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INTERNATIONAL DIMENSION OF EUROPEAN MONETARY UNION:  
IMPLICATIONS FOR THE DOLLAR

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## **Abstract**

This paper attempts to review the different elements of the international role of the dollar and, where possible, to provide quantitative information about the current scale of dollar use and how it may be changing, including in response to European monetary union. The paper considers the exchange value of the dollar, the dollar as reserve asset, the dollar as vehicle currency, and the macroeconomic implications for the United States of the fiscal actions likely to be required for the participating EU countries to meet the fiscal convergence criteria specified in the Maastricht Treaty. The paper finds that if Federal Reserve policy continues to contribute to confidence in the long-term value of the dollar and the process of change remains gradual, then European monetary union does not pose serious negative consequences for the international role of the dollar.

**International Dimension Of European Monetary Union:  
Implications For The Dollar**

Karen H. Johnson<sup>1</sup>

**Introduction**

The plans to go forward with a European monetary union have drawn the attention of observers of the world's financial markets for the past several years. Adoption of a single currency, the ECU, for the European economy, whether in one stage or in several, would eventually mean one currency for an economy whose GDP is currently about 110 percent of that of the United States. Such a currency would inevitably come to play a significant role on world financial markets--and in that sense be a rival for the dollar.

Events since September 1992 suggest that the transition to monetary union may potentially be marked by occasional periods of instability on exchange markets. During such periods, the level and/or stability of the exchange value of the dollar may well be affected.

This paper attempts to review the different elements of the international role of the dollar and, where possible, to provide quantitative information about the current scale of dollar use and how it may be changing, including in response to European monetary union. The paper considers in turn: (1) the exchange value of the dollar--how it

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1. The author is Assistant Director, Division of International Finance, Board of Governors of the Federal Reserve System. The views expressed in this paper are those of the author and do not necessarily reflect those of the Board of Governors of the Federal Reserve System or any other members of its staff. The author wishes to thank Rick Heller for excellent research assistance.

relates to the current ERM and what that might imply about the dollar and monetary union; (2) the dollar as reserve asset--including both official and private holdings; and (3) the dollar as vehicle currency in the trading of goods and assets--including invoicing, asset denomination, and means of payment. In addition, a macroeconomic perspective is raised concerning the extent to which the transition to European monetary union and the policy choices that are expected to be associated with that process will have an impact on the United States. The final section provides some summary thoughts on the dollar and European monetary union.

#### The Exchange Value of the Dollar

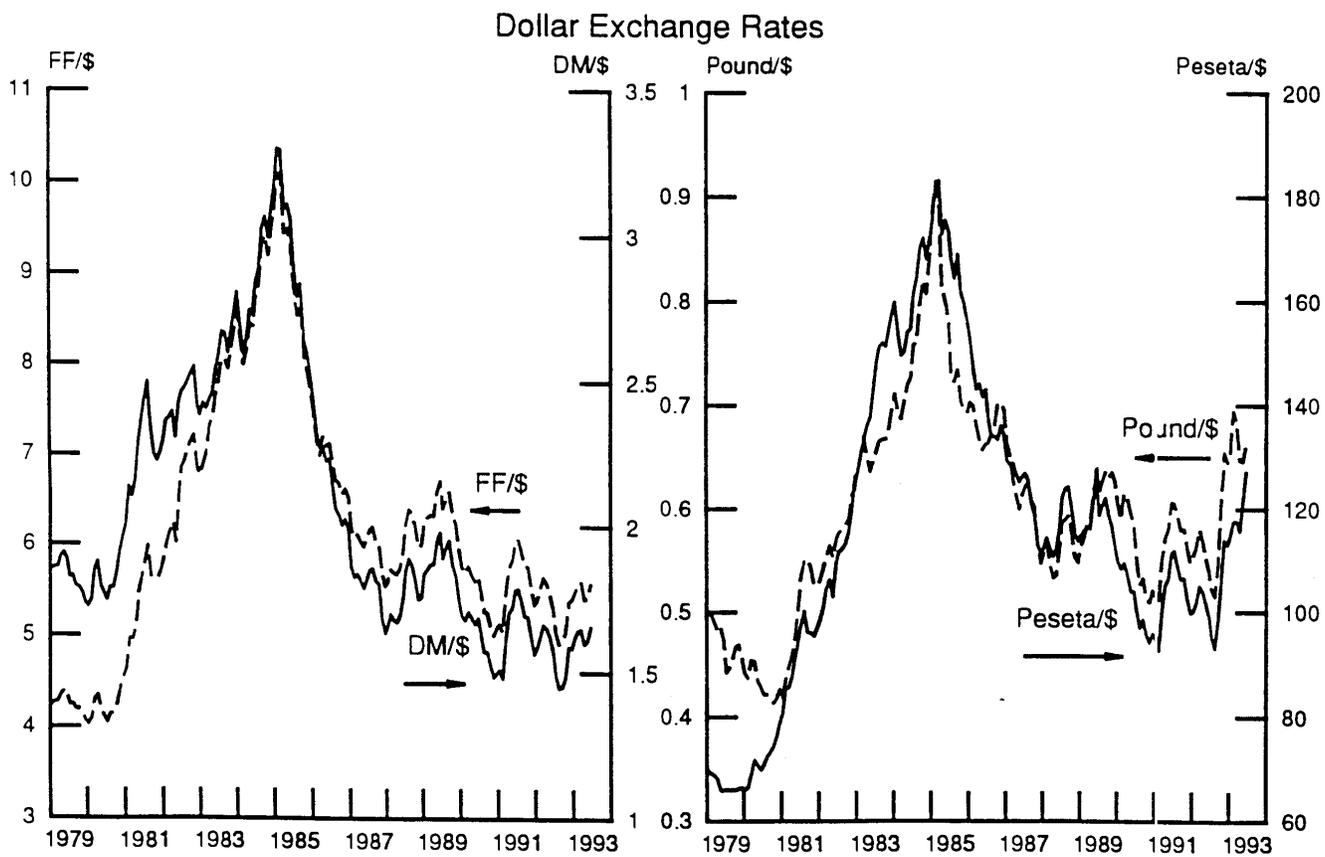
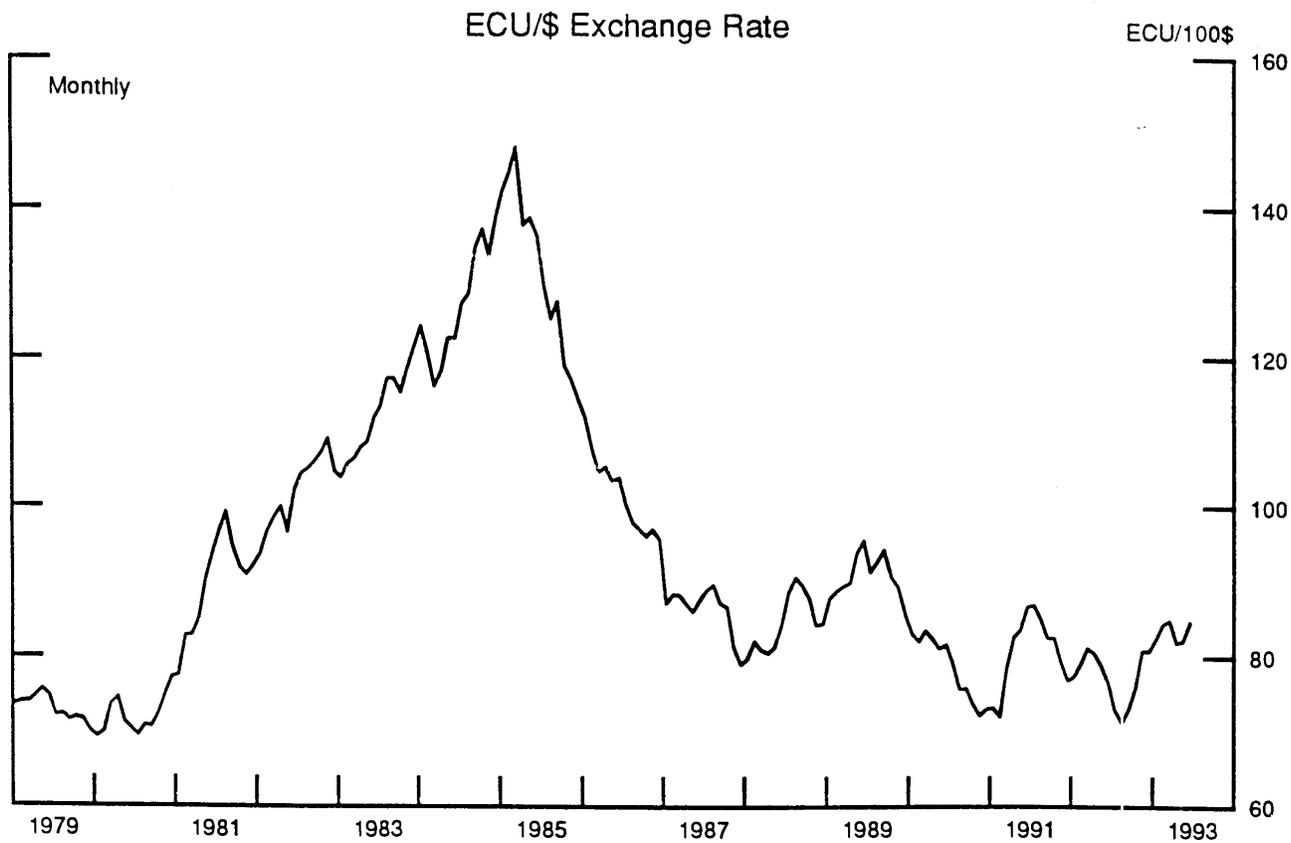
The move to floating exchange rates in the early 1970s allowed the exchange rates for different currencies to move independently of one another. By its very nature, however, an exchange rate reflects economic developments in two countries, not one. Moreover, news that has an impact on market participants' views with respect to one currency changes that currency's relative attractiveness; as market portfolios are adjusted in response, the exchange rates of that currency in terms of many other currencies are likely to be affected, as may be the cross rates of those other currencies.

Although the dollar is not a participant in the Exchange Rate Mechanism (ERM) of the European Monetary System (EMS), developments within the ERM can and often do have an impact on dollar exchange rates. Success on the part of ERM participants at maintaining stability of their exchange rates in terms of each others' currencies imparts a degree of stability to the dollar, although the dollar can move relative to all ERM currencies taken together. Periods of volatility within the ERM

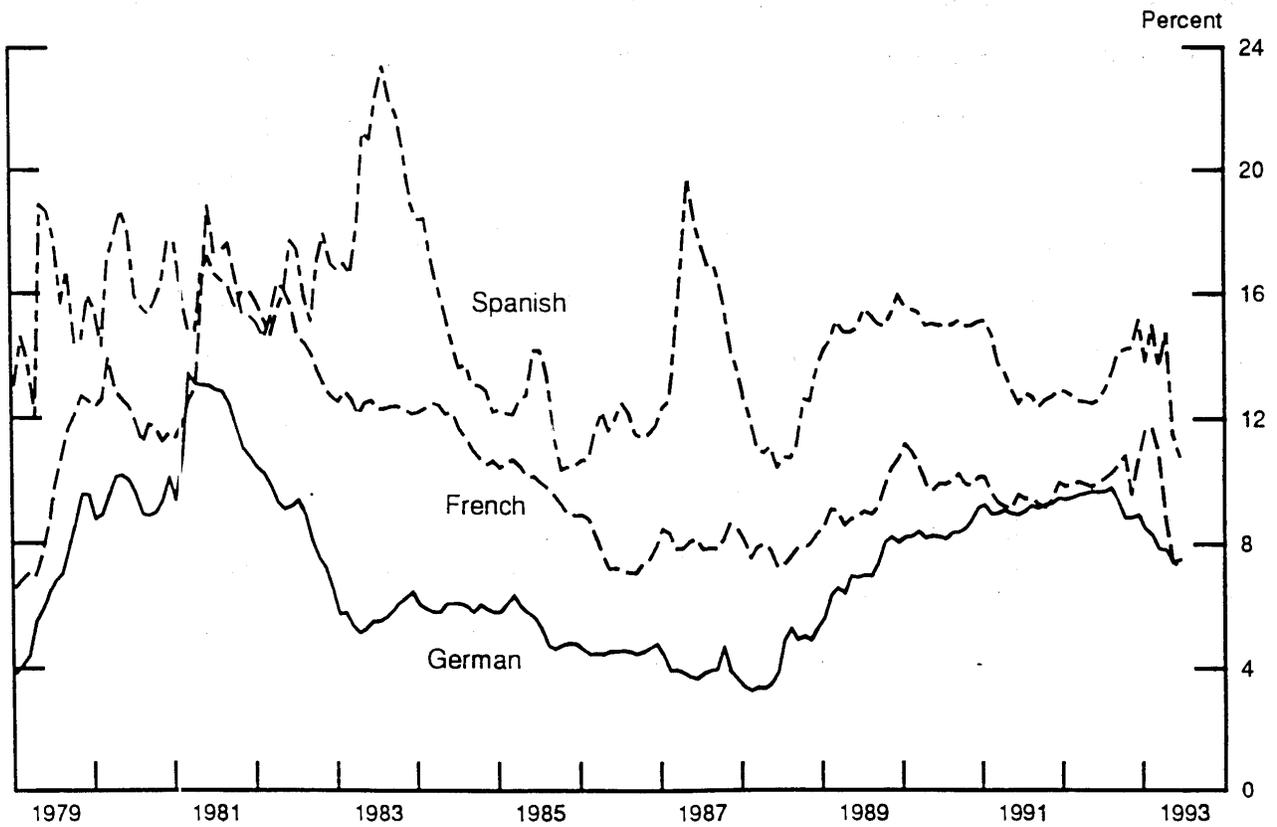
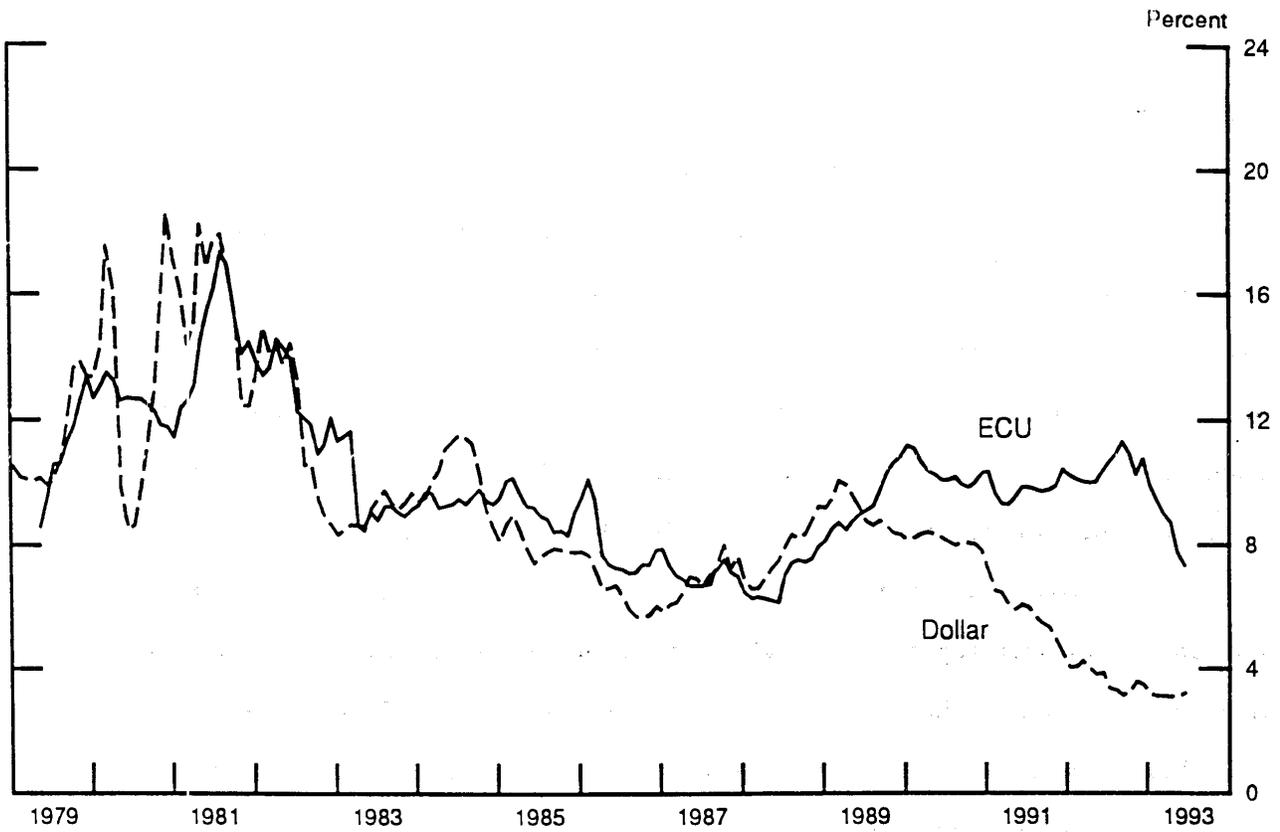
necessarily imply movement of the dollar in terms of at least some ERM currencies.

In the top panel of Chart 1, the ECU value of the dollar is shown for the period since the establishment of the ERM in 1979 (through June 30, 1993). For the most part, that exchange rate is dominated by the general rise in the value of the dollar through early 1985 and its subsequent decline. Since the end of 1987, the dollar has fluctuated without any clear trend in terms of the ECU. The dollar exchange rates for some constituent currencies are shown in the lower panels. The movements of the dollar in terms of the German mark tend to parallel that for the ECU, in part because the mark has the greatest weight in the ECU and in part because of the success of the other ERM countries in stabilizing their exchange rates in terms of the mark. The movement of the French franc/dollar exchange rate also reflects the general rise of the dollar in the early 1980s. Unlike the case of the mark, the dollar has tended to rise some in terms of the franc on balance over this period. For the peseta, which joined the ERM in June 1989, and the pound, which joined in October 1990 and then suspended membership in September 1992, there has been a more significant rise in the value of the dollar on balance over this period, but the general tendency for the dollar to fluctuate fairly narrowly after declining from its 1985 highs is still evident.

Short-term dollar interest rates (Chart 2) remained close to Euro-ECU 3-month rates through much of the mid and late 1980s. Since 1990, however, dollar rates have declined to the lowest levels for the period while ECU rates were held up during 1990-1992 before declining in 1993. Of the constituent ECU interest rates, German rates moved up in



### Short-Term Interest Rates



the early 1990s while dollar rates were moving down. Peseta rates remained relatively high during the past several years, but have come down most recently.

The data on these two charts confirm that the dollar has fluctuated freely against EC currencies over this period. The dollar exchange rate has shown no clear trend in terms of the ECU, but has fluctuated quite widely. While dollar interest rates have at times moved similarly to ECU rates, particularly in the early 1980s when industrial countries generally were attempting through tighter monetary conditions to lower inflation, those rates clearly have diverged most recently.

Examination of the impact, if any, of the ERM on the dollar is one way of attempting to judge what might be the implications of European monetary union for the exchange value of the dollar.<sup>2</sup> It must be remembered, however, that monetary union will remove all possibility of exchange rate fluctuation among the currencies of participating countries and thus will eliminate the characteristics of the ERM that are most often studied in the literature. The ERM can be thought of as a middle ground between freely floating exchange rates and absolutely fixed rates (or a single currency). The history of the ERM is a reasonable place to look for insight into the transition period to full monetary union. It is less clear whether studying the period of the ERM will offer insight into how the ECU/dollar exchange rate is likely to behave under monetary union.<sup>3</sup>

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2. For a more detailed discussion of European monetary arrangements, exchange rate volatility and the dollar, see Edison and Kole (1993).

3. Alogoskoufis and Portes (1992) argue that full monetary union is likely to mean greater exchange rate stability between the dollar and yen and European currencies, largely on the grounds that international policy cooperation will not be undermined and may even be enhanced by full monetary union in Europe.

ERM Volatility. One possible concern for holders of dollars is that volatility within the ERM might "spill over" into an impact on the dollar. Episodes of volatility within the ERM might be systematically related to the level or changes in the level of the dollar; for example, during periods perceived as risky for ERM currencies funds might leave the ERM altogether and move into dollars, putting upward pressure on dollar exchange rates. Such an outcome would imply a relationship between ERM volatility and the mean rate of change of the dollar. Alternatively, volatility in the ERM may be associated with higher volatility in dollar exchange rates and generally disorderly markets, without necessarily any systematic effect on the mean rate of change. In that case, volatility in one set of exchange rates would be related to volatility in another.

In an attempt to see whether the data provide any evidence of a systematic relationship between events within the ERM and dollar exchange rates, we used the French franc/German mark exchange rate (Chart 3) to identify subperiods in the 1979-1993 interval. The measure of ERM volatility used was the variance of daily changes in that cross rate, where changes were measured as the first difference of the natural logarithm of the exchange rate. Examination of the data by year along with the dates of ERM realignments suggested six periods into which the whole ERM history (through June 1993) could be divided: March 1979 to December 1979, January 1980-February 1981, March 1981-April 1983, May 1983-June 1985, July 1985-January 1987, February 1987-June 1993. In addition, we broke the final period into three subperiods, February 1987-August 1992, September 1992 - December 1992, January 1993 - June 1993, in order to look more closely at the turbulent period of late 1992.

### The French Franc per Deutsche Mark Exchange Rate



Shaded areas mark periods that tested as one of high ERM volatility.

These periods were then tested for equality of the volatility measure over time, using a standard F-test. For each period in turn, the equality of the variance of daily changes with that in the following period was tested (using a one-tailed test as the data had been structured to yield alternating periods of high and low volatility). Thus each period was tested against those that preceded and followed it, so that a sequence of high and low volatility periods was confirmed, even though over time the absolute amount of variance in the daily changes data appeared to be declining.<sup>4</sup> The F-tests confirmed that on the basis of the behavior of the French franc/German mark exchange rate, the following periods could be thought of as alternately high and low volatility periods within the ERM:<sup>5</sup>

March 1979 - December 1979	High
January 1980 - February 1981	Low
March 1981- April 1983	High
May 1983 - June 1985	Low
July 1985 - January 1987	High
February 1987 - June 1993	Low

For the last period, the same tests revealed the following subperiods:

February 1987 - August 1992	Low
September 1992 - December 1992	High
January 1993 - June 1993	Low

The next question was whether these periods also characterized systematic behavior of the dollar. For the ECU/dollar exchange rate, the mean and variance of the daily changes in the dollar in each period are:

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4. Artis and Taylor (1993) confirm that volatility within the ERM declined during the period 1979-90.

5. For each pair of adjacent periods, the data supported a finding that the variance of daily changes was significantly different in the two periods at the 1 percent level of significance.

Period	ERM Volatility	Mean Daily Changes in \$ (x1000)	Variance of Daily \$ Changes (x1000)
3/79-12/79	High	-0.236	0.015
1/80-2/81	Low	0.609	0.046
3/81-4/83	High	0.462	0.061
5/83-6/85	Low	0.209	0.670
7/85-1/87	High	-0.979	1.965
2/87-6/93	Low	0.024	0.065

For the three subperiods:

2/87-8/92	Low	-0.165	0.064
9/92-12/92	High	2.441	0.112
1/93-6/93	Low	0.478	0.047

Given the definition of ERM volatility being used, the data for the six major periods do not support the notion that high volatility periods in the ERM tend to be associated with upward pressure on balance on the dollar in terms of the ECU. For two of the three periods identified as high volatility, the dollar on balance tended to decline relative to the ECU over the period (although the mean daily change was very close to zero). In addition, the period of the highest mean daily change of the dollar, January 1980 to February 1981, was a period of low ERM volatility by the measure used. For the subperiods that break out the fall of 1992, these findings are reversed. The very high volatility period of September to December 1992 was associated with upward pressure on balance on the dollar.

With respect to volatility of the dollar, the pattern shown for the six major periods is quite different from that for the ERM. The variance of daily changes in the dollar clearly tends to rise from one period to the next until the 7/85-1/87 interval. This interval is also one of high ERM volatility, with the next interval low volatility. Nevertheless, this radically different pattern does not require a calculation to establish that the variances are not alternately high and

low as in the ERM measure. Once again, however, the subperiods since 1987 give a different result. For the ECU/dollar rate, daily changes are significantly more volatile in the period September to December 1992 than in the preceding or following subperiod, just as is the case for our measure of ERM volatility.

From these data and the measure of volatility used, it would appear that over fairly long intervals, as the ERM has evolved toward generally lower volatility but with identifiable episodes of higher and lower volatility along the way, no systematic relationship with either the mean change or the volatility of the ECU/dollar exchange rate could be identified. However, the data for the September 1992 episode of extreme instability in the ERM suggest that during shorter intervals, spillover to the dollar from ERM volatility may be present. A finer screen that looked at episodes of a few days would probably confirm the presence of spillover effects, but it is not clear that effects that come and go within a few days have any lasting significance. On balance, given the weak evidence from the data examined in this study of a systematic relationship between ERM developments and the dollar, there does not seem to be an a priori basis on which to conclude that the dollar would either gain or lose (in terms of mean change or volatility) from an ending of the ERM and a move to a single currency. There is some evidence to suggest that a long transition, should it be characterized by repeated episodes of instability, might generate spillover effects that also increase dollar volatility.

Once full monetary union has been implemented, volatility within the ERM per se will no longer be an issue. Furthermore, differential monetary policies within the EC, which may have contributed to volatility

within the ERM at times, will no longer be possible as, of course, would also be the case for speculative capital flows. These factors suggest that from the point of view of the dollar, the move to monetary union might reduce whatever spillover of instability may have occurred under the ERM. Nevertheless, economic shocks that have different impacts on different EC members could still occur, and exchange rate change within the EC will no longer be a part of the adjustment process; as a result, fluctuations of the ECU against other currencies, including the dollar, may play a larger role in adjustment to such economic shocks.

#### The Dollar as Reserve Asset

Official reserves. Throughout the post-WWII period to date, the dollar has served as the principal official international reserve asset. Such use of the dollar arose naturally under the Bretton Woods fixed exchange rate system as countries other than the United States tended to peg their currencies in terms of the dollar and to hold dollar reserves.<sup>6</sup> The dollar has continued to be held in significant quantities in official portfolios even after the breakdown of the Bretton Woods System and the move to a floating exchange rate regime. Of course, other currencies have come to be held in official portfolios; and over time, the share of the dollar in such holdings has tended to diminish.

Table 1 shows the percent share of dollars, pounds, marks, and several other currencies in the official holdings of industrial countries and of developing countries for selected years since the mid-1970s.

Although the shares show some tendency to fluctuate, there is clearly a

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6. Sterling remained a significant reserve asset after the WWII in the sterling bloc, but by the collapse of the fixed exchange rate system in the early 1970s, sterling's role as an international currency was greatly reduced.

Table 1  
Share of National Currencies in Total Official Holdings of Foreign Exchange  
(end of year, percent)

	Industrial Countries*				Developing Countries*					
	1975	1980	1985	1990	1992	1975	1980	1985	1990	1992
US dollar	87.3	77.9	65.2	56.0	64.9	70.8	58.1	64.5	60.7	63.6
Pound sterling	1.1	0.6	1.8	1.9	2.3	6.8	5.3	4.3	6.4	4.6
Deutsche mark	4.0	12.4	19.5	21.9	14.4	8.8	15.4	10.0	11.6	10.9
French franc	0.1	--	0.1	2.5	3.0	2.4	2.6	1.9	2.0	1.9
Swiss franc	0.9	1.5	2.1	1.1	0.6	2.3	4.8	2.6	2.2	2.5
Netherlands guilder	0.3	0.5	1.0	1.3	0.5	0.9	1.3	0.9	0.7	0.9
Japanese yen	0.2	2.8	8.9	9.6	7.4	0.9	4.9	6.9	7.3	9.0
Unspecified	6.2	4.2	1.4	5.9	6.9	7.1	7.6	9.0	9.0	6.7

\* The SDR value of ECUs issued against dollars is added to the SDR value of dollars. ECUs issued against gold are excluded.

#### Industrial Countries: ECU treated separately

	1979	1980	1985	1990	1992
US dollar	62.2	54.3	48.9	44.5	49.9
Pound sterling	0.5	0.5	1.7	1.7	2.2
Deutsche mark	6.3	9.4	16.4	21.9	13.5
French franc	--	--	0.4	2.1	2.8
Swiss franc	1.1	1.1	1.5	1.1	0.5
Netherlands guilder	0.4	0.4	0.9	1.2	0.5
Japanese yen	1.7	2.1	7.3	9.2	7.0
ECU	24.0	29.0	20.2	12.9	17.0
Unspecified	3.8	3.2	2.7	5.5	6.5

Source: Annual Report of the IMF, various issues.

general tendency for the dollar share to fall for both groups of countries since the late 1970s.<sup>7</sup> The dollar share has moved much less for developing countries than for industrial, and for both groups has been about stable since the mid-1980s. With some decline in the share of dollars in official holdings, the shares of German marks and, to a lesser extent, Japanese yen have increased. The top panel counts as dollar holdings the ECU balances issued against dollars for the EC member countries; the bottom panel shows ECUs separately as a reserve currency. On either basis, dollar holdings as a share of the total have declined over time.

During Stage II of the move toward EMU, it is likely that the trends that have been in place since the 1970s will continue and that some further decline in the share of dollars in official portfolios will occur. To the extent that Stage II succeeds in achieving enhanced stability of exchange rates within the EMS, the substitution of European currencies for dollars may accelerate as the more stable purchasing power of, for example, the German mark in terms of other currencies and the goods of other European economies may make it a more attractive international reserve asset. Conversely, if the transition period to full monetary union is marked by additional speculative episodes of the sort experienced in September 1992 and July/August 1993, the relative attractiveness of the dollar may be raised and dollar holdings may rise, at least temporarily, as the perceived riskiness of European currencies becomes greater.

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7. The measure of the share of each currency over time reflects both the change in quantity held and the change in the value of that currency. Thus exchange rate fluctuations move these share measures even if quantities are unchanged.

Once European Monetary Union is actually implemented, several significant changes in official balances will follow. First, for EMU members, holdings of ECU balances and the currencies of other participating countries will no longer be international "reserves." Second, the dollar has served as an intervention currency for ERM member countries. Once the need for intervention among (some) European currencies is eliminated by EMU, their need for dollar reserves may be lowered. Third, with the formation of the monetary union, the participating countries can "pool" their international reserve assets; the balance between what is external trade and what is trade within the domestic currency area will change greatly for each participating country. As a result, the members of the monetary union together may be able to economize on their holdings of international reserves. The EC Commission has estimated that full monetary union would cause the demand for reserves on the part of EC countries to fall by \$200 billion, equivalent.<sup>8</sup> This figure for total reserves presumably overstates the amount by which dollar reserves might be reduced.

For countries other than those actually participating in EMU, the final step to monetary union will offer a possible reserve currency that will compete with the dollar. The ECU would be the domestic currency of a very large and growing economy with fully integrated financial markets. As long as there appears to be no risk of controls or other devices that would restrict the use of the ECU by potential holders, it seems reasonable to assume that the ECU would be more attractive than any one of the European currencies reported on Table 1 or even than all of them taken together. The ECU would clearly be

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8. EC Commission, One Money, One Market, p. 183.

particularly held by any country that chose to fix the exchange rate of its currency to the ECU, either formally or informally.

Over time, however, the degree to which the ECU competes with the dollar as an international reserve currency is likely to depend on the stability of the purchasing power of the two currencies. As long as the Federal Reserve achieves an acceptable degree of price stability for the dollar, so that the purchasing power of the dollar in terms of goods--both U.S. goods priced in dollars and, on average, world goods priced in other currencies--remains stable, the process of reducing the share of the dollar in official portfolios is likely to remain gradual.

Virtually all official reserve holdings take the form of interest-bearing instruments. As long as the U.S. Treasury is paying the market rate of interest on these instruments, there is no gain to the Treasury or to the United States in general from the fact that dollars are held as reserve assets. It might be the case that official holdings represent a large enough component of demand that shifts in these holdings could have a perceptible influence on the market rate of interest; lower demand would then raise the cost of financing the given stock of debt to the U.S. Treasury. With the total outstanding stock of marketable, interest-bearing U.S. Treasury obligations at about \$3 trillion in 1993, the \$200 billion potential reduction in demand estimated by the EC Commission does not seem large enough to have a significant effect. Even if the total shift in the demand for dollars as official reserves is several times that amount, as long as the process remains gradual, it would be difficult to measure any meaningful additional cost to the United States.

While the stock of total outstanding debt is large relative to potential shifts in official portfolios, the quantity of dollars traded each day or week on global exchange markets may not be. According to data compiled by the BIS (March 1993), global net turnover on the world's foreign exchange markets was roughly \$880 billion per business day in April 1992, with the U.S. dollar figuring on one side of 83 percent of all such transactions. It would seem that if official portfolios were adjusted in an abrupt manner, such a change in the demand for dollar holdings could disrupt exchange markets and have a visible effect on the exchange value of the dollar. Such an outcome appears most unlikely, however, as it is not in the interest of any governments currently holding dollars to sell some or all in such a way that the value they receive in exchange for their dollars would suddenly decrease.

Private holdings. Many individuals and private firms outside of the United States also hold dollars. In part these holdings may be related to trading arrangements, etc. (see the section below on the dollar as vehicle currency), but in part they arise because of a demand for a stable store of value. Substitution of dollar-denominated currency and bank accounts in place of similar instruments denominated in domestic currency most often occurs in those cases where the domestic inflation rate is high and variable and/or where the risk of devaluation of that currency seems high. If officials of the European Central Bank succeed in achieving their price stability objective, then the ECU could come to displace the dollar, at least in part, where it is used as a substitute for the domestic currency.

Dollar currency held abroad does provide a gain to the United States as no interest is paid on those holdings<sup>9</sup>. This benefit is in essence a measure of the seignorage gained when the currency was first issued and traded for real goods and services, in this instance provided by foreigners. It is estimated that over two-thirds of outstanding U.S. currency is held abroad, about \$200 billion in July 1993 (Porter, 1993). Even at low 1993 Treasury bill interest rates of 3 percent, these holdings provide a yearly savings to the U.S. Treasury of \$6 billion.

As the ECU becomes a major international currency, provided it remains free from capital controls or the risk of capital controls and maintains a stable value, use of ECU currency outside of the countries participating in EMU is likely to grow. Such a development will probably emerge first in areas nearest the EC countries, such as Eastern Europe and the countries of the former Soviet Union. Only over time would it perhaps spread to Asia or even to Latin America. Growing use of ECU currency in this way would reduce the movement of additional dollars abroad and thus limit the seignorage gains to the United States. Whether and to what extent this occurs will depend upon Federal Reserve policy, as well as European monetary policy. As long as the dollar remains competitive as a store of value, the United States will continue to benefit from use of its currency abroad.

Dollar-denominated instruments other than currency are also bought and held as a store of value in global private portfolios. As long as these instruments are paying market rates of return, no special benefit accrues to the United States or to U.S. borrowers from this role

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<sup>9</sup>. However, flows of currency abroad do make assessment of U.S. money growth more difficult, as they can only be measured imprecisely.

of the dollar. While a private ECU market already exists, no doubt transition to full monetary union would be accompanied by an expansion of ECU securities markets.<sup>10</sup> As these markets become somewhat deeper and more liquid, equilibrium rates of return on ECU securities may fall. Given the huge size of, for example, the dollar segment of the Euro-bond market, it seems likely that such a development would have only a marginal impact on equilibrium Euro-dollar rates.<sup>11</sup> Since U.S. borrowers could, if they chose, issue ECU-denominated obligations, and many of the borrowers who issue dollar-denominated obligations are not U.S. persons or firms, there is no clear gain or loss to the United States from a wider role for the ECU on private, global financial markets.

#### The Dollar as Vehicle Currency

For the past several decades the dollar has been widely used as a vehicle currency in international trade of goods and services and of assets. The dollar has served as a unit of account in contracts, i.e., invoicing in the case of goods trade or currency of denomination for assets, and also as a medium of exchange even when neither party to the transaction is a U.S. person or firm.

Invoicing. Data on the choice of currency for invoicing are not regularly collected and reported. Table 2 gives figures compiled by Page (1981) for trade in 1980 with updates provided by Black (1991) for 1987. From this data it appears that exports are more likely to be denominated

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10. ECU-denominated securities would replace those denominated in participating currencies. The private ECU market would likely expand further as ECU use in a variety of business transactions became more widespread.

11. The BIS (June 1993) reports outstanding stocks of straight fixed-rate international bond issues plus floating rate notes at the end of 1992 totalled nearly \$1.5 trillion in value, of which U.S. dollar denominated instruments were about one-third (p. 115).

Table 2  
Currencies Used in World Trade (percent)

	Exports: Various years 1977-1980					Imports: Various years 1977-1980				
	Dollar	DM	Sterling	Fr. Franc	Own	Dollar	DM	Sterling	Fr. Franc	Own
USA	98.0	1.0	1.0	--	98.0	85.0	4.1	1.5	1.0	85.0
West Germany	7.2	82.3	1.5	2.8	82.3	33.1	42.8	3.1	3.3	42.8
Japan	61.5	1.9	0.9	0.3	32.7	93.0	2.0	2.0	1.0	2.0
United Kingdom	17.0	3.0	76.0	2.0	76.0	29.0	9.0	38.0	5.0	38.0
France	11.6	10.2	3.2	62.4	62.4	28.7	14.1	3.8	35.8	35.8
Switzerland	7.1	7.8	--	1.2	82.8	27.0	24.0	5.0	6.0	38.0

	Exports: 1987					Imports: 1987				
	Dollar	DM	Sterling	Fr. Franc	Yen	Dollar	DM	Sterling	Fr. Franc	Yen
USA	94.0	2.0	1.0	1.0	1.0	80.0	8.0	3.0	2.0	2.0
West Germany	7.4	81.6	1.8	2.5	0.5	22.0	52.4	2.6	3.9	1.6
Japan	63.6	2.0	1.0	--	33.4	84.0	2.0	1.0	1.0	10.6
United Kingdom	17.0	3.0	76.0	2.0	--	20.0	15.0	38.0	8.0	2.0
France	11.8	10.2	3.6	61.5	0.4	18.7	15.3	2.8	46.5	4.4
Italy	20.0	18.0	--	9.0	38.0	28.0	19.0	5.0	9.0	--
OPEC	92.0	2.0	2.0	2.0	--	40.0	20.0	8.0	7.0	10.0

Source: Page (1981), some figures are estimates.

Source: Black (1991), some figures are estimates.

in the home country's currency than are imports. For the industrial countries shown, both the export and import "own" currency invoicing is quite high, with Japan something of an exception. From 1980 to the end of the decade the figures do not appear to change very much, although there is some indication of a reduction of the use of the dollar and increase in the use of the German mark for imports across the countries shown.

With currency of invoicing for the industrial countries tending to be either that of the exporter or importer, the share of a country's trade in world trade determines in large part the extent to which a given country's currency is used in invoicing trade. The U.S. dollar is the one currency that has had a significant role in trade between third parties, thus increasing the use of the dollar in trade significantly above the share of the United States in world trade. Page (1981) calculates that in 1980 the dollar was the currency used in slightly more than half of world trade, with 32 percentage points of its share in world trade accounted for by third-party use. About two-thirds of this third-party use of the dollar is accounted for by developing countries (Page, p. 61). Many developing countries do not have convertible currencies. In addition, trade in primary commodities is a large part of their total trade, and world commodity markets often have a particular currency, frequently the dollar, in which prices are quoted.

Use of the dollar as a vehicle currency for trade within Europe is not supported by the data. In general, the use of individual European currencies in trade corresponds to the share of that country in world trade, with the German mark and pound sterling having slightly higher use than their countries' respective shares in world trade. The data are

incomplete enough, however, that use of the French franc in francophone Africa or other similar cases may not be being captured. The evidence does seem to suggest that a move to a common currency in Europe would not displace dollar use for intra-European trade, as such use is negligible (Page, p.62 ). Once monetary union has established the ECU as a major world currency, the ECU may well come to replace the dollar as the invoicing currency in some third-party uses.

Table 3 reports the share of U.S. imports invoiced in foreign currency for selected years in the 1980s from Alterman (1991, p. 134). For total U.S. trade, the share of foreign currencies in import trade is fairly small, about 15 to 20 percent, consistent with the data on Table 2. Alterman's figures show foreign currency use falling, and dollar use rising, through the 1980s. This shift is not consistent with the data as reported by Black, who estimates that the dollar's share in U.S. imports fell from 85 to 80 percent over this period (Black (1991), p. 524). Alterman's data do confirm that while industrial country exporters have a fairly high percentage of use of their own currency in exports to the United States, developing countries such as Taiwan and South Korea do not.

While the use of the dollar as the most important vehicle currency in world trade appears to have been fairly stable over the past decade or so, and may even be rising as some developing countries increase their share in world trade, the move to monetary union in Europe would provide a currency that over time might successfully compete with the dollar for this role. What are the advantages, if any, for the United States to have the dollar serve as a vehicle currency? The choice of invoice currency in a direct sense determines which party, the

Table 3  
U.S. Import Prices Quoted in Foreign Currency (excluding petroleum, percent)

	September 1982	March 1985	June 1989
West Germany	57.9	54.4	52.2
Switzerland	54.2	52.7	48.5
United Kingdom	36.5	35.0	33.3
France	27.6	24.5	19.5
Sweden	18.9	28.9	18.7
Japan	22.3	19.1	18.2
Italy	11.9	13.3	17.2
TOTAL WORLD	19.6	17.3	15.3
Canada	9.4	8.3	9.1
Hong Kong	13.0	6.1	4.5
Taiwan	0.0	0.2	0.9
South Korea	0.0	0.0	0.0

Source: Alterman.

exporter or the importer, bears the exchange rate risk during the life of a contract. However, for the time frame relevant for most trade contracts, markets exist that would permit either party to hedge any exchange rate risk. Such hedging does entail a cost, and it might be the case that U.S. exporters or importers would have to bear a greater portion of such costs if use of the dollar in U.S. trade were to decline following EMU. The incidence of such costs is not obvious, however, as the price quoted in the contract may change to reflect any shifting of the exchange rate risk or hedging costs. Indeed, all the terms of the contract, including choice of invoice currency, are variables whose equilibrium outcomes depend upon the strategic marketing decisions of both exporters and importers. (See Bilson (1983) for a model of strategic choice of an invoice currency.) On balance, it is not clear that U.S. interests would be harmed significantly if the dollar's share as invoicing currency in U.S. trade were to fall. For third-party trade, there are no direct gains to the United States currently from the use of the dollar and no clear loss if the dollar's role should shrink.

Asset denomination. The dollar as currency of denomination has tended to predominate in asset markets, as well. Table 4 reports the currency of issue of international bond issues from Alogoskoufis and Portes (1992) (updates by author). Although the figures have tended to fluctuate somewhat over time, the general trend is for the use of the dollar to decline in favor of the yen and the EC currencies. Taken together, the issuance of bonds denominated in EC currencies exceeded that of dollar-denominated bonds since 1990.

For issuers of international bonds and similar instruments the choice of currency in which to borrow depends on expected relative rates

Table 4  
International Issues of Bonds, Breakdown by Currency of Issue

	1971	1976	1981	1986	1987	1988	1989	1990	1992
Total (\$ bn)	3.8	15.4	26.5	187.7	140.5	178.9	212.9	179.6	276.1
Percent:									
US dollar	59.7	65.1	80.2	62.9	41.3	41.7	55.2	38.4	37.4
Japanese Yen	--	--	1.5	9.9	16.1	8.9	7.3	12.9	12.2
EC Currencies	39.9	22.5	12.2	21.1	29.3	35.0	27.1	40.9	42.3
Deutsche mark	22.9	18.4	5.2	9.1	10.7	13.2	7.7	10.2	12.2
Sterling	1.6	--	2.0	5.6	10.7	13.2	8.7	12.0	8.4
French franc	1.3	0.4	2.0	1.9	1.3	1.3	2.1	5.0	8.8
Italian lira	--	--	--	0.2	0.5	0.9	1.6	3.0	2.8
Dutch guilder	7.1	3.0	1.6	0.5	0.8	0.1	1.1	0.8	2.4
ECU*	7.0	0.7	1.4	3.8	5.3	6.3	5.9	9.9	7.7
Other Currencies	0.4	12.4	6.1	6.1	13.3	14.4	10.4	7.8	8.1

Sources: Algoskoufis and Portes and OECD Financial Statistics Monthly, various issues.

\* Before 1981 European Unit of Account.

of return, including expected exchange rate change over the duration of the asset. In turn, such rates of return depend in part of the depth and liquidity of the underlying market. As new derivative instruments have been introduced into the financial markets, it has become possible for both the borrower and the lender to separate the different components of risk contained, for example, in a long-term, fixed interest bond and so to achieve for the total portfolio or net position, the risk and maturity conditions best suited to each. As long as market prices for each of the components of risk and for the component instruments are competitively determined, no obvious advantage accrues to the country whose currency is used by international borrowers and lenders for denominating instruments.

If individual markets or currencies are subject to risks that appear extreme or difficult to price in standard ways, use of that currency may shrink. The recent disruptions in the ERM may have a negative effect on use of some EC currencies or the private ECU, at least for a time. Full European monetary union should effectively eliminate these risks. Wider use of the ECU in private-sector markets is likely to follow, but in competitive markets, at competitive rates of return.

Means of payment. The dollar is also used as the means of payment in completing transactions for goods or assets in world markets to an extent that exceeds direct U.S. trades in these markets. To some extent, the choice of an invoice currency for goods trade may be linked to the means of payment actually used, but there is no reason why this need be the case.

For trade among separate economies, the question of what will serve as means of payment has no obvious answer. The gains from finding an "international" means of payment and thus allowing trade to expand

beyond that which can be accomplished through barter are considerable. Krugman (1984) and Black (1991) provide models of multilateral trade in which one currency comes to be used for international payments for just such reasons. Krugman's model suggests that economies of scale may result in the currency of a very large trading country coming to dominate as the means of payment in trade. Once established, such a currency tends to retain its use as a means of payment even if the country's share in trade should diminish. Black's model is framed in terms of transaction costs.

In practice, the market outcome being captured in these models can be seen in the fact that for many currencies it is easier and cheaper, particularly at the wholesale level, to trade currency A for currency B by trading A for dollars and then dollars for B. Such trades avoid the need to find a "double-coincidence" of desired exchanges between every possible pair of currencies (or to maintain separate markets for every possible pairwise trade). While there are no direct data on payments between exporters and importers, the flows of transactions in the exchange markets give an indication, at a somewhat aggregated level, of the currency payments that accompany the trading in goods. As cited above, the BIS estimates that the U.S. dollar figured on one side of 83 percent of transactions on the world's foreign exchange markets per business day in April 1992 (BIS, March 1993), a figure that greatly exceeds the U.S. share in world trade. Of course, these figures contain the currency counterparts of asset trades as well. Taken altogether, these data confirm that the dollar is being used as a means of payment for goods and asset trades to a significant extent.

The use of the dollar as means of payment likely increases the demand for dollar "working" balances on the part of financial institutions and of firms engaged in trade. Many of these balances take the form of claims on international banks, that in turn hold offsetting dollar-denominated assets. The net increase in demand for "dollars" that underlies these gross claims is still likely to be large. A shift away from the dollar in favor of the ECU as means of payment, if it occurs, may take some time as the fixed costs involved impart considerable inertia to this process (Krugman, 1984, pp. 268-269). Some impact on dollar exchange rates and rates of return over time cannot be ruled out, however.

At present, it would seem that the demand for dollars to hold greatly dominates the demand for dollars that arises narrowly from its role as international means of payment (see discussion above of dollar as reserve asset). Those factors that influence how the asset demand for dollars might shift with the introduction of European monetary union, including relative inflation performance and perceived exchange risk, will likely determine whether and how the component of dollar demand related to its means of payment function might change over time.

Macroeconomic Implications of European Monetary Union<sup>12</sup>

The current terms of the Maastricht Treaty call for several convergence criteria to be met by each participating country before full monetary union can be implemented. In addition, the criterion relating to the limit on fiscal deficits (3 percent of GDP) will continue to apply after monetary union is in place. The simultaneous efforts of several

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12. This section is based on the work of Lewis Alexander, formerly senior economist at the Board of Governors.

European countries to reduce their fiscal deficits poses the risk that output growth in EC countries could be significantly reduced during the transition period. Weaker real output growth in Europe in turn could lower demand for exports from other countries, resulting in a "spillover" effect of generally weaker growth in the world economy.

To gauge the potential size of this effect on U.S. real growth, simulations were run using the Board staff's Multi-country Model (MCM). Using estimates of the 1993 fiscal deficits for Western Germany, France, the United Kingdom, and Italy, the policy goal for each of those countries was set in terms of gradually lowering the deficit relative to baseline by the following amounts: Western Germany 1.1 percent of GDP, France 2.4 percent of GDP, United Kingdom 3.9 percent of GDP, Italy 7.3 percent of GDP.<sup>13</sup> Four simulations were calculated; in two the fiscal corrections were achieved by increases in the direct tax rate; in two, by reductions in government consumption. The fiscal corrections were phased in over 5 or more years.

The outcome of the simulations depends on the assumptions made for monetary policy in each of the countries in the model. German policy plays a special role, as the currencies of the other ERM members are assumed to be tied to the mark so that the monetary policies of those countries consist of matching German interest rates. In one pair of

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13. This procedure can be thought of as assuming that in the absence of the fiscal measures being simulated, the general government deficits of these four countries would remain about unchanged from 1993 levels. To the extent that the 1993 deficits have been enlarged by cyclical weakness that would likely be reversed even at unchanged fiscal policies, these simulations overstate how much fiscal action would be needed to meet the fiscal criterion. In addition, to the extent that the various governments would undertake to reduce fiscal deficits from current levels even without Maastricht criteria, the simulation results overstate the narrow effects of Maastricht per se.

simulations, German policy consists of targeting the price level. In the other pair, it consists of targeting the stock of M3. The exchange value of the mark in terms of the dollar in the model responds to the differential in long-term real interest rates between Germany and the United States. To reflect the fact that the United Kingdom and Italy are currently withdrawn from the ERM, the model determines the exchange value of the pound and lira by equations similar to that for the mark. The French franc remains tied to the mark. The U.S. monetary policy assumption is M2 targeting.

Table 5 reports the calculated effects on GDP growth rates (Q4/Q4) after five years as the fiscal measures are phased in.<sup>14</sup> In most, but not all, cases, the effects in earlier years on growth build up to the figures reported in Table 5. The assumption about German monetary policy does not have a major impact on the results, although when the results for all the years are taken into account, on balance fiscal convergence is more contractionary when the German assumption is M3 targeting. While the results are a bit mixed, achieving fiscal convergence through cuts in government consumption appears to be more contractionary than using tax rate increases. For the most part, the size of the impact of fiscal convergence on growth reflects the degree of deficit reduction that is needed. However, the effects on French growth as estimated by the MCM consistently exceed those on U.K. growth even though the French budget reduction is less. This result appears to depend on the particular way that exchange rates are modeled in the MCM.

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14. Tables at the end of the paper report more details of the simulation results.

Table 5  
Impact on GDP Growth Rate (Q4/Q4) After 5 Years  
(deviation from baseline)

	German M3 Target	German Price Level Target
<b>Tax Rate Increased:</b>		
Western Germany	0.04	0.00
France	-0.29	-0.31
United Kingdom	-0.01	-0.02
Italy	-0.86	-0.89
United States	0.01	0.01
<b>Government Consumption Cut:</b>		
Western Germany	-0.05	0.00
France	-0.96	-0.79
United Kingdom	-0.33	-0.17
Italy	-1.72	-1.16
United States	0.01	0.01

The results for the United States suggest that spillovers to U.S. growth are very small for the size fiscal contraction contained in the simulations. In general, in the model, fiscal contraction abroad tends to appreciate the dollar slightly, letting U.S. interest rates come down a bit (given the M2 target assumed for the United States) and lowering inflation slightly. These latter two effects tend to offset the contractionary effects of a higher dollar and weaker growth abroad, leaving the net effect on U.S. output very small. While no one model or one set of simulations can be taken as definitive, these results suggest that most of the contractionary impact of fiscal convergence will be felt within Europe and that little of that effect will "spillover" to the United States.

### Conclusions

When implemented, European monetary union will bring about profound changes in world financial markets. But, it will be only one of several significant forces for change, many of which are already having their effects. The revolution in information and data processing technology has transformed the speed with which information is disseminated and transactions occur. That revolution has contributed to the so-called globalization of financial markets, in which firms may be active in various financial markets continuously and trading can take place almost around the clock. The economies of many industrial countries have grown to achieve global importance. These economies have sophisticated financial and product markets in which multinational corporations are active. Their currencies naturally figure importantly in world trade. Finally, the emergence of new financial products, e.g., the derivative products discussed above, has made it possible for the

components of risk, including exchange rate risk, to be more carefully managed than ever before.

In such an environment as that just described, it is to be expected that the dominance of one currency, i.e., the dollar, that characterized the early post-WWII period will gradually erode. This, in fact, has been happening. European monetary union, over time, has the potential to have an effect on the different dimensions of the dollar's international role. In addition, the specific provisions of the Maastricht Treaty raise the possibility that the macroeconomic policies that might accompany the transition to monetary union could have negative implications for the United States.

In this paper we have reviewed each of these channels. Some clearly have the potential to imply costs for the United States should the ECU rapidly displace the dollar to a significant extent. Foreign use of dollar currency is perhaps the clearest example where displacement of the dollar by the ECU would imply such costs. As a result, the Federal Reserve remains a very interested observer of progress toward European monetary union. However, for most if not all of the international dimensions of the dollar, the process of diminishing the relative role of the dollar as other currencies come to figure more prominently in international transactions is already underway without serious negative consequences for the United States. That experience suggests that if Federal Reserve policy continues to contribute to confidence in the long-term value of the dollar and the process of change remains gradual, then there is no reason for the Federal Reserve to be unduly concerned about the implications of European monetary union. The international fate of the dollar still remains largely in our own hands.

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## Simulation Results

	1993	1994	1995	1996	1997	1998	Average
<b>Government Consumption Cut-German M3 Target</b> (deviations from baseline)							
<b>United States</b>							
GDP growth 1/	-0.01	-0.02	-0.02	0.00	0.00	0.01	-0.01
Output price inflation 1/	-0.01	-0.02	-0.04	-0.05	-0.05	-0.05	-0.03
Exchange Rate 2/	0.05	0.03	-0.08	-0.22	-0.33	-0.38	-0.15
<b>Germany</b>							
GDP growth 1/	-0.30	-0.30	-0.18	-0.04	0.00	-0.05	-0.14
Output price inflation 1/	-0.03	-0.09	-0.19	-0.29	-0.39	-0.47	-0.24
Exchange Rate 3/	-0.09	-0.06	0.09	0.28	0.42	0.48	0.19
<b>France</b>							
GDP growth 1/	-0.52	-0.83	-0.92	-0.94	-0.95	-0.96	-0.85
Output price inflation 1/	-0.07	-0.33	-0.80	-1.42	-2.09	-2.77	-1.25
Exchange Rate 3/	-0.09	-0.06	0.09	0.28	0.42	0.48	0.19
<b>Italy</b>							
GDP growth 1/	-0.95	-0.94	0.13	0.78	-0.25	-1.72	-0.49
Output price inflation 1/	-0.06	-0.35	-0.78	-0.90	-0.63	-0.54	-0.55
Exchange rate 3/	-0.09	-0.06	0.09	0.28	0.42	0.48	0.19
<b>United Kingdom</b>							
GDP growth 1/	-0.90	-0.65	0.08	0.69	0.49	-0.33	-0.10
Output price inflation 1/	-0.06	-0.46	-1.16	-1.59	-1.02	0.38	-0.65
Exchange rate 3/	-0.09	-0.06	0.09	0.28	0.42	0.48	0.19
<b>Government Consumption Cut-German Price Level Target</b> (deviations from baseline)							
<b>United States</b>							
GDP growth 1/	-0.02	-0.02	-0.01	0.00	0.01	0.01	-0.01
Output price inflation 1/	-0.01	-0.02	-0.04	-0.05	-0.05	-0.05	-0.04
Exchange rate 2/	0.30	0.19	0.10	0.01	0.00	0.05	0.11
<b>Germany</b>							
GDP growth 1/	-0.06	0.01	0.04	0.04	0.02	0.00	0.01
Output price inflation 1/	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exchange rate 3/	-0.45	-0.29	-0.17	-0.05	-0.06	-0.15	-0.20
<b>France</b>							
GDP growth 1/	-0.43	-0.61	-0.66	-0.71	-0.76	-0.79	-0.66
Output price inflation 1/	-0.05	-0.25	-0.60	-1.06	-1.57	-2.10	-0.94
Exchange rate 3/	-0.45	-0.29	-0.17	-0.05	-0.06	-0.15	-0.20
<b>Italy</b>							
GDP growth 1/	-0.71	-0.78	0.05	0.66	-0.01	-1.16	-0.33
Output price inflation 1/	-0.03	-0.26	-0.60	-0.71	-0.48	-0.32	-0.40
Exchange rate 3/	-0.46	-0.29	-0.17	-0.05	-0.06	-0.15	-0.20
<b>United Kingdom</b>							
GDP growth 1/	-0.72	-0.51	0.03	0.50	-0.41	-0.17	-0.08
Output price inflation 1/	-0.04	-0.30	-0.78	-1.08	-0.69	0.34	-0.42
Exchange rate 3/	-0.45	-0.30	-0.17	-0.05	-0.06	-0.15	-0.20

1/ Percent, Q4/Q4

2/ Percent change in G-10 weighted average per dollar

3/ Percent change in dollars per unit of other currency

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Simulation Results

	1993	1994	1995	1996	1997	1998	Average
<b>Tax Rate Increased-German M3 Target</b> (deviations from baseline)							
<b>United States</b>							
GDP growth 1/	0.00	-0.00	-0.01	0.00	0.00	0.01	0.00
Output price inflation 1/	0.00	0.00	-0.01	-0.02	-0.02	-0.02	-0.01
Exchange Rate 2/	0.09	0.11	0.10	0.09	0.07	0.06	0.09
<b>Germany</b>							
GDP growth 1/	-0.03	-0.02	-0.01	0.00	0.01	0.04	0.00
Output price inflation 1/	0.00	0.00	-0.01	-0.01	-0.01	0.00	0.00
Exchange Rate 3/	-0.13	-0.17	-0.15	-0.14	-0.12	-0.10	-0.13
<b>France</b>							
GDP growth 1/	-0.05	-0.12	-0.17	-0.22	-0.27	-0.29	-0.19
Output price inflation 1/	0.01	0.02	0.02	-0.01	-0.06	-0.14	-0.03
Exchange Rate 3/	-0.13	-0.17	-0.15	-0.14	-0.12	-0.10	-0.13
<b>Italy</b>							
GDP growth 1/	-0.04	-0.21	-0.53	-0.87	-1.02	-0.36	-0.59
Output price inflation 1/	0.01	0.08	0.20	0.32	0.34	0.25	0.20
Exchange rate 3/	-0.13	-0.17	-0.15	-0.14	-0.12	-0.10	-0.14
<b>United Kingdom</b>							
GDP growth 1/	-0.10	-0.17	-0.20	-0.15	-0.05	-0.01	-0.11
Output price inflation 1/	0.01	0.03	0.00	-0.10	-0.19	-0.17	-0.07
Exchange rate 3/	-0.13	-0.17	-0.15	-0.14	-0.12	-0.10	-0.14
<b>Tax Rate Increased-German Price Level Target</b> (deviations from baseline)							
<b>United States</b>							
GDP growth 1/	0.00	-0.01	-0.01	0.00	0.00	0.01	0.00
Output price inflation 1/	0.00	0.00	-0.01	-0.02	-0.02	-0.02	-0.01
Exchange rate 2/	0.10	0.11	0.11	0.09	0.06	0.02	0.08
<b>Germany</b>							
GDP growth 1/	-0.02	-0.01	-0.01	-0.01	-0.01	0.00	-0.01
Output price inflation 1/	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exchange rate 3/	-0.14	-0.17	-0.16	-0.14	-0.10	-0.05	-0.13
<b>France</b>							
GDP growth 1/	-0.05	-0.12	-0.17	-0.22	-0.27	-0.31	-0.19
Output price inflation 1/	0.01	0.02	0.02	0.00	-0.05	-0.14	-0.03
Exchange rate 3/	-0.14	-0.17	-0.16	-0.14	-0.10	-0.05	-0.13
<b>Italy</b>							
GDP growth 1/	-0.03	-0.21	-0.53	-0.88	-1.03	-0.89	-0.59
Output price inflation 1/	0.01	0.08	0.21	0.33	0.34	0.24	0.20
Exchange rate 3/	-0.15	-0.17	-0.16	-0.14	-0.10	-0.05	-0.13
<b>United Kingdom</b>							
GDP growth 1/	-0.09	-0.17	-0.20	-0.16	-0.07	-0.02	-0.12
Output price inflation 1/	0.01	0.04	0.01	-0.08	-0.18	-0.19	-0.07
Exchange rate 3/	-0.14	-0.17	-0.16	-0.14	-0.10	-0.05	-0.13

1/ Percent, Q4/Q4

2/ Percent change in G-10 weighted average per dollar

3/ Percent change in dollars per unit of other currency

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