the ECU and all its component currencies, the U.S. dollar, the Japanese yen, and the SDR basket on its 1985 definition are also considered. Average data for interest rates, exchange-rate variations, and total returns are computed on a quarterly basis; interest rates refer to domestic money-market instruments.

Over the entire period of floating, the DM, the dollar, and the yen showed approximately the same return (see Figure 1). As to currency baskets, the SDR performed better than the ECU, mainly as the result of two long waves in the dollar exchange rate, with a low tide in the first half of the period and a high tide in the second half, which was broadly contemporaneous with the EMS experience (Figure 2). The two long waves are broken by strong cross-currents: the dollar-appreciation phase came to an end in February 1985, and a significant decline took place thereafter. These developments are summarized in quantitative terms in the Appendix. Tables A.1a and A.1b report both the interest-rate and the exchange-rate components. They also show the standard deviations of recorded returns.

FIGURE 1  
COMPOUNDED RETURN IN DOLLAR TERMS OF MONEY-MARKET INVESTMENTS  
IN FIVE CURRENCIES, 1973I-1985IV

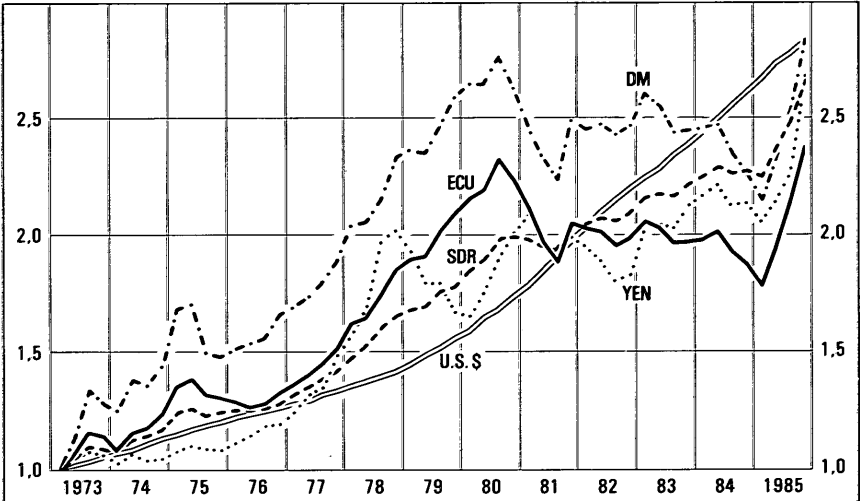
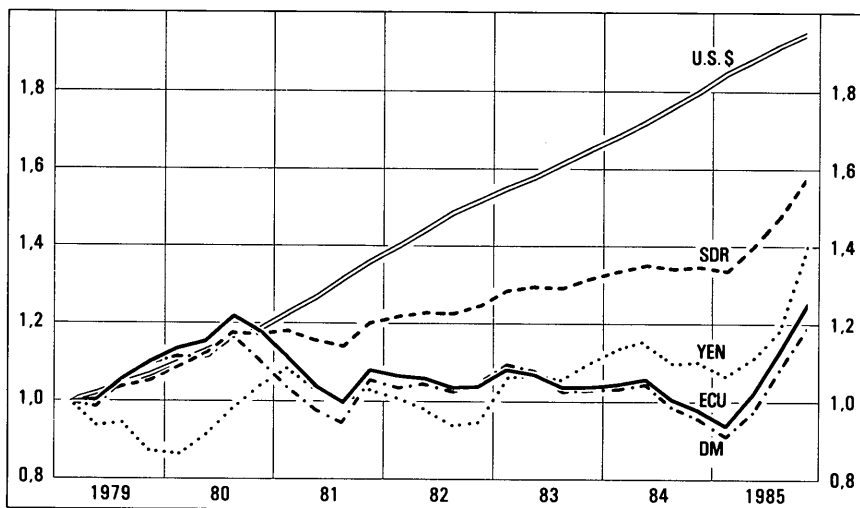


FIGURE 2  
 COMPOUNDED RETURN IN DOLLAR TERMS OF MONEY-MARKET INVESTMENTS  
 IN FIVE CURRENCIES, 1979I-1985IV



If we concentrate our attention on reward-to-variability ratios of foreign investments during the period of operation of the EMS, some interesting features emerge. First, taking in turn as the domestic currency the DM, the French franc, and the Italian lira, the ECU represents the “best” investment opportunity in each case. Taking the Dutch guilder as the domestic currency, the ECU is “second best,” closely following the DM (Table A.1b). For the U.K. or U.S. investor, on the other hand, the most satisfactory choice—still on the basis of the reward-to-variability ratio—is the SDR. But the SDR shows up as a very poor choice for all investors whose currencies participate in the ERM.

A more satisfactory analysis of international financial portfolios can be made by allowing for the covariance among alternative returns (Solnik, 1973, 1974; Adler and Dumas, 1983). The standard Markowitz (1952, 1959) model can be used to determine the weights of currencies in “efficient” portfolios, with a view to minimizing the overall variance for a given expected return. In this case, too, the exercise is carried out sequentially, taking each currency in turn as the domestic currency and considering all other currencies as elements of the “foreign” portfolio. The parts of the portfolio invested in foreign short-term assets are constrained to be positive (an unconstrained approach is followed by Hamai, 1985, and Jorion, 1986), ruling out short sales. The viewpoint is that of an investor rather than a borrower (negative weights) or



an arbitrageur (negative or positive weights). Consequently, lending rather than borrowing rates are considered. Eliminating constraints on the signs of the weights would have required assuming equal lending and borrowing rates and an unbounded objective function (i.e., unbounded theoretical profits) with very large offsetting positions in highly correlated currencies. Such assumptions would have led often to empirical results of little economic importance.

For the period of operation of the EMS—March 1979 to December 1985—the simulations of efficient portfolios for investors in different countries again show that the ECU represents a good investment for European residents. It appears, in combination with other currencies, in the efficient-portfolio frontier of all EMS residents (Table A.2b). Moreover, it also lies close to the frontier as a low-risk asset. This is true for residents of both weak- and strong-currency countries (Figures A.1 and A.2). The fact that the ECU is always present with significant weights in minimum-variance portfolios demonstrates its special attractiveness for risk-averse operators. The weights vary from 0.98 for the French investor to 0.24 for the German one. A combination of ECUs (0.77) and SDRs (0.23) is the efficient least-variance portfolio for U.K. residents.

When the dollar and the yen are taken as base currencies, the portfolio analysis points to the desirable properties of the SDR, which for the non-European investor performs a role similar to that of the ECU for the European investor. These results suggest that there is something to the “infant currency” argument. Without (a) the active initial support of the EC Commission and of some European countries and (b) the use of the official ECU, it might have been difficult to reach the threshold at which the private ECU could assert itself in the markets. Now that the private-ECU market exists, substantial benefits can be reaped from the significant reduction in transactions costs compared with those of individually tailored baskets and the SDR itself.

## **5 An Assessment of the Present and Future Status of the ECU**

We have seen that the ECU has perhaps fallen short of expectations in the official field but has run ahead of them in the private markets. Although technically the EMS could function even without the ECU, emphasis continues to be placed on assigning the ECU a central role in the system, especially by European political forces.

Advocates of this emphasis insist on two points: (a) the ECU should be developed into a full-fledged international reserve asset, eventually competing with the dollar; (b) the ECU should gradually acquire the status of a true European currency, functioning parallel to national currencies in the initial

phase and eventually becoming the common currency. Objective (a) is usually related to developments in the official field, objective (b) to advances in private markets.<sup>9</sup>

This continuing interest is indicated by the recent reference to the ECU in the amended Treaty of Rome—the Constitutional Charter of the EC. The objective of monetary cooperation was explicitly recognized in the revision of the texts that was approved in January 1986. The Preamble of the Single Act referred to the fact that in 1972 the heads of state had approved the goal of progressive realization of economic and monetary union, and a new Article (102 A) was introduced in the Treaty: “In order to ensure the convergence of economic and monetary policies which is necessary for the further development of the Community, Member states shall . . . take account of the experience acquired in cooperation within the framework of the EMS and in developing the ECU . . .” (European Single Act, Brussels, 1986).<sup>10</sup>

Among the many reasons for promoting the ECU's role as an international reserve asset is that it would reduce European dependence on the dollar, allowing easier decoupling of policies if necessary. In a world characterized by floating exchange rates between major currencies and by EMS exchange-rate agreements, cohesion among the EC currencies would reduce the impact of dollar swings.

To achieve cohesion, intra-EC international reserves are needed. The demand might be satisfied by national currencies, but problems would be likely to arise for one country, such as Germany, if its currency began to serve as the main reserve currency and its liquid liabilities to foreigners grew disproportionately. Swings of confidence could put a severe burden on domestic monetary policy. The availability of the ECU as an alternative to the DM might lessen these difficulties and prevent the emergence of EMS tensions as a consequence of switches out of the dollar. These positive effects would be enhanced if the ECU were also used as an instrument for invoicing international transactions and pricing international commodities.

If the ECU is to play an important role as an international reserve asset, it must be made more fully usable as a means of international payments. While this statement may appear trivial, the point is that there is no inconsistency between the development of the ECU in the official and private spheres. On the contrary, it is impossible to advance one use of the ECU beyond a critical point unless both aspects are brought together in a complementary way. The ECU cannot become an effective international reserve asset unless it is used

<sup>9</sup> The latter distinction could be reversed, however, under present arrangements: the private ECU arguably has more of the attributes of a reserve currency than the official ECU.

<sup>10</sup> To underline the relevance of the ECU, Sarcinelli (1985) argues that the difference between the snake and the EMS is the presence of the ECU. The same argument was made by the former Governor of the Bank of France, Michel Camdessus.

both by central banks and by private holders, particularly commercial banks.

Market intervention in ECUs, invoicing and pricing in ECUs,<sup>11</sup> and holding reserves in ECUs would represent the three activities necessary to establish the ECU as a full currency in both the official and private sectors: as a unit of account, medium of exchange, and store of value.<sup>12</sup> Uncertainty in the system would be reduced, in part as an automatic result of the fact that the vehicle currency is an average of participating currencies.<sup>13</sup>

It follows from the arguments developed so far that the most appropriate way to increase use of the official ECU is not to make its use mandatory in intra-EMS transactions, as by requiring the use of ECUs in settlements of intramarginal interventions or eliminating the present 50 percent payments ratio. Both would have "symmetric" monetary-base effects on surplus and deficit countries alike. This may be desirable once conditions of monetary stability have been achieved in all EMS countries, but not necessarily in the present transitional phase, when success is still uneven. A more fruitful approach would be to ensure transferability and convertibility of the official ECU by facilitating interchangeability between the official and the private sectors.

## 6 The ECU as Means of International Payments: A Suggested Scheme

Reserve currencies must be liquid and fully convertible into other currencies, represent a stable store of value, and provide a competitive return. The "portfolio" results reported in section 4 suggest that the ECU basket has some of these properties. In view of the enlargement of the EC, it would be better if the basket consisted only of currencies participating in the ERM; otherwise, the ECU would be weakened by the lack of policy commitment to exchange-rate stability.

However, the institutional aspects of the ECU discussed in sections 1 and 2 indicate that the official ECU also has important defects in terms of transferability and convertibility. Admittedly, acceptance limits were introduced

<sup>11</sup> On the general question of the choice of an invoice currency in international transactions, see Bilson (1983). As to the specific role of the ECU, see *ECU Newsletter* (1986). In the case of the ECU, the development of deep and resilient forward markets is important. Richard Mikkelsen and Herring Dalgaard have pointed out to me a key reason why the ECU has been slow to replace other currencies for invoicing: a company wanting to minimize its foreign-exchange risk in international trade can easily do so by using one of the major currencies for invoicing and then covering the entire risk in the forward market; using the ECU for this purpose only partially reduces exchange risk.

<sup>12</sup> For early proposals along these lines, see Ossola (1971) and Magnifico (1973).

<sup>13</sup> See Williamson (1983) for a forceful elaboration of these points with reference to the SDR, which *mutatis mutandis* can also be applied to the ECU and to European trade, trade financing, and reserve holding.

as protection against the risk of excessive ECU creation resulting from the automatic link to the price of gold. Today, however, those limits restrict the usefulness of the ECU as a reserve asset: central banks must be free to use the official ECU to intervene in the market. The main problem, however, is to establish the appropriate links between official ECUs and those traded in the market.

The problem and its possible solutions are not new to the theory of international finance. They have already been addressed in discussions of the role and expansion of the SDR, notably in contributions by the Bank of England in the Committee of 20 (IMF, 1974), by Coats (1982), and by Kenen (1983). These discussions provide a framework that can be adapted to the current problem of the ECU. The package of improvements to the use of the official ECU, described in section 2, will make matters easier, because the BIS has been designated an "other holder" of official ECUs. Three approaches are suggested to achieving transferability of the ECU between the official and private sectors:

a. The most direct way to achieve transferability would be to empower the EMCF to open accounts in *official* ECUs for private institutions, particularly commercial banks. This approach has obvious drawbacks, legal and institutional as well as economic. According to present legal provisions, official ECUs are created through three-month revolving swaps with the EMCF against the deposit of 20 percent of the gold and dollar reserves held by EMS central banks. The total amount of primary official ECUs is thus determined on an *ex ante* basis. Furthermore, only Community central banks and other designated official monetary agencies can be holders of official ECUs. To change these legal provisions would prove extremely difficult. A Council Regulation and consultation with the European Parliament would be unavoidable.

These difficulties apart, serious objections can be raised on strictly economic grounds. To start with, the total amount of high-powered ECUs would be affected by operations undertaken on the initiative of the private sector, and this would be unacceptable to EC central banks. EMCF operations would become extremely difficult. And serious problems would be encountered in deciding which private agents would be empowered to hold official ECUs.

A variant of this approach would allow commercial banks to hold official ECUs on the books of central banks. The drawback here is that private international interbank transactions could be cleared only through transfers of official ECUs by central banks. This would have the symmetric monetary-base consequences that are regarded as undesirable by certain EC monetary authorities under present conditions.

b. A second line of attack would be to allow central banks to deposit *private* ECU balances with the EMCF. This scheme appears to be most directly aimed at widening the scope for use of official ECUs: through the intermediary of the EMCF, EC central banks and other official monetary agencies could more easily engage in swaps between private and official ECUs. It would not solve the problem of ECU convertibility, however, since any such swap operation would always be subject to mutual consent by two monetary authorities.

c. The third model—which is by no means inconsistent with the second—is based on linking the private and the official markets through the intermediary of a clearinghouse, recognized as an “other holder” of official ECUs. This scheme, which was originally suggested by Kenen (1983) for the SDR, would work along the following lines. Central bank A wishes to acquire foreign exchange with a view to intervening to support its currency before it reaches the compulsory margin. A triangular operation is activated with a commercial bank in country B and the clearinghouse. Commercial bank B receives official ECUs sold by central bank A; since it cannot hold them, it must deposit them simultaneously with the clearinghouse in exchange for an instrument of deposit. Therefore, at the end of the operation, central bank A has acquired a private-ECU bank deposit with commercial bank B, and it is readily usable for intervention purposes. The central bank has lost official ECUs, which are on the books of the clearinghouse as an asset with the EMCF. Commercial bank B has recorded an increase in assets (ECU-denominated deposits with the clearinghouse) and an increase in liabilities (ECU-denominated deposits owed to central bank A). The clearinghouse holds an ECU asset with the EMCF and has an ECU liability to commercial bank B.

Further transactions between commercial bank B and other commercial banks can of course affect the ownership of deposits with the clearinghouse, but not the ownership of official ECUs. Note also that intervention sales by central bank A of the private ECUs thus acquired would imply the usual asymmetric monetary-base consequences: they would be concentrated on country A itself.

An advantage of this scheme is that it would not require any legal change. A joint decision by the Board of EC Governors, the Board of the EMCF, and the Board of the BIS would, in my opinion, be quite sufficient to make it operational. As mentioned earlier, the BIS has now been officially designated as an “other holder” of ECUs. In addition, the previous ECU clearinghouse system MESA (Mutual ECU Settlement Account), comprising seven commercial banks (Crédit Lyonnais, Lloyds, Banque Bruxelles-Lambert, Kredietbank-Brussels, Kredietbank-Luxembourg, Société Générale-Bruxelles,

Istituto Bancario San Paolo), has been strengthened under the auspices of the BIS, which now acts as the final clearing institution.<sup>14</sup> Finally, the EMCF and the BIS operate under the same roof, which would facilitate the implementation of the scheme suggested here.<sup>15</sup>

Some key features of the new ECU clearing system have a bearing on the workings of the scheme proposed here. The projected system is characterized by two functions: (a) a netting function, which would record payment orders and the statement of net balances for each clearing bank vis-à-vis all other banks and would be entrusted to SWIFT (Society for Worldwide Interbank Financial Telecommunications), and (b) a banking function, which would work out the net balance for each clearing bank and its settlement, with the BIS playing the role of banking agent.

This clearing system is structured so as to avoid money creation: any clearing bank's negative clearance balance must be supported by liquidity. Since the ECU bank account opened by each clearing bank at the BIS can never be permitted to register a debit balance, each such bank must have sufficient liquidity in its BIS account to cover its net balance at the end of the day. The agreements with the BIS provide that the clearing banks' ECU accounts at the BIS be directly increased or decreased by channeling all of the ECU component currencies through the respective central banks. Liquidity thus consists, ultimately, of deposits of ECU component currencies in BIS bank accounts at the various central banks. All these currencies can thus be transformed through the system into ECU clearance balances. Should a clearing bank not be able to meet its debit balance when the BIS begins the clearing process at the end of a working day, the clearing for that day must be canceled. The clearing transactions undertaken by each participating bank are carried out on the following working day, but without any payment orders to and by the clearing bank in default.

The fact that private and official ECUs are already standardized makes it easier to implement the clearinghouse proposal. A potentially important problem is posed, however, by a difference in yield, since private ECUs earn Eurocurrency rates and official ECUs earn domestic money-market rates. But, given the present degree of financial deregulation, these differences are becoming smaller and should decline further; moreover, deposits with the BIS are likely to carry a security yield, because they have the security of BIS

<sup>14</sup> On these points, see BIS (1986). In March 1986, the ECU Banking Association and the BIS signed the convention for setting up the ECU clearing system. After a trial period, the system came into force at the end of 1986.

<sup>15</sup> An intermediate step in this direction would be to foster swaps of private and official ECUs between a central bank in need of private ECUs and the BIS, which performs the dual function of commercial bank and "recognized other holder." This exchange is already possible under existing rules (see Padoa-Schioppa, 1986).

backing, which may help offset the rate spread. The remaining gap would presumably have to be paid by the central bank initiating the operation (central bank A).

In the initial phase, various quantitative and qualitative limitations could be introduced to avoid excessive use of the proposed facility, the yield gap just referred to being in itself a limiting factor. These limitations could be lifted progressively as the necessary operating experience was gained. Some difficulties could also arise because of the precarious nature of the official ECU. This should not pose insurmountable problems, although the scheme is likely to result in pressure to consolidate the present three-month revolving swap system.<sup>16</sup>

A final possible problem with this scheme for linking official and private ECUs is analogous to the criticism made by Williamson (1983) concerning Kenen's (1983) original proposal for an SDR clearing union. Williamson argued that changes in the stock of SDR deposits at the clearinghouse should not be limited to the case of a central bank switching from official to private SDRs. He pointed out, however, that there would be a problem in maintaining the value of the SDR if commercial banks wished to increase their holdings of SDR deposits when no central bank was willing to reduce its holdings: the SDR's value would be bid up beyond that of the component currencies. Williamson therefore suggested that Kenen's scheme be extended to include an arrangement whereby the clearinghouse would also be empowered to issue SDR deposits in exchange for the basket of currencies, plus a small premium to cover the costs of the operation.

With respect to the ECU, the problem raised by Williamson is partly overcome through the workings of the private ECU market and of the new ECU clearing system. As we have seen, commercial banks are able to create the ECU deposits necessary to ensure balance in a basically lopsided market largely by "bundling" the component currencies into ECUs: this could be done through the intermediary of the BIS even now. In other words, it would be possible to rely on a market mechanism that would ensure that the value of the ECU deposits with the BIS remained in line with the value of the private ECU and the calculated value of the official ECU.

More generally, the question has to be addressed by taking proper account of the swap mechanism on which the creation of "primary" ECUs is based.

<sup>16</sup> It has been argued that the existing official ECU-creating mechanism is a major impediment to the full use of the ECU, not only because of the temporary nature of the swap operation but also because the amounts of ECUs vary in line with factors outside the Community's control (e.g., gold and dollar prices). While this is not the place to examine how arrangements could develop beyond the existing swap system, the problem should receive early attention. On this issue, see EC Monetary Committee (1978), Padoa-Schioppa (1980), Masera (1980), and Triffin (1984).

The proposed mobilization mechanism, using a new BIS clearinghouse, would involve the creation by commercial banks of ECU term deposits. The maturity of these deposits would be less than (at the limit, equal to) the maturity of the official swaps between the central banks and the EMCF, which create primary ECUs.

Suppose the commercial banks that have acquired the official ECU deposits and transferred them to the BIS want to transfer them back to the central banks. Of course, when the original term contract matures, they can do this simply by reversing the original steps. Should the contracting parties agree to provide for operations to be canceled before maturity, the terms and the cost of such unwinding operations would have to be specified in the original contract itself.

Various options can be envisaged. Either the BIS would be able to execute the operation on its own account by borrowing alternative funds, or the BIS would turn to the central bank that originated the operation and ask it to convert the assets into private ECUs or any other currency. The central bank in turn could repay the BIS and ultimately the commercial bank in several ways: it could use its private ECU deposits, it could turn to the market and borrow private ECU or component currencies, or it could acquire foreign exchange from other central banks by activating the existing mobilization scheme for official ECUs.

## **7 Balance-of-Payments, Monetary, and Credit Implications of Increased Use of the Private ECU**

I have contended that the ECU's development as an international reserve asset and, eventually, as a parallel common currency are complementary processes, contrary to what many believe. The emphasis on market convertibility of the official ECU must have as its counterpart increased use of the ECU as a monetary and credit instrument by private economic agents, in international as well as domestic transactions.<sup>17</sup> Therefore, it is necessary at this point to address these aspects of the process of ECU expansion in conjunction with preliminary comments on its balance-of-payments (exchange-rate) implications.

### *Balance-of-Payments Implications*

To what extent does the existence of the ECU market affect the volume and geographical pattern of international capital flows?<sup>18</sup> Clearly, if the existence

<sup>17</sup> Beyond private agents, official agencies—especially Treasuries—could also make more extensive use of the private ECU. The availability of short-term paper issued by prime borrowers such as Treasuries will be particularly important for giving the ECU the full character of an international currency.

<sup>18</sup> For a general analysis of this issue, see Mayer (1985).



and expansion of the ECU market have different credit and monetary implications for the various EC countries, there will be spillover effects on the respective balances of payments. Let me make three points.

First, note that in some instances the ECU serves *de facto* as an indexation device for domestic credit contracts. If the Italian government provides domestic residents with debt instruments indexed to the ECU, there are balance-of-payments consequences only to the extent that the newly supplied ECU-denominated assets satisfy residents' portfolio-diversification demands, relieving them of the need to acquire foreign assets through capital outflows.<sup>19</sup>

Second, because the ECU is a basket of currencies, its interest rate cannot diverge significantly from the weighted average of interest rates in the component currencies.<sup>20</sup> Accordingly, the ECU interest rate cannot play an important role in clearing the ECU deposit and credit markets, especially at the short-term end. As a spread between actual and theoretical rates arises, arbitrage forces will be set in motion that will lead to bundling or unbundling of the ECU into its component currencies and may thus lead to capital flows.

Third, and more generally, the foreign-currency denomination of credit contracts has no direct impact on the balance of payments of the country issuing the currency concerned, but it may have indirect effects. It is in fact likely that, as a consequence of the close links between the domestic market and the Euromarket for an international currency, residents of the vehicle-currency country will be stimulated to enter into international transactions (to activate capital flows) that would otherwise not have taken place. With specific reference to the ECU, one implication is that a switch from the dollar to the ECU as a currency of denomination could reduce the elasticity of capital flows to and from the United States and foster greater intra-EC capital-market integration.

These considerations generally reinforce the argument that separate analysis of the effects of an increasing ECU role as a medium for international transactions and as a substitute for domestic currencies is bound to be futile, given the intimate relationship between the two processes.

In order to reach more specific conclusions, suppose now that an importer in country A decides to finance his trade by borrowing ECUs from the banking system, which we assume to be in balance. The excess demand for credits in ECUs does not bid up the ECU interest rate; instead, the banking system meets the demand by borrowing the component currencies to "bundle" them

<sup>19</sup> If this is so, it enhances the argument for an expansion of ECU borrowing and lending between residents in countries that continue to restrict capital movements. On these points, see Modigliani and Capponi (1985).

<sup>20</sup> I shall not take up the redefinition of the ECU here, except to express agreement with Triffin (1984, p. 56), who regards the issue as "revolutionary and premature at this stage, but imperative in the long, or even medium term."

into ECUs. The "autonomous," or voluntary, capital inflow into country A sets in motion compensatory, or involuntary, flows denominated in the currencies of the other EC countries and linked to their respective weights in the basket. These funds will in general be borrowed in the Euromarkets. This will trigger capital flows from the various countries involved to the extent that the pressures on the Eurocurrency markets spill over to the respective domestic money markets (i.e., according to the yield-elasticity conditions prevailing in each single Eurocurrency market).

In this way, the ECU banking market tends to influence the balance of payments of the countries issuing the component currencies of the basket. As we have seen, there is an element of automaticity in the process, mechanically linked as it is to currency weights in the ECU.

### *Monetary and Credit Implications*

On the basis of past experience, the overall yield of the ECU (interest adjusted for exchange-rate changes), combined with its variance and covariance, gives the ECU a place in the efficient portfolios of European residents. With the prospect of increasing monetary cohesion in the EMS, this should be even more the case in the future. As the risk of significant movements in intra-EC exchange rates declines, EC residents are increasingly likely to perceive the ECU as a closer substitute for the domestic currency than other international currencies, especially the dollar.

Shifts toward the ECU are particularly likely to occur when investors are confident that the ECU will provide a higher overall yield than the domestic currency. The converse would be true for borrowers. It might then appear that the market impetus will sometimes come from the lending side and other times from the borrowing side, with the ECU banking system covering through bundling operations. This is not, however, a foregone conclusion.

Take the following situation in countries with higher inflation and traditionally weak currencies: (a) these countries try to keep their exchange rates in line by offering real yields higher than those prevailing in lower-inflation countries; (b) exchange rates do not conform to purchasing-power parity but instead trend toward appreciation in terms of consumer-price inflation. Under these conditions, it turns out to be advantageous for the residents of these weak-currency countries to borrow in ECUs and for residents of strong-currency countries to lend in ECUs, rather than in domestic currency. Although it would prove even more advantageous under these circumstances to activate direct capital flows between the countries in question, the ECU risk-cover properties explain why part of the flows may be intermediated by the ECU banking system: the ECU vehicle can provide a partial alternative to straight forward-cover operations.

Because the ECU can thus facilitate intra-EC capital movements, it increases the efficiency and integration of European credit markets while re-

ducing the uncertainty costs for private operators. Inevitably, these welfare gains are achieved at the cost of some independence of domestic monetary policies. The shifts in intermediation from the domestic markets to the external ECU market also raise well-known questions about the possible repercussions on overall credit and money-creation processes.

The accepted view is that the questions must be addressed by analyzing the money- and credit-creating potential of Eurocurrency markets. The common wisdom is that these markets largely represent a substitute for, and not an addition to, domestic money and credit. Net additions are relatively low and result directly from the greater efficiency and monetary-base saving brought about by the growth of the Euromarkets. The mechanistic approach, which stressed the analogy with a domestic banking system, argued that the actual and potential multipliers were very high because of the low leakages into currencies and reserves. This approach has been discarded (see Swoboda, 1980, for a definitive paper on the argument).

As one of the first to develop a portfolio—as against a multiplier—approach to the workings of Euromarkets (Masera, 1972), I continue to stand by that line of thinking. I also agree with Allen (1986) that the portfolio approach provides the best explanation for the growth of the ECU market to date. But this is not the end of the story. With the prospect of growing Community use of the ECU, both domestically and internationally, there are some potentially important differences between the analysis of the ECU market and, say, the Eurodollar market.

Eurodollar balances have never had the potential to become an internal means of payment for residents of EC countries. Checking facilities have not been a significant feature of the Eurodollar markets; deposits, generally for very large amounts, have sometimes represented a temporary outlet for liquid funds, but they have always been closely linked to the financial transactions of international investors and traders. The absence of reserve requirements and the differential tax and supervisory treatment for Eurocurrency deposits, however advantageous, are not sufficient in themselves to activate a closed circuit of deposit formation and credit creation capable of becoming an alternative to domestic-currency banking.

The situation is different for the ECU. If use of the ECU becomes significant in domestic as well as foreign banking transactions, it could tend to supplant “controlled” bank operations. The ECU is in principle a close substitute for the domestic currency; if the advantages of Eurotransactions in ECU were open to ordinary banking transactions, problems of monetary control would emerge. This is one aspect of the general problem posed by the growing internationalization and deregulation of financial markets. The specific issue raised by the ECU is that it could—indeed should—become a better substitute for domestic currencies than any other “foreign” currency.

This argument is reinforced when central-bank redepositing in ECUs is

taken into account. It is commonly agreed, on the basis of analysis of the Eurodollar market, that central-bank repositing of dollars in the Euromarket could trigger a multiple expansion of deposits, credits, and reserves. Take, for example, the case of a payments outflow from the United States and downward pressure on the dollar exchange rate. If central banks intervene to support the dollar and deposit the proceeds with the Eurobanking system, which in turn re-lends the funds outside the United States, an additional round of dollar interventions will ensue, and so the dance goes on.

A similar situation can arise in the case of the ECU under the following circumstances. Suppose that residents of country A find it cheaper to borrow in ECUs than in domestic currency. Starting from what is viewed as an equilibrium position by the monetary authorities of country A, the incipient capital inflow in ECUs would tend to put upward pressure on the domestic exchange rate (and downward pressure on domestic interest rates). The central bank in country A will intervene in the exchange market to offset the exchange-rate impulse and will sterilize the monetary-base impact of the intervention. If the proceeds of the foreign-currency purchase are re-lent to the ECU banking system, a chain can be activated whereby domestic borrowers build up external ECU liabilities that have as their counterpart "private" ECU assets held by the domestic central bank.

If we now permit residents to accumulate ECU deposits while avoiding reserve requirements and in addition make allowance for differences in risk behavior and in expectations about exchange rates, we can see how a process of credit and monetary creation could be set in motion that would add to, rather than substitute for, the creation of domestic-currency bank deposits and credit. If the ECU were to develop as a parallel domestic currency, it is not difficult to imagine how the competitive edge stemming from the lack of reserve requirements or other control devices on ECU banking in any single country would activate a monetary-credit circuit. In principle, this would have no balance-of-payments repercussions if the process took place in all EC countries, although a problem of credit and monetary control would arise. It is as if a system of nonbank intermediaries were created that offered deposits and credits fully competitive with those provided by the banks but imposed no reserve cost.

## **8 Conclusions**

Efforts to make the ECU an international reserve asset and eventually a European common currency should be regarded as complementary. Market convertibility of the official ECU requires deep and resilient private markets. Interchangeability between the two sectors could be achieved without institutional changes if central banks could exchange their official deposits with

commercial banks, and commercial banks could simultaneously redeposit them with the BIS. The BIS, which also acts as a clearinghouse for commercial banks, is in fact empowered to hold official-ECU balances.

It might be argued that the whole scheme, even if acceptable from a formal point of view, has no real future given the reservations of the German monetary authorities concerning the role and function of the ECU. In reply, it should be recognized that Germany's legal argument is losing weight. The greater the role of the ECU in private as well as official markets, the more difficult it becomes to maintain that the ECU is merely an indexation device. The legal concept of money has already changed and will continue to be adapted to economic changes. The facts that there is no ECU "currency," no central bank behind it, and no legal payment in ECUs do not appear to be sufficient reasons for denying that the ECU has already acquired a wholly different monetary character from its predecessor, the EUA, which really *was* only an indexation instrument.

Official ECUs do exist, and they can be used for official settlements between central banks. The EMCF plays the role of a central institution overseeing the creation and distribution of official ECUs. Banking and foreign-exchange payments in ECUs, not only between private operators but also between market participants and official monetary authorities, amount to billions each year. Fines levied by the EC Commission can be paid in ECUs.

If market convertibility of the official ECU were to develop along the lines suggested here, it would become impossible for Germany not to acknowledge the monetary and foreign-exchange character of the ECU. I have shown that, under present conditions of uneven success in securing domestic monetary stability, certain central banks, notably the Bundesbank, manifest a preference for what I call "asymmetric monetary-base interventions" in EC currencies. I have also shown that this is precisely the character of intramarginal ECU interventions in the market, as opposed to mandatory interventions at the margin that involve settlements in official ECUs or recourse to the VSTF mechanism. The Bundesbank's attitude may not remain as negative as it is now. It may be forced to change by the liberalization of capital movements in ERM countries, and, especially if the United Kingdom joins the ERM, by the large additional volume of intervention that would be required to operate the system.

The counterpart to an expanded use of the official ECU would be an increasing role for the ECU as a substitute for domestic-currency borrowing and lending, leading to its use as a parallel common currency. This process would have to be closely monitored in order to prevent problems of money and credit control. The introduction of reserve requirements or other control instruments for all deposits—regardless of denomination—should be considered, in order to avoid artificial incentives for residents to favor ECU deposits

rather than domestic-currency deposits held with the home banking system. This could be done either on a country-by-country basis, or, preferably, through the EMCF, which would be entrusted with the task of overseeing the process of ECU expansion (Thygesen, 1980). Convergence in monetary-control techniques would thereby be stimulated. Looking beyond the short-term frictions connected with individual countries' monetary policies, such a development would improve prospects for European monetary integration.

The high substitutability that would develop under this scenario between the ECU and each currency in the EMS would increase capital mobility within the Community, largely because of the intrinsic properties of the ECU, but also as a result of the "involuntary" capital flows that are likely to be set in motion. There is a certain irony in the fact that the countries most active and vociferous at the official level in pressing for further development of the ECU are also those which still impose capital controls.

If the two-pronged approach to developing the ECU suggested here were to be followed, the ECU could become an instrument for fostering European monetary integration without at the same time threatening monetary stability and credit control. It cannot be overemphasized, however, that this will be so if, and only if, efforts to continue the development of the official ECU and advances made by the markets in using it are not seen by Community governments and citizens as substitutes for the domestic monetary adjustments needed to achieve a zone of monetary stability.

I shall not dwell on these points; Robert Triffin and I have recently expounded them in great detail (Masera and Triffin, 1984). Let me simply stress that domestic cost-formation processes and public-sector deficits must be the primary target of economic-policy actions leading to integration. It is no accident that countries characterized by very high public deficits and high public debt/GDP ratios have encountered difficulties with the process of monetary and exchange-rate stabilization in the EMS. It should also be self-evident that capital-market liberalization in the EC is a prerequisite for any meaningful attempt to achieve greater monetary convergence and integration.

I conclude, therefore, on a sober note. While the ECU could be a useful instrument in building a European monetary dimension, the fact remains that the objective of gradual integration leading to monetary unification could be achieved even without the ECU. Finally, if the development of the ECU becomes an alibi for not tackling fundamental economic imbalances that impede domestic monetary stability, this potentially useful instrument will turn out to be counterproductive.

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## STATISTICAL APPENDIX

### EFFICIENT PORTFOLIO CHOICE AND THE ECU

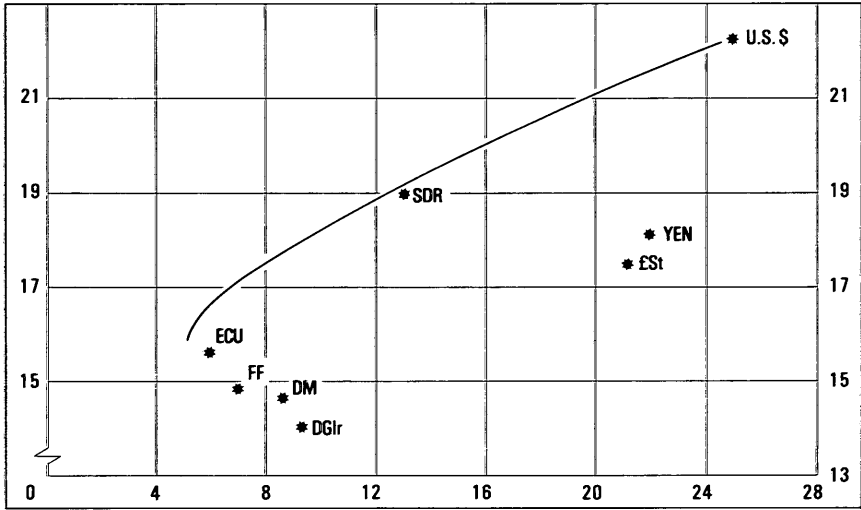
The BIS and the IMF data banks provided the basis for the data. Period-average domestic money-market interest rates and period-average exchange rates were used for EC currencies, the U.S. dollar, and the yen. For the ECU and the SDR, interest rates were calculated as a weighted average of domestic money-market rates on component currencies.

Efficient corner portfolios were derived according to Markowitz's (1959) critical-line method, assuming nonnegative investments. Input data were the variance-covariance matrixes and mean yields observed in two periods (1973I-1985IV) and (1979II-1985IV). The former covers the entire period of floating exchange rates among major currencies, the latter the period during which the EMS has been in effect. The shares of corner portfolio invested in single currencies are reported together with portfolio returns, standard deviations, and reward-to-variability ratios (Tables A.1a and A.1b). For every currency taken in turn as the base currency, corner portfolios are ranked, in decreasing order, from maximum return to minimum risk (Tables A.2a and A.2b). The efficient portfolios frontiers for the Italian lira and the Deutsche-mark are shown in Figures A.1 and A.2. See the Table of Currency Symbols below for the definitions of symbols used in the tables.

TABLE OF CURRENCY SYMBOLS

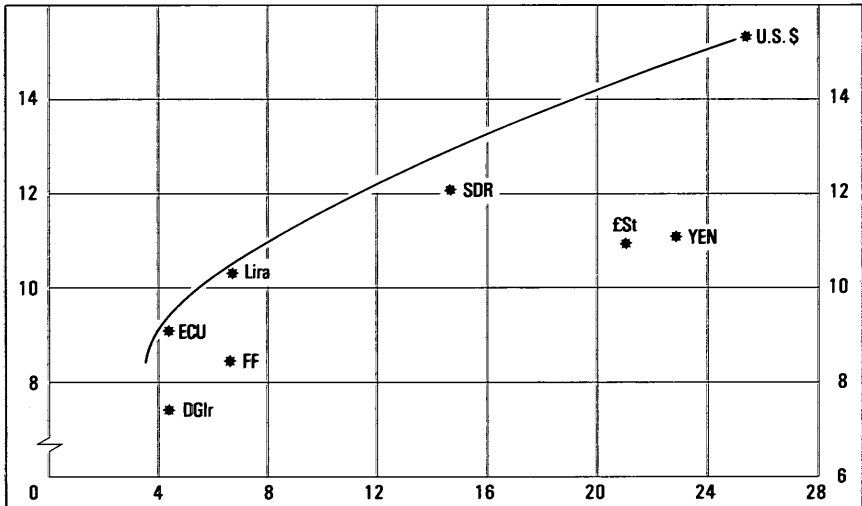
Country	Name	Symbol
Australia	dollar	A\$
Canada	dollar	Can\$
France	franc	FF
Germany	Deutschemark	DM
Italy	lira	Lit
Japan	yen	¥
Netherlands	guilder	DGlr
Switzerland	franc	SwF
United Kingdom	pound	£
United States	dollar	U.S.\$

FIGURE A.1  
EFFICIENT PORTFOLIOS FRONTIER FOR A WEAK-CURRENCY COUNTRY, 1979II-1985IV  
(basis currency: lira)



NOTE: The mean and the standard deviation of yields of money-market investments in each currency are reported on the vertical and horizontal axes respectively.

FIGURE A.2  
EFFICIENT PORTFOLIOS FRONTIER FOR A STRONG-CURRENCY COUNTRY, 1979II-1985IV  
(basis currency: DM)



NOTE: The mean and the standard deviation of yields of money-market investments in each currency are reported on the vertical and horizontal axes respectively.

TABLE A. 1a  
REWARD-TO-VARIABILITY RATIOS: MAIN CURRENCIES AND CURRENCY BASKETS, 1973I-1985IV

Basis Currency	U.S.\$	¥	DM	FF	£	DGlr	SDR	ECU	Lit
YIELDS ON FOREIGN INVESTMENTS (annualized percent)									
U.S.\$	8.50	7.80	8.43	7.15	6.84	7.00	8.01	7.33	6.74
¥	6.10	5.34	5.99	4.83	4.53	4.58	5.62	4.99	4.54
DM	7.31	6.58	7.21	6.00	5.69	5.80	6.82	6.16	5.65
FF	12.45	11.85	12.42	10.95	10.63	10.96	11.95	11.17	10.37
£	12.68	12.08	12.65	11.16	10.85	11.19	12.17	11.38	10.57
DGlr	8.13	7.43	8.05	6.79	6.49	6.63	7.65	6.97	6.41
SDR	8.93	8.25	8.86	7.56	7.25	7.43	8.44	7.74	7.14
ECU	11.44	10.81	11.40	9.97	9.66	9.95	10.94	10.18	9.44
Lit	17.58	17.11	17.62	15.88	15.55	16.11	17.05	16.15	15.07
YIELDS ON FOREIGN INVESTMENTS: STANDARD DEVIATIONS (in percent)									
U.S.\$	2.55	23.43	25.12	22.31	23.55	22.57	9.51	19.43	18.19
¥	22.37	0.88	23.53	20.80	24.02	21.92	16.12	19.25	19.08
DM	24.85	22.30	2.83	12.31	20.47	6.81	15.32	8.39	14.33
FF	25.86	21.46	14.05	2.43	21.49	12.80	15.81	9.48	13.82
£	25.02	25.50	23.84	20.74	2.19	20.67	17.26	16.21	19.40
DGlr	24.37	22.73	6.14	10.90	19.75	2.31	14.59	6.36	12.44
SDR	11.60	16.67	16.27	13.68	17.35	14.19	1.95	10.32	11.55
ECU	22.32	20.26	10.29	8.85	16.57	7.17	11.79	1.85	9.63
Lit	23.65	23.51	19.36	13.97	20.29	15.50	15.08	10.37	2.59

FOREIGN INVESTMENTS: REWARD-TO-VARIABILITY RATIOS  
(in percent)

U.S.\$	333.50	33.31	33.54	32.03	29.03	31.00	84.22	37.71	37.08
¥	27.26	608.10	25.46	23.25	18.86	20.91	34.84	25.92	23.79
DM	29.39	29.50	254.60	48.71	27.79	85.05	44.51	73.45	39.40
FF	48.15	55.25	88.45	450.00	49.47	85.65	75.57	117.80	75.01
£	50.66	47.38	53.06	53.83	495.10	54.12	70.51	70.23	54.49
DGlr	33.37	32.67	131.20	62.34	32.83	287.30	52.41	109.60	51.49
SDR	76.99	49.45	54.47	55.28	41.80	52.34	432.30	75.06	61.82
ECU	51.25	53.39	110.80	112.70	58.27	138.80	92.78	550.60	97.99
Lit	74.34	72.78	90.99	113.70	76.66	104.00	113.10	155.70	582.90

TABLE A.1b  
REWARD-TO-VARIABILITY RATIOS: MAIN CURRENCIES AND CURRENCY BASKETS, 1979II-1985IV

Basis Currency	U.S.\$	¥	DM	FF	£	DGlr	SDR	ECU	Lit
YIELDS ON FOREIGN INVESTMENTS (annualized percent)									
U.S.\$	10.48	6.14	3.35	3.98	6.32	2.80	7.44	4.59	5.96
¥	9.72	5.37	2.63	3.29	5.60	2.08	7.00	3.88	5.28
DM	15.36	11.05	8.00	8.43	10.93	7.42	12.20	9.14	10.32
FF	19.96	15.69	12.39	12.63	15.27	11.79	16.70	13.43	14.44
£	16.35	12.06	8.95	9.34	11.87	8.37	13.18	10.07	11.21
DGlr	15.89	11.59	8.51	8.92	11.43	7.93	12.73	9.64	10.80
SDR	12.86	8.53	5.61	6.15	8.56	5.05	9.76	6.81	8.09
ECU	17.62	13.33	10.15	10.50	13.06	9.57	14.41	11.25	12.34
Lit	22.29	18.04	14.61	14.77	17.48	14.00	18.98	15.61	16.52
YIELDS ON FOREIGN INVESTMENTS: STANDARD DEVIATIONS (in percent)									
U.S.\$	2.10	24.94	23.36	23.87	27.78	24.61	10.17	22.00	19.65
¥	23.55	0.55	21.40	20.30	25.11	21.65	16.62	19.57	17.73
DM	25.41	22.83	2.25	6.58	21.01	4.45	14.63	4.45	6.67
FF	27.98	22.39	9.87	1.90	22.58	10.01	16.67	7.51	9.71
£	28.58	27.68	20.96	21.28	2.05	20.07	19.47	17.18	20.78
DGlr	26.51	23.34	3.61	6.41	20.81	2.03	15.37	4.31	6.97
SDR	12.22	17.68	13.78	13.91	20.21	14.93	1.70	11.72	9.97
ECU	24.95	21.32	6.04	5.49	18.09	6.24	13.26	1.73	6.24
Lit	24.95	21.86	8.67	7.00	21.34	9.40	13.05	5.98	2.36

## FOREIGN INVESTMENTS: REWARD-TO-VARIABILITY RATIOS

*(in percent)*

U.S.\$	498.40	24.62	14.35	16.67	22.76	11.38	73.22	20.86	30.34
¥	41.29	971.90	12.27	16.18	22.31	9.60	40.31	19.82	29.79
DM	60.44	48.41	356.10	128.10	52.01	166.80	83.40	205.40	154.80
FF	71.34	70.06	125.50	664.30	67.64	117.80	100.10	179.00	148.80
£	57.22	43.56	42.69	43.91	578.80	41.70	67.69	58.61	53.97
DGlr	59.97	49.68	236.10	139.10	54.94	390.60	82.83	223.80	154.90
SDR	105.20	48.26	40.75	44.21	42.38	33.83	573.40	58.06	81.05
ECU	70.62	62.52	168.00	191.20	72.18	153.30	108.70	650.10	197.70
Lit	89.36	82.52	168.60	211.10	81.89	148.90	145.40	261.20	700.70

TABLE A.2a  
COMPOSITION OF EFFICIENT PORTFOLIOS, 1973I-1985IV

U.S.\$	¥	DM	FF	£	DGlr	SDR	ECU	Lit	E	S	E/S(%)
BASIS CURRENCY: U.S.\$											
—	0	1	0	0	0	0	0	0	8.43	25.12	33.54
—	0	0	0	0	0	1	0	0	8.01	9.51	84.22 (*)
BASIS CURRENCY: ¥											
1	—	0	0	0	0	0	0	0	6.10	22.37	27.26
0.5657	—	0.4343	0	0	0	0	0	0	6.05	19.10	31.69
0	—	0.1243	0	0	0	0.8757	0	0	5.66	16.29	34.77
0	—	0.0048	0	0	0	0.9952	0	0	5.62	16.12	34.85
0	—	0	0.0074	0	0	0.9926	0	0	5.61	16.12	34.81
0	—	0	0.0455	0	0	0.9545	0	0	5.58	16.10	34.66
0	—	0	0.0467	0	0	0.9184	0	0.0349	5.54	16.10	34.43 (*)
BASIS CURRENCY: DM											
1	0	—	0	0	0	0	0	0	7.31	24.85	29.39
0	0	—	0	0	0	1	0	0	6.82	15.32	44.51
0	0	—	0	0	0	0.3998	0.6002	0	6.43	10.42	61.69
0	0	—	0	0	0.2966	0.2294	0.4739	0	6.21	8.36	74.25
0	0.0545	—	0	0	0.6486	0	0.2969	0	5.95	6.81	87.33
0	0.0543	—	0	0	0.7966	0	0.1491	0	5.89	6.68	88.25
0	0.0541	—	0.0343	0	0.8950	0	0.0166	0	5.85	6.65	87.99 (*)
BASIS CURRENCY: FF											
1	0	0	—	0	0	0	0	0	12.45	25.86	48.15
0.1687	0	0.8313	—	0	0	0	0	0	12.43	13.39	92.84
0.0836	0.1608	0.7556	—	0	0	0	0	0	12.34	12.48	98.85
0	0.1394	0.7055	—	0	0	0.1551	0	0	12.27	12.13	101.10
0	0.1439	0.6785	—	0	0	0.1776	0	0	12.26	12.07	101.50
0	0.1302	0.3517	—	0	0	0	0.5181	0	11.70	10.18	114.90
0	0.0554	0	—	0	0	0	0.9446	0	11.20	9.42	118.90
0	0.0508	0	—	0	0	0	0.9492	0	11.20	9.42	118.90 (*)



## BASIS CURRENCY: £

1	0	0	0	—	0	0	0	0	12.68	25.02	50.66
0.4687	0	0.5313	0	—	0	0	0	0	12.66	20.13	62.90
0.4402	0.0528	0.5070	0	—	0	0	0	0	12.63	19.87	63.58
0.2230	0	0.3904	0	—	0	0.3866	0	0	12.47	18.67	66.80
0	0	0.2610	0	—	0	0.7390	0	0	12.29	17.44	70.48
0	0	0.1864	0	—	0	0.8136	0	0	12.26	17.26	71.03
0	0	0	0	—	0	0.6630	0.3370	0	11.90	16.06	74.14
0	0	0	0	—	0	0.3606	0.6394	0	11.67	15.69	74.34 (*)

## BASIS CURRENCY: DClr

1	0	0	0	0	—	0	0	0	8.13	24.37	33.37
0.0565	0	0.9435	0	0	—	0	0	0	8.06	6.00	134.40
0.0556	0.0016	0.9428	0	0	—	0	0	0	8.06	5.99	134.50
0.0483	0	0.9138	0	0	—	0	0.0379	0	8.02	5.79	138.60
0	0	0.7357	0	0	—	0	0.2643	0	7.77	4.69	165.50
0	0	0.5165	0	0	—	0	0.4835	0	7.53	4.24	177.60 (*)

## BASIS CURRENCY: SDR

1	0	0	0	0	0	—	0	0	8.93	11.60	76.99
0.6145	0	0.3855	0	0	0	—	0	0	8.90	5.62	158.30
0.5241	0.1546	0.3213	0	0	0	—	0	0	8.80	3.97	222.00
0.5046	0.1606	0.3007	0	0.0341	0	—	0	0	8.74	3.55	246.10
0.4609	0.1497	0.1956	0.1123	0.0816	0	—	0	0	8.52	2.55	334.00
0.4376	0.1439	0.1224	0.1135	0.0766	0	—	0.1060	0	8.41	2.40	350.00
0.4346	0.1430	0.1160	0.1142	0.0769	0	—	0.1114	0.0039	8.40	2.40	349.70 (*)

TABLE A.2a (cont.)  
COMPOSITION OF EFFICIENT PORTFOLIOS, 1973I-1985IV

U.S.\$	¥	DM	FF	£	DGlr	SDR	ECU	Lit	E	S	E/S(%)
BASIS CURRENCY: ECU											
1	0	0	0	0	0	0	—	0	11.44	22.32	51.25
0.2175	0	0.7825	0	0	0	0	—	0	11.41	8.70	131.10
0.1744	0.0806	0.7450	0	0	0	0	—	0	11.36	8.22	138.20
0	0.0385	0.6409	0	0	0	0.3206	—	0	11.23	7.35	152.80
0	0.0391	0.6386	0	0	0	0.3224	—	0	11.23	7.34	152.90
0	0.0403	0.6313	0	0.0142	0	0.3142	—	0	11.20	7.21	155.40
0	0.0347	0.5634	0.0828	0.0514	0	0.2678	—	0	11.05	6.33	174.70
0	0.0224	0.4080	0.1852	0.1193	0	0.0791	—	0.1860	10.51	3.99	263.70
0	0.0290	0.1903	0.2090	0.1338	0.2241	0	—	0.2138	10.11	3.17	319.30
0	0.0252	0.1250	0.2153	0.1332	0.2875	0	—	0.2138	10.01	3.13	320.30 (*)
BASIS CURRENCY: Lit											
0	0	1	0	0	0	0	0	—	17.62	19.36	90.99
0.3751	0	0.6249	0	0	0	0	0	—	17.60	16.12	109.20
0.3265	0.1014	0.5721	0	0	0	0	0	—	17.55	15.72	111.70
0.1598	0.0379	0	0	0	0	0	0.8023	—	16.41	10.53	155.80
0.1319	0.0240	0	0	0	0	0	0.8441	—	16.36	10.37	157.70
0.0954	0	0	0.0427	0	0	0	0.8618	—	16.27	10.23	159.00
0.0753	0	0	0.0574	0	0	0	0.8673	—	16.24	10.22	158.90 (*)

E = Portfolio return.

S = Portfolio standard deviation.

(\*) = Minimum risk portfolio.

TABLE A.2b  
COMPOSITION OF EFFICIENT PORTFOLIOS, 1979II-1985IV

U.S.\$	¥	DM	FF	£	DClr	SDR	ECU	Lit	E	S	E/S(%)
BASIS CURRENCY: U.S.\$											
—	0	0	0	0	0	1	0	0	7.44	10.17	73.22
BASIS CURRENCY: ¥											
1	—	0	0	0	0	0	0	0	9.72	23.55	41.29
0.8051	—	0	0	0.1949	0	0	0	0	8.92	20.96	42.56
0.6537	—	0	0	0.1664	0	0	0	0.1799	8.24	19.42	42.42
0.3452	—	0	0	0.1005	0	0.5543	0	0	7.63	18.23	41.87
0	—	0	0	0.0041	0	0.9959	0	0	6.69	16.61	40.30
0	—	0	0	0.0254	0	0.9746	0	0	6.67	16.58	40.23
0	—	0	0	0.0234	0	0.7055	0	0.2711	6.29	16.38	38.39(*)
BASIS CURRENCY: DM											
1	0	—	0	0	0	0	0	0	15.36	25.41	60.44
0.9225	0	—	0	0.0775	0	0	0	0	15.01	23.89	62.85
0.1221	0	—	0	0.0567	0	0	0	0.8212	10.97	8.07	135.90
0.0798	0	—	0	0	0	0	0.3037	0.6165	10.36	6.37	162.70
0	0	—	0	0	0	0	0.5643	0.4357	9.65	4.71	205.10
0	0	—	0	0	0	0	0.6072	0.3928	9.60	4.62	207.80
0	0	—	0	0	0.2837	0	0.4388	0.2775	8.98	3.83	234.30
0	0	—	0.0784	0	0.5147	0	0.2374	0.1695	8.40	3.57	235.20(*)
BASIS CURRENCY: FF											
1	0	0	—	0	0	0	0	0	19.96	27.98	71.34
0.8922	0	0	—	0.1078	0	0	0	0	19.45	25.88	75.15
0.8463	0	0	—	0.1055	0	0	0	0.0481	19.20	24.89	77.14
0.2228	0.0505	0	—	0.0661	0	0	0	0.6605	15.79	12.65	124.70
0.1404	0.0624	0	—	0	0	0	0.3367	0.4605	14.95	10.28	145.50
0	0.0653	0	—	0	0	0	0.6438	0.2909	13.87	7.83	177.10
0	0.0268	0	—	0	0	0	0.9732	0	13.49	7.49	180.20
0	0.0233	0	—	0	0	0	0.9767	0	13.49	7.49	180.10(*)

TABLE A.2b (cont.)  
COMPOSITION OF EFFICIENT PORTFOLIOS, 1979II-1985IV

U.S.\$	¥	DM	FF	£	DGlr	SDR	ECU	Lit	E	S	E/S(%)
BASIS CURRENCY: £											
1	0	0	0	—	0	0	0	0	16.35	28.58	57.22
0.9322	0.0677	0	0	—	0	0	0	0	16.06	27.60	58.20
0.5917	0	0	0	—	0	0.4083	0	0	15.06	24.48	61.50
0	0	0	0	—	0	1	0	0	13.18	19.47	67.69
0	0	0	0	—	0	0.2253	0.7747	0	10.77	16.95	63.53 (*)
BASIS CURRENCY: DGlr											
1	0	0	0	0	—	0	0	0	15.89	26.51	59.97
0.9023	0	0	0	0.0977	—	0	0	0	15.46	24.53	63.01
0.0896	0	0	0	0.0821	—	0	0	0.8283	11.31	8.03	140.80
0.0277	0	0	0	0	—	0	0.4452	0.5271	10.43	5.53	188.50
0	0	0	0	0	—	0	0.5380	0.4620	10.18	4.89	208.00
0	0	0	0	0	—	0	0.5510	0.4490	10.16	4.86	209.20
0	0	0.3457	0	0	—	0	0.4548	0.1995	9.48	3.52	269.60
0	0	0.5948	0.1251	0	—	0	0.2802	0	8.88	3.01	294.70
0	0	0.6140	0.1334	0	—	0	0.2526	0	8.85	3.01	293.90 (*)
BASIS CURRENCY: SDR											
1	0	0	0	0	0	—	0	0	12.86	12.22	105.20
0.9050	0	0	0	0.0950	0	—	0	0	12.45	10.21	122.00
0.8372	0.0425	0	0	0.1202	0	—	0	0	12.16	8.92	136.30
0.4695	0.0862	0	0	0.1064	0	—	0	0.3378	10.42	2.35	443.30
0.4391	0.0902	0	0.1114	0.0978	0	—	0	0.2616	10.05	1.94	518.80
0.4366	0.0911	0	0.1118	0.0945	0	—	0.0158	0.2501	10.02	1.93	517.70 (*)

## BASIS CURRENCY: ECU

1	0	0	0	0	0	0	—	0	17.62	24.95	70.62
0.7849	0	0	0	0.2151	0	0	—	0	16.64	20.38	81.64
0.1419	0	0	0	0.1916	0	0	—	0.6665	13.23	6.96	190.00
0.0421	0	0	0.3193	0.1736	0	0	—	0.4650	12.10	3.73	324.70
0	0	0.1815	0.3798	0.1594	0	0	—	0.2792	11.36	2.39	476.00
0	0	0.2585	0.4201	0.1510	0	0	—	0.1704	11.11	2.25	493.10 (*)

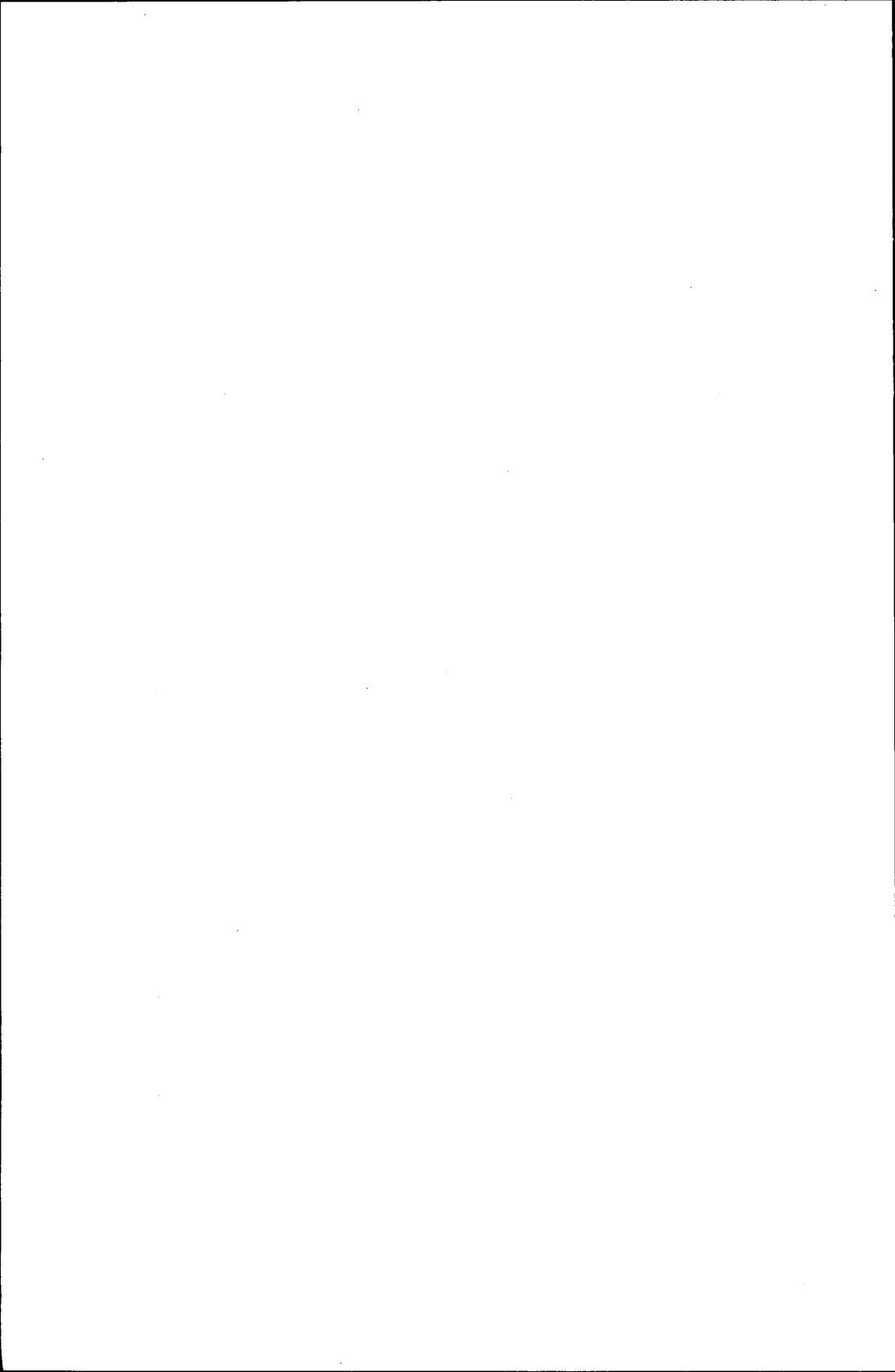
## BASIS CURRENCY: Lit

1	0	0	0	0	0	0	0	—	22.29	24.95	89.36
0.8152	0	0	0	0.1848	0	0	0	—	21.40	21.16	101.20
0.7556	0.0335	0	0	0.2109	0	0	0	—	21.13	20.17	104.80
0.3771	0.0432	0	0	0.0381	0	0	0.5416	—	18.31	10.52	174.00
0.3152	0.0416	0	0.0558	0.0182	0	0	0.5692	—	17.81	8.97	198.40
0.1792	0.0176	0	0.0891	0	0	0.2183	0.4958	—	17.51	8.11	215.80
0.0885	0	0	0.1418	0	0	0.3539	0.4157	—	17.27	7.45	231.70
0	0	0	0.2278	0	0	0.4137	0.3585	—	16.81	6.31	266.60
0	0	0	0.4180	0	0	0.1776	0.4044	—	15.86	5.14	308.30 (*)

E = Portfolio return.

S = Portfolio standard deviation.

(\*) = Minimum risk portfolio.



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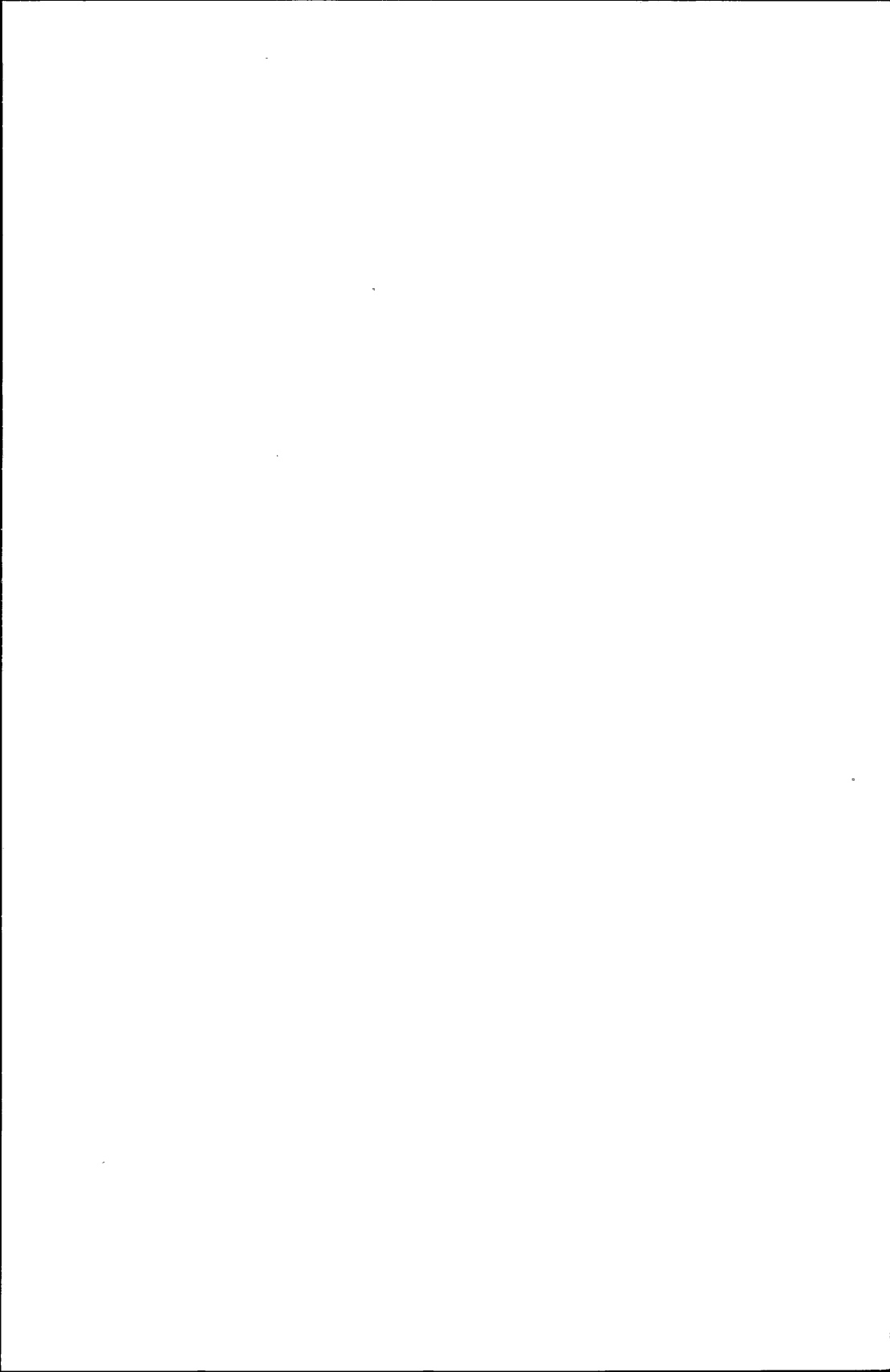
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