Some Empirical Findings on Differences Between EMS and Non-EMS Regimes: Implications for Currency Blocs

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> Never in history was there a method devised of such efficacy for setting each country's advantage at variance with its neighbors' as the international gold . . . standard. . . . The part played by orthodox economists . . . has been disastrous. . . . For when in their blind struggle for an escape, some countries have thrown off the obligations which had previously rendered impossible an autonomous rate of interest, these economists have taught that a restoration of the former shackles is a necessary first step to a general recovery.
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> —John Maynard Kenyes (1936, p. 349)

Introduction

Substitution of permanently fixed exchange rates for the gold standard brings Keynes's statement up to date. Many economists, and others, now advocate the establishment within the European Community (EC) of a monetary and economic union based on rigidly fixed exchange rates, complete freedom of capital movements, and the absence of barriers to trade and to the movement of goods and labor across national boundaries.

The advantages of a system of permanently fixed exchange rates with free capital movements are well known and, nowadays, often repeated. If the system is credible, then the costs of information and transactions are reduced for international exchanges. Deficit finance must be restricted (Brunner and Meltzer 1976), and country or regional policies must necessarily be harmonized, at least to the degree required by international capital movements that are

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unrestricted by exchange controls. Under such a system, harmonization reduces uncertainty about individual country policies, and the variability of real exchange rates is reduced. In addition, Mussa (1986) has shown that bilateral, *ex post*, real exchange rates are less variable under fixed (but adjustable) exchange rates.

Keynes's statement warns, however, that the reduced variability of real exchange rates may not add and may even reduce welfare. Again, the reasons are well known. Changes in nominal exchange rates facilitate adjustment, particularly when prices and nominal values are slow to adjust. Further, the greater variability of real exchange rates under fluctuating rates may reflect the sluggish adjustment of prices that both increases the variability of real exchange rates and delays the adjustment of real wages and production costs. If exchange rates are fixed permanently, then more of the adjustment may be borne by quantities of goods or services produced or consumed as well as by quantities of factors employed. Typically, labor and product markets are singled out in the case of exchange rates as likely to be more variable under fixed than under flexible rates. Keynes, and many others, presumed that changes in the exchange rate act as shock absorbers, adjusting relative prices and real wages to external or internal shocks. Critics of fluctuating rates and some proponents of fixed rates claim the opposite, that fluctuating exchange rates increase variability of prices, output, or other variables.

The problem is an old one. The history of economics shows that many economists have been concerned by the variability of economic activity and prices in a fixed exchange rate system. Jevons, Marshall, Fisher, both Frank and Benjamin Graham, Friedman, and Keynes are a sample of well-known economists who offered proposals for bimetallism, commodity standards, fluctuating exchange rates, and other means of reducing the variability in consumption or production under a gold or other fixed rate standard. The problem arises under fixed exchange rates because shocks to output require the adjustment of real interest rates, aggregate demand, and the domestic price level sufficient to maintain the nominal exchange rate. A reduction in demand by one country lowers the exports of all countries. If the country experiencing the shock is a relatively large importer, then the shock is transmitted to other countries, raising or lowering their demand, output, prices, and employment.

The Bretton Woods system sought to reduce this disadvantage of a fixed exchange rate system in two ways. First, surplus countries were supposed to lend to deficit countries when the deficits arose from transitory shocks. This permitted the deficit country to more

nearly maintain its spending and employment. Second, the adjustment of exchange rates was to be reserved for permanent shocks. Thus, shocks to members of the system were to be reduced and the variability of output, prices, and employment was to be lowered for all countries while retaining some of the advantages claimed for a fixed rate system.

In practice, it was difficult to distinguish between permanent and transitory shocks. Countries were not able to establish when exchange rate changes were preferable to other types of adjustment, and they compounded the problem by failing to agree on whether the United States or other countries should adjust par values. The major problem of the Bretton Woods system, however, and the one that brought it to an end, was the failure to specify a rule for money creation. In practice, the system required the United States to maintain stability of prices and nominal values, and it obligated other member countries either to accept dollars at par, thereby importing the U.S. inflation rate, or to revalue their nominal exchange rates. When the inflation problem persisted, major countries chose revaluation and, eventually, fluctuating exchange rates against the dollar. The system failed primarily because of the absence of rules for regulating the quantity of money and the adjustment of parities.

The breakdown of Bretton Woods illustrates a broader proposition that is neglected in many discussions of monetary union. The proposition, one of the folk theorems of international finance, states that fixed exchange rates, price stability, and freedom of capital movements are not compatible with independent monetary policy by member countries. The proposition recognizes that a fixed exchange rate system cannot achieve both price and exchange rate stability without some restriction on the aggregate quantity of money in the system. In practice, capital mobility is often restricted in fixed exchange rate systems to maintain the fixed rate. The European Monetary System (EMS) is not exceptional in this respect.

A basic function of money and a monetary system is to reduce the costs of acquiring information and transacting. Variability of relative prices and exchange rates is one of the principal determinants of these costs; information costs increase with variability (Brunner and Meltzer 1971). Inflation, particularly a variable rate of inflation, also raises the cost of acquiring information. Mussa's (1986) data suggest that a fixed exchange rate system may lower information costs by reducing variability of real exchange rates, but Mussa did not investigate whether systematic differences in the variability of other relative prices or quantities work in the opposite direction.

The welfare problem is complicated, however. There are benefits to the variability of relative prices as well as costs. A country faced with external shocks, common to all countries, may have lower costs of adjustment because relative prices and other endogenous variables adjust more quickly to the common shocks. If shocks are frequent, then higher variability could contribute to welfare by avoiding or reducing the risk of recessions. The long expansion of the 1980s may be the result of the increased flexibility of real exchange rates between major currencies under fluctuating rates.

Two types of comparison are used here to examine the variability of unemployment, inflation, and measures of relative price and real exchange rate variability under fixed and fluctuating exchange rates. The first compares the years of Bretton Woods to the years of fluctuating exchange rates. These data do not hold constant the many factors that differ between periods. The second compares countries that are in the European Monetary System and those that are outside the system. My purpose is exploratory—to use some available data to learn about variability and the costs of information under fixed and fluctuating exchange rates. This analysis differs from work by Mussa (1986), Belongia (1988), Grilli and Kaminsky (1988), and Fratianni and von Hagen (1990) by focusing more on multilateral exchange rates. The results are preliminary, but I believe they have implications for current discussions of currency blocs and a European Monetary Union.

Experience under Fixed and Fluctuating Rates

If fluctuating exchange rates operate as a shock absorber for the economy, then shocks to the economy under a fixed exchange rate regime are borne elsewhere. Ideally, we would run a controlled experiment in which two economies that differ only in their exchange rate regimes are subject to the same shocks. Lacking experimental data, we must rely on weaker types of evidence. This section compares periods of fixed and fluctuating exchange rates and the performance of EMS and non-EMS countries. The data used are from the OECD.[1] All variables are available quarterly except unit labor costs, which are available semi-annually. Additional details are presented in the data appendix.

One problem is that "pure" systems are rare. Bretton Woods and the European Exchange Rate Mechanism (ERM) were designed as

[1]*Main Economic Indicators Historical Statistics, 1960–79*, supplemented by the May issue for odd years in the 1980s. Unit labor costs are the exception. These data are from OECD's disk, June 1988 edition.

systems of fixed but adjustable exchange rates. Countries devalued or revalued instead of adjusting money stocks and price levels as required in a system of permanently fixed exchange rates. By adjusting exchange rates, countries avoided some of the variability of real variables that would be required by the monetary union that is now proposed. Hence, the comparison between countries in the EMS and countries with fluctuating exchange rates may be biased in favor of the EMS.[2] Nevertheless, members of the EMS are considered here to have quasi-fixed exchange rates, since the largest part of their trade is inter-country trade within the European Community subject to fixed but adjustable rates. The data in Mussa (1986) suggest that this is a relevant distinction; bilateral, *ex post* real exchange rates are less variable for EMS members than for nonmembers. Ireland poses a problem because a significant share of its trade is with the United Kingdom, which did not join the ERM until October 1990. Since the late 1970s, Sweden, Norway, and Finland have targeted a nominal effective exchange rate based on a trade weighted basket.

The first comparison is between rates of decline in unemployment. Most countries reduced inflation during the 1980s by restricting money growth. If money wages and other money costs of production adjust slowly, then factor unemployment increases for a time. If fluctuating exchange rates buffer the effect on productive factors, then the rate of decline may be lower under fluctuating exchange rates or the rise in unemployment may be smaller. Alternatively, the greater variability of real exchange rates in a fluctuating rate regime may be a cause of fluctuations in output and changes in employment. Table 1 looks at these alternatives by comparing the annualized rate of decline in the unemployment rate for a sample of countries. The annualized rate of decline is calculated from the quarter of peak unemployment to the fourth quarter of 1988.

The data suggest that the average unemployment rate was higher and declined more slowly in the six EMS countries examined than in the eight non-EMS countries. When Ireland and Japan are removed from the two samples, the difference in mean unemployment rates becomes much smaller, but the difference in the rates of decline in unemployment remains economically meaningful. In the three countries that are closest to "pure" floaters—the United States,

[2]Austria maintains a fixed exchange rate with Germany, so it is included with the EMS countries. Spain joined the EMS in 1989, so it is included with the non-EMS countries. The ERM is the system of adjustable rates, but the system is usually referred to as the EMS, and I follow that practice. The United Kingdom was not a full-fledged member of the EMS during the 1980s; it held only an observer status, and it was not part of the ERM. Consequently, it is classified with the non-EMS countries in this study.

TABLE 1

RATE OF DECLINE IN UNEMPLOYMENT DURING THE 1980S

	Maximum Unemployment		Percent Annualized Rate of Decline to 1988/4	
Non-EMS Countries				
Canada	12.7		8.0	
United States	10.7		11.0	
Japan	3.0		13.8	
Australia	10.3		7.3	
Finland	7.7		5.5	
Spain	22.2		6.2	
Sweden	3.8		17.3	
United Kingdom	13.0		13.6	
Mean for 8 countries[a]		10.4		10.3
Excluding Japan		11.5		9.8
EMS Countries[b]				
Austria	7.5		16.2	
Belgium	19.3		8.7	
Denmark	10.7		2.7	
Germany	9.4		1.8	
Ireland	23.6		4.9	
Italy	12.3		2.6	
Mean for EMS		13.8		6.2
Excluding Ireland		11.8		6.4

[a]For the United States, Japan, and the United Kingdom—relatively "pure" fluctuating rate countries—the mean rate of decline is 12.8.
[b]France is omitted; its maximum is in 1987, and the rate of decline to 1988 is small.

Japan, and the United Kingdom—the rate of decline in unemployment is twice the rate in the EMS countries. The differences are consistent with the proposition that exchange rate fluctuations buffer the labor market and speed the adjustment to real and nominal shocks.

Evidence of this kind is suggestive, but it cannot be decisive. Differences in the timing and magnitude of disinflationary policy, in the response to declining oil prices, in types of policy, or in structural features of the economies may influence the result. Average rates of unemployment differ across countries for many reasons, including differences in measurement. The measured difference in maximum unemployment rates may be misleading.

The choice of monetary standard may affect the variability experienced in different countries and the risks that households and businesses face. Table 2 compares the relative coefficients of variation for periods with fixed and fluctuating exchange rates.[3] If fluctuating rates reduce variability or substitute variability of real exchange rates for other sources of variability, then variability should be lower in the fluctuating exchange rate period than under Bretton Woods. Also, countries in the EMS after 1975 should experience higher variability of prices or real variables during the 1970s and 1980s than countries outside the system of quasi-fixed rates. If fluctuation in real exchange rates is a cause of variability, then these conclusions would be reversed.

The choice of period is a problem. The shift to fluctuating exchange rates in 1973 occurred at a time of rising inflation. Variability appears to have been relatively large in the first 8 to 10 years of fluctuating rates. Some of the increased variability in EMS and non-EMS countries resulted from policies to reduce inflation; some of the variability reflects the oil shocks of the period. Table 2 shows that variability during 1985–88 was substantially lower in all countries than during 1973–88. Hence, the 1985–88 period is included for comparison. An additional problem arises from sample selection. Countries are subject to common shocks, but not all shocks are common. Because of this, variability between countries may differ.

The mean values at the bottom of Table 2 show that the variability of real interest rates is lower and the variability of unemployment rates is higher in the EMS than in the non-EMS countries under the Bretton Woods system. The variability is lowest in the countries that float most freely. At the time, most countries had fixed exchange rates.

Despite the problems and qualifications, some conclusions can be drawn from the data presented in Table 2. First, there is no evidence that real interest and unemployment rates are systematically more variable in EMS than in non-EMS countries after 1973. Second, price-level variability is approximately the same in EMS and non-EMS countries in each of the periods, but it is marginally lower in countries with fluctuating rates. Third, no general conclusion emerges about variability under the different regimes. Variability was generally highest in the non-EMS countries for 1973–88, but variability was often lower in these countries during 1985–88. The

[3]Coefficients of variation remove the influence of mean values that differ across countries and over time. This removes any systematic effect of the choice of regime on mean values, so it is not an innocuous choice.

TABLE 2

COEFFICIENTS OF VARIATION, QUARTERLY UNEMPLOYMENT, INTEREST RATES, AND PRICES

Unemployment	Canada	U.S.	Japan	U.K.	Finland	Sweden	Australia	Austria	Belgium	Denmark	Germany	Ireland	Italy
1960/2–1970/4	0.25	0.22	0.11	0.22	0.47	0.22	0.14	0.48	0.27	N	0.62	0.14	0.18
1973/1–1988/4	0.23	0.20	0.20	0.47	0.33	0.27	0.35	0.55	0.38	0.36	0.44	0.32	0.25
1985/1–1988/4	0.11	0.11	0.06	0.17	0.17	0.25	0.06	0.23	0.08	0.07	0.03	0.02	0.07
Real Long-Term Interest Rates							France						
1960/2–1970/4	0.47	0.59	N	0.62[a]	1.72	1.15	0.34	N	0.56	0.80	0.68	N	1.50
1973/1–1988/4	1.04	1.64		3.40	7.71	1.94	0.41		1.04	0.52	0.52	2.63	6.84
1985/1–1988/4	0.16	0.30		0.70	0.86	0.45	0.37		0.22	0.31	0.35	0.38	0.30
Price Level													
1960/2–1970/4	0.09	0.09	0.15	0.10	0.16	0.11	0.12	0.11	0.10	0.15	0.08	0.14	0.12
1973/1–1988/4	0.33	0.29	0.15	0.40	0.38	0.37	0.39	0.21	0.27	0.33	0.16	0.48	0.55
1985/1–1988/4	0.05	0.04	0.01	0.05	0.05	0.06	0.04	0.02	0.02	0.05	0.01	0.04	0.06

	Fluctuating			Fixed		
Mean Values	Unemployment	Real Rates	Prices	Unemployment	Real Rates	Prices
1960/2–1970/4	0.23	0.91	0.12	0.33	0.78	0.12
1973/1–1988/4	0.29	3.15	0.32	0.38	1.99	0.34
1985/1–1988/4	0.13	0.49	0.04	0.08	0.32	0.03

N = Not available.
[a]Series starts 1963/1.

three floaters often have lowest variability of prices and unemployment, but the differences are not large. Fourth, country-specific differences appear to dominate. Japan has relatively low variability of prices and unemployment, and Finland has relatively high variability of unemployment and interest rates. Austria, which pegs its currency to the German mark, also has a relatively variable unemployment rate. French real interest rates show lower variability than other countries until 1985–88. A main reason for the change may be France's recent relaxation of exchange controls, credit controls, and other restrictions. Many of the restrictions substitute for interest rate changes.

Next, I turn to a smaller group of countries to consider a broader set of variables. Table 3 compares relative variances of several variables under fixed and fluctuating exchange rates in large countries. A number greater than unity in the table indicates that variability increased under fluctuating rates. The data suggest that variances increased markedly under fluctuating exchange rates in all countries when the entire fluctuating rate period is included. This conclusion is reversed, for countries other than the United Kingdom, if 1985–88 is used as the fluctuating rate period. The differences are not the result of changes in mean value. Similar conclusions are reached for real

TABLE 3

RELATIVE VARIANCES OF CHANGES DURING FIXED AND FLUCTUATING RATE PERIODS[a]

	Canada	U.S.	Japan	U.K.	France	Germany
			ALL DATA $\frac{1973–88}{1960–70}$			
Real Stock Prices	1.3	1.6	135.1	4.4	0.9	1.2
Inflation[b]	3.0	3.9	3.0	9.2	3.3	1.0
Short-Term Real Rates[b]	5.5	14.4	1.7	15.4	3.0	1.5
Unit Labor Costs	159.0	125.0	14.0	293.0	42.0	14.0
			RECENT DATA $\frac{1985–88}{1960–70}$			
Real Stock Prices	0.4	1.1	107.2	1.8	0.4	0.6
Inflation[b]	0.3	0.8	1.0	2.0	0.9	0.6
Short-Term Real Rates	0.3	0.9	0.8	4.3	0.3	0.4
Unit Labor Costs	0.8	0.8	0.6	0.4	0.1	0.4

[a]Periods are as in Table 2.
[b]Based on quarterly rate of price change.

stock prices and unit labor costs if the comparison is between relative coefficients of variation. Table 4 shows these computations.

Comparing data for the two EMS countries and the four non-EMS countries shows that variability rose less on average in the EMS countries than in the non-EMS countries following the breakup of Bretton Woods. Restricting the fluctuating exchange rate period to more recent data reverses the direction of change in variability but does not affect the comparison between EMS and non-EMS countries; for the four measures observed, variability is lower on average during the fluctuating exchange period than in the years of Bretton Woods, but the decline in variability is greater for EMS countries than for non-EMS countries on average. At least one of the non-EMS countries, however, has relative variability comparable to the relative variability of the EMS countries. This suggests again that policy actions or other country-specific factors may dominate the results.

Unanticipated Changes

The data considered in the previous section do not distinguish between anticipated and unanticipated changes. Unanticipated changes may be more costly to individuals and society. One reason is that information costs differ; the duration of a fully anticipated change may be known or predictable with reasonable accuracy. Examples are a tax rule that provides a credit only during recessions or a monetary rule that adjusts adaptively to past changes in output or monetary velocity. Unanticipated changes are subject to greater

TABLE 4

RELATIVE COEFFICIENTS OF VARIATION IN REAL STOCK PRICES (QUARTERLY) AND UNIT LABOR COSTS (SEMI-ANNUALLY)

	Canada	U.S.	Japan	France	Germany	Spain	U.K.
Real Stock Prices[a]							
1960/2–1970/4	.14	.14	.14	.23	.22	.18	.14
1973/1–1989/1	.18	.24	.65	.37	.29	.89	.38
1985/1–1989/1	.09	.16	.29	.21	.14	.34	.16
Unit Labor Costs							
1964/1–1970/2	.06	.05	.04	.17	.08	.08	.09
1973/2–1989/2	.29	.26	.07	.31	.14	.44	.35
1985/1–1989/2	.04	.04	.02	.01	.03	.07	.04

[a]Ratio of index numbers for stock prices and CPI base 100 in the four quarters of 1985; the GNP deflator is used for Japan.

uncertainty about duration and impose larger costs of acquiring information. At the time of occurrence it will generally not be reliably known whether a given shock is persistent or transitory or whether it will be followed by a sequence of changes in the same direction. Unanticipated shocks that temporarily change the price level, the exchange rate, output, or other variables cannot be readily distinguished at the time of occurrence from persistent changes in the level of these variables or persistent changes in their rates of change. Additional observations are required before there is sufficient evidence about the duration of the change in level or rate of change. The number of observations required for judgment depends on the relative variances of the permanent and transitory components of the underlying series.

Meltzer (1986) and Meltzer and Robinson (1988) used a Kalman filter to separate anticipated and unanticipated changes and, for unanticipated changes, to separate permanent and transitory shocks to levels and growth rates under different monetary regimes.[4] Meltzer (1986) analyzed quarterly data or unanticipated changes for Canada, Germany, the United Kingdom, and the United States under the Bretton Woods system for 1960/1–1971/3 and under fluctuating rates for 1971/3–1984/4. Meltzer and Robinson (1988) analyzed annual data on unanticipated changes for the years of the international gold standard (1870–1913), Bretton Woods, and fluctuating rates; the sample of countries includes Denmark, Germany, Italy, Japan, Sweden, the United Kingdom, and the United States.

These studies found that the variability of unanticipated changes differs with regimes. The variability of unanticipated output was usually highest under the gold standard, although there were some exceptions. The United Kingdom experienced the lowest variability of the level and growth rate of unanticipated values under the gold standard and the highest under the fluctuating rate regime. The results for Japan are opposite, with the variability of the output level and growth rate being lowest under fluctuating rates and highest under the gold standard. For most of the other countries studied, the differences in unanticipated variability in the two postwar regimes are relatively modest, and variability is lower than under the gold standard. Annual data on unanticipated prices and rates of price change under the three regimes show a mixed pattern. Variability of unanticipated changes in price level and maintained inflation is highest for some countries under the gold standard (Japan, Germany, Sweden). For others (Denmark, the United States), it is highest under

[4]Details of the statistical models and the procedure are in the references.

Bretton Woods. Still others (Italy, the United Kingdom), show the highest variability under fluctuating rates. Germany, Denmark, and Sweden show the lowest variability under fluctuating rates.

The postwar quarterly data in Meltzer (1986) show similar mixed results for the four countries considered. There are relatively large differences in unanticipated variability of output, prices, and money under the fixed and fluctuating rate regimes, but the changes are not unidirectional. Data for Germany suggest that the variability of prices and output is lower under the fluctuating rate regime than under Bretton Woods, but Canada shows the opposite pattern for prices and not much difference for real output.

The main conclusions to be drawn from the data on unanticipated changes are similar to the conclusions reached earlier. Variability is not uniformly greater or smaller under one regime.[5] Country-specific factors, including possible differences in domestic policies and country-specific real shocks, may be important.

If we accept this conclusion and the findings on variability of real exchange rate changes reported in Mussa (1986), it would appear that, on average, unanticipated variability and information costs were lower under fixed exchange rates during the postwar period. The reason is that countries were able to reduce the variability of real exchange rate changes by fixing the nominal exchange rate without increasing variability of other real variables to an economically significant degree. This follows from Mussa's finding that the variability of *ex post* real exchange rate changes in countries with fluctuating exchange rates is from 8 to 80 times greater than under fixed exchange rates and the finding here that systematic differences in the variability of other variables, if present, are difficult to detect.

Variability of Multilateral Exchange Rates

This section reconsiders the variability of changes in real and nominal exchange rates using trade-weighted, multilateral exchange rates. Quarterly data are from the International Monetary Fund (IMF) for the period from 1979/1 to 1989/3. The IMF computes multilateral real exchange rates in several ways, using weighted unit labor costs, as well as wholesale and consumer prices to deflate nominal exchange rates. I used the series based on unit labor costs and wholesale prices. Each of the series on real rates is a trade-weighted real exchange rate for a particular country using the weights applicable to that country. The relation is $N \equiv R + P$, where N, R, and P

[5]Grilli and Kaminsky (1988) reached a similar conclusion from a comparison of dollar-pound exchange rates under different regimes since 1885.

are first differences of the logarithms of weighted nominal and real exchange rates and the relative price of domestic to foreign costs or prices.

A major problem faced in any comparison of exchange rate regimes arises from the absence of a standard. Fixed rates do not remain fixed, and fixed exchange rate countries rely on credit controls, exchange controls, and other distortions to avoid parity changes. Fluctuating rate countries intervene to affect nominal values and also introduce exchange controls and distortions to affect real exchange rates. Further, non-EMS countries include those that peg to a basket of currencies, using adjustable pegs. As a first step, I consider whether a commitment to fixed but adjustable bilateral rates has implications for the correlation between multilateral nominal rates for the pair of countries. Then, I compare variability of real exchange rate changes in a sample of countries.

Simple correlations between changes in multilateral nominal or real exchange rates help to identify countries that maintain relatively fixed nominal exchange rates. If two currencies are fixed and have similar trade weights, then the simple correlation of changes in nominal exchange rates should be near to unity. The converse is not true, however. Correlation does not imply a fixed rate; two currencies may move together against an important or dominant third currency, such as the dollar, without being fixed. A correlation of nominal rates in the neighborhood of -1 suggests that the two currencies fluctuate relatively freely; depreciation of one accompanies appreciation of the other. For real rates, correlations also reflect differences in price movements.

Table 5 shows the correlations between changes in N and R for three countries that pursue compatible, low inflation policies and have relatively active inter-country trade. These countries, however, differ in exchange rate regime: Germany is a member of the EMS; Austria, although not a member of the EMS, maintains a fixed parity with Germany; and Switzerland, also not a member of the EMS, is usually said to have an independent monetary policy. Differences in types of shock in different periods and differences in the performance of the EMS in earlier and later periods suggest that some benefit may be gained from comparisons based on more than one period. I used quarterly data for 1979/1 to 1989/3 and 1983/1 to 1989/3.

Table 5 shows a relatively high correlation between nominal exchange rate changes in the three countries. The correlation is slightly higher for Germany and Austria, but the difference is not impressive. Changes in real rates show more differentiation.[6]

[6]The IMF computes real exchange rates using wholesale (WP) and consumer price

TABLE 5

SIMPLE CORRELATIONS, EXCHANGE RATE CHANGES FOR GERMANY, AUSTRIA, AND SWITZERLAND, QUARTERLY 1979–89 AND 1983–89

	Nominal Rates (N)	
	Austria	Switzerland
Germany	.97	.91
	1.00	.93
Austria		.94
		.92
	Real, Wholesale Prices (R_{WP})	
	Austria	Switzerland
Germany	.40	.78
	.30	.95
Austria		.01
		.24
	Real, Unit Labor Costs (R_{ULC})	
	Austria	Switzerland
Germany	.71	.10
	.63	.13
Austria		.30
		.42

NOTE: The top number in each cell is for 1979/1–1989/3; the lower number is for 1983/1–1989/3. Each cell shows the simple correlations between a pair of countries, e.g., Germany and Austria, Germany and Switzerland, or Austria and Switzerland.

Changes in the trade-weighted real exchange rate, based on wholesale prices (WP), are closely related for Germany and Switzerland, particularly after 1983; but changes in real exchange rates based on relative unit labor costs (R_{ULC}) are unrelated. For Austria and Germany, correlations for R_{ULC} are much higher than for R_{WP}. The relatively high correlations of changes in real exchange rates based on relative trade-weighted costs of production lower the social cost of the fixed nominal exchange rate for Austria.

Tables 6 and 7 permit a comparison of fixed and fluctuating rate systems and, by comparison with Table 5, show that fixity of bilateral nominal exchange rates is neither necessary nor sufficient for multilateral nominal exchange rate stability. Table 6 shows correlations of exchange rate changes for some of the principal members of the

levels and unit labor costs (ULC) for each country. I have used the wholesale price and unit labor cost series. The two series for R, denoted R_{WP} and R_{ULC}, are derived from the single series for N.

TABLE 6

SIMPLE CORRELATIONS: GERMANY, FRANCE, ITALY, AND THE NETHERLANDS, 1973–89 AND 1983–89

	France	N Italy	Netherlands
Germany	−.60	−.68	.99
	.23	−.56	1.00
France		.96	−.61
		.30	−.52
Italy			−.67
			.27
		R_{WP}	
Germany	.55	.40	.92
	.82	.57	.96
France		.30	.45
		.42	.77
Italy			.51
			.70
		R_{ULC}	
Germany	.08	.63	.44
	.09	.66	.78
France		−.33	−.09
		−.53	−.14
Italy			−.07
			.74

NOTE: The top number in each cell is 1979/1–1989/3; the lower number is 1983/1–1989/3. For an explanation, see Table 5.

EMS. Table 7 compares correlations of changes in multilateral exchange rates for the mark against some of the principal currencies to similar correlations for changes in principal fluctuating rate currencies.

Among EMS countries, only the Netherlands shows the degree of correlation with Germany found for Austria and Switzerland. Prior to 1983, France and Italy frequently devalued relative to Germany, so the correlation of multilateral nominal exchange rate changes is negative. For Italy, the correlation remains negative for 1983–89. Nominal exchange rate changes in Germany and Japan (Table 7) are more closely related than the changes for Germany with some principal members of the EMS (Table 6).

These data suggest that countries have achieved relatively stable multilateral exchange rates by pursuing similar monetary policies.

TABLE 7

SIMPLE CORRELATIONS: GERMANY, JAPAN, THE UNITED STATES, AND THE UNITED KINGDOM, 1973–89 AND 1983–89

	Japan	N U.S.	U.K.
Germany	.92	−.36	−.83
	.93	−.96	−.72
Japan		−.32	−.78
		−.92	−.66
U.S.			−.02
			.54
		R_{WP}	
Germany	.35	−.80	.20
	.74	−.89	.11
Japan		−.60	−.04
		−.94	.39
U.S.			−.24
			−.42
		R_{ULC}	
Germany	.78	−.82	−.53
	.92	−.98	−.49
Japan		−.67	−.57
		−.64	−.16
U.S.			.09
			.39

NOTE: The top number in each cell is 1979/1–1989/3; the lower number is 1983/1–1989/3. For an explanation, see Table 5.

Weights for the dollar differ substantially for Germany and Japan, so movements of the dollar are not the principal reason for the correlation. The relatively high correlation of nominal exchange rate changes for Germany and Japan appears to result from similar economic policies, particularly monetary policies. Both countries pursue policies of low inflation. The high correlation between nominal changes in the mark and the yen, like the correlation between the Swiss franc and the mark, reflects common policy rules in all three countries.[7] Common monetary policy rules to achieve low inflation or price stability appear to achieve almost as much correspondence of multilateral nominal exchange rate changes as the more rigidly

[7]The correlations between the trade-weighted yen and Swiss franc are 0.87 and 0.82 for the two periods.

fixed exchange rate policies of Austria and the Netherlands with Germany.

A comparison of Tables 5, 6, and 7 shows greater correspondence of changes in real exchange rates based on unit labor costs (R_{ULC}) for Germany and Japan than for EMS member countries, Switzerland, or Austria in 1983–89. The correlations of R_{WP} and R_{ULC} for France and Germany are similar to the correlations for Germany and Switzerland, while the correlations for Germany and Italy are similar to those for Germany and Austria. Table 6 also shows that, frequent devaluations notwithstanding, Italy's R_{ULC} moves with Germany's. Less-frequent devaluations of the French franc in the late 1980s, however, have not changed the relation of French and German R_{ULC}. Nor have changes in relative costs of production in France and Germany been harmonized by the EMS. In the EMS, changes in real exchange rates based on wholesale prices tend to move more closely together than real exchange rates based on the cost of production (unit labor costs). If the correlations between changes in real exchange rates remain in the same range as Europe moves toward monetary union, there are likely to be significant social costs of resource unemployment in France or Germany as relative costs of production change.

Table 7 shows that the considerable amount of intervention in exchange markets carried out since 1975 has had little effect on the negative correlation of real exchange rate changes between the United States and Germany or the United States and Japan. Correlations have been -0.9 or above (in absolute value) for 1983 to 1989, suggesting that the dominant movements have been devaluations or revaluations driven by the difference in economic policy pursued by the three countries and differences in relative costs and opportunities. For the United States, Germany, and Japan, correlations of changes in real exchange rates for 1983–89 are negative and similar to the correlations for N. This suggests that differences in inflation played a lesser role. For the United Kingdom, correlations with other countries are typically low. The United Kingdom generally has pursued independent policies, particularly monetary policies, that have produced comparatively high inflation, so its nominal exchange rate was devalued against the low-inflation countries.

Table 8 shows the ranking of variances for N, R, and P on the basis of multilateral rates. Variances of the relative rates of change are ranked from highest to lowest. Var N for Japan, the most variable nominal exchange rate during this period, is 19 times Austria's Var N.

Even a cursory glance at Table 8 shows two clear patterns. First, countries with partially fixed nominal exchange rates generally have

TABLE 8

RANK OF VARIANCES OF CHANGES IN MULTILATERAL EXCHANGE RATES,[a] 1979/1–1989/3

	From ULC[b]		From WP[c]	
Var N	Var R	Var P	Var R	Var P
Japan	Japan	Norway	U.K.	Japan
U.S.	U.K.	Spain	Japan	Norway
U.K.	U.S.	Italy	U.S.	Sweden
Sweden	Spain	Ireland	Sweden	Austria
Spain	Sweden	Austria	Norway	U.K.
Switzerland	Switzerland	Denmark	Switzerland	Italy
Ireland	Ireland	Sweden	Spain	Germany
France	Denmark	Finland	Austria	Spain
Denmark	Norway	U.K.	Germany	U.S.
Canada	Italy	France	Ireland	Belgium
Germany	Canada	Germany	Finland	Denmark
Norway	Germany	Belgium	Belgium	Ireland
Belgium	Belgium	Japan	France	Netherlands
Finland	Finland	Switzerland	Netherlands	Finland
Netherlands	France	Netherlands	Denmark	France
Italy	Austria	Canada	Italy	Canada
Austria	Netherlands	U.S.	Canada	Switzerland

[a]From highest to lowest.
[b]ULC = change in relative unit labor cost.
[c]WP = change in relative wholesale prices.

lower variability of changes in multilateral nominal exchange rates than countries that float more freely. Many of the EMS countries and Austria have relatively low values for Var N, whereas the countries that fluctuate most freely show the highest values. On average, the variance of the nominal exchange rate for fluctuating rate countries—the United States, the United Kingdom, Japan, and Switzerland—is 5.8 times the variance for the countries in the EMS (including Austria). For the remaining countries—Sweden, Spain, Norway, Finland, and Canada—the variance is closer to the EMS average than to the fluctuating rate average. Second, there is a clear, positive association between Var N and either measure of Var R. As in Mussa (1986), countries that are part of a fixed exchange rate bloc have lower variability of changes in *ex post* real exchange rates than countries that float freely. The relative differences are somewhat smaller than for Var N. The ratio of the highest to the lowest Var R for the countries in Table 5 is 7.4 using ULC and 8.9 using WP.

The relation of Var P to Var R is less clear from inspection. Non-EMS countries have both the highest and lowest values of Var P. For example, the United States has the lowest value of Var P based on unit labor costs (ULC), and Switzerland has the lowest value based on WP. Japan has the highest value of Var P based on wholesale prices but a relatively low value of Var P based on unit labor costs. On average, Var P_{ULC} for fluctuating rate countries is half the average for EMS countries.

Table 9 shows rank correlation coefficients for the 17 countries. The rank correlations suggest that Var R and Var N are positively correlated, but the correlation of Var R and Var P depends on the measure of P. The relation is weaker for ULC than for WP. Further, the variances of the two measures of P are unrelated to Var N. Fluctuating rates or more frequent devaluations or revaluations that increase Var N do not affect the relative ranking of variability of changes in relative costs and prices.

TABLE 9

RANK CORRELATIONS FOR VAR N, VAR R, AND VAR P, 1979/1–1989/3

		Correlation
Var N	Var R_{ULC}	.87
Var N	Var R_{WP}	.66
Var R_{ULC}	Var P_{ULC}	.02
Var R_{WP}	Var P_{WP}	.58
Var N	Var P_{ULC}	−.24
Var N	Var P_{WP}	.15

NOTE: 5 percent significance level = 0.41.

The data also show that changes in real exchange rates are more variable than changes in relative unit labor costs and relative wholesale prices in all countries. The difference in mean variability of real exchange rates based on ULC for the four fluctuating rate countries and the eight EMS countries is significant at the 1 percent level. The difference in variability of relative unit labor costs goes in the opposite direction; unit labor costs are less variable in fluctuating rate than in EMS countries, but the difference is not statistically significant.

Table 10 reports the mean values of variances of P for EMS, fluctuating rate, and other countries. Also shown are the mean values of Var P for the three principal EMS countries to compare to the large

TABLE 10

MEAN VAR P FOR EMS AND NON-EMS COUNTRIES, 1979/1–1989/3 (QUARTERLY RATES × 100)

	EMS		Non-EMS	
	All[a]	3 Largest[b]	Fluctuating[c]	Other[d]
Based on ULC	.013	.014	.007	.017
Based on WP	.017	.016	.037	.030

[a]Seven EMS countries plus Austria.
[b]France, Germany, Italy.
[c]United States, Japan, United Kingdom, Switzerland.
[d]All remaining countries in Table 8.

fluctuating rate countries. All values are at quarterly rates multiplied by 100.

The data suggest that, on average, non-EMS countries have greater variability of changes in relative wholesale prices. This conclusion does not hold for changes in unit labor costs. The relative variability of the unit labor cost ratio is lower for fluctuating rate countries than for either EMS or other countries.

To further study the differences between countries, I ran regressions of Var R and Var N on the two values of Var P. These are shown in Table 11, where the constant term is not reported. To maintain degrees of freedom, non-EMS countries are treated as a group.

The regressions hint at some similarities in the responses of the two sets of countries. For both EMS and non-EMS countries, Var N and Var R work in opposite directions; the variances of the changes in relative price ratios increase with Var R and decline with Var N. There is even some evidence of uniformity in the relation of Var P to Var R. Three of the four coefficients are about 0.8. The small number of degrees of freedom suggests caution in drawing strong conclusions from these regressions.

Mussa (1986) found that changes in real exchange rates are more persistent under fluctuating rates than under fixed exchange rates. This conclusion does not hold for the data on multilateral exchange rates, using the serial correlation of changes in real exchange rates to measure persistence. The reason is that serial correlation is usually not significant at the 5 percent level.[8] For changes in the real exchange rate, R_{ULC}, only Canada shows significant serial correlation (0.55). For R_{WP}, none of the serial correlations is significant at the 5

[8]Five percent significance is at 0.41.

TABLE 11

REGRESSIONS OF VAR R AND VAR N ON VAR P

Dependent Variable	Var P_{ULC}	Var P_{WP}
	EMS	
Var N	−.33	−1.49
	(.81)[a]	(5.55)
Var R_{ULC}	.83	.82
	(1.90)	(2.88)
Var R_{WP}	.10	.66
	(.34)	(3.46)
R^2	.50	.93
	Non-EMS	
Var N	−.70	−1.08
	(1.95)	(.82)
Var R_{ULC}	.56	.78
	(1.47)	(.56)
Var R_{WP}	.90	.52
	(.76)	(1.19)
R^2	.53	.43

[a]Numbers in parentheses represent *t-statistics.*

percent level. For P_{ULC}, the countries with the highest serial correlation are France (0.72), Canada (0.52), and the Netherlands (0.30); for P_{WP}, the highest serial correlations are for Finland (0.40) and France (0.37). In both cases, there is a mixture of exchange rate regimes.

Implications for Monetary Union

The data on variances support the hypothesis that EMS countries have a lower variance of changes in relative wholesale price levels and real and nominal exchange rates than non-EMS countries. This conclusion does not hold for relative unit labor costs. Non-EMS countries with fluctuating exchange rates appear to have lower variances of changes in relative unit labor costs than EMS countries. Further, there is some evidence of an association between the variability of changes in real or nominal exchange rates and the variability of changes in relative prices and production costs.

The evidence examined in the previous sections supports two hypotheses that I tentatively accept. First, the EMS countries considered have had lower variability of changes in exchange rates and relative prices on average compared to the averages for non-EMS

countries; that is, prices and exchange rates are more flexible in the non-EMS countries than in EMS countries. Second, country-specific differences (including policy differences) appear to be more important for explaining differences in variability or flexibility than does the exchange rate regime. The differences between the countries examined may reflect greater freedom to choose policies in non-EMS countries, particularly in fluctuating rate countries. And the lower variances found for the EMS, on average, may reflect Germany's role in the EMS.

In Table 8, three of the five columns show that the variances for the EMS countries are grouped around the value for Germany; variability is similar for these countries on all measures considered. Table 10 shows the greater degree of correspondence in the variability of relative price changes for EMS countries compared to non-EMS countries. The data do not show whether the greater degree of correspondence arises from policy harmonization, German dominance, or some other source.

The role of Germany in the EMS has been the subject of several investigations. Giavazzi and Giovannini (1987, 1989) claim that Germany plays a role in the EMS that is similar to the dominant role the United States took under Bretton Woods. Fratianni and von Hagen (1990) deny that Germany has that role. They conclude that the EMS is an interactive system and see the Bundesbank as an important, but not the dominant, central bank.[9] Both pairs of authors recognize that EMS countries have devalued and revalued their currencies and that several have used exchange controls. Exchange controls are a substitute for interest rate, relative price, and real exchange rate changes. Such controls lower welfare and reduce the variability of relative prices and real exchange rates, but they do not commensurately reduce the costs of acquiring information. Devaluation and revaluation increase nominal and real exchange rate variability but avoid changes in other relative prices and quantities.

There are at least three reasons for using caution in interpreting the evidence from the EMS countries as representative of the variability, costs, and responses to be expected in a fully fixed exchange rate system without exchange controls, such as is now proposed for Europe. First is the relative stability of German policies, particularly the emphasis given to price stability. Germany's average inflation rate (from 1975 to 1987) is the lowest of the countries in the sample. Second is the so-called Lucas critique that warns about structural

[9]Weber (1988) found that the high-inflation EMS countries gained credibility from Germany.

changes following changes in policies. Third is the reliance by some EMS members on exchange controls and devaluations or revaluations, which have permitted countries to remain in the EMS without fully adjusting their policies to those of Germany. Under the proposed European system, exchange rates are to be fixed permanently and capital will be freely mobile, but there is no rule for coordinating policies of independent central banks. A European monetary authority, if agreed to, may choose different policies and achieve a different rate of inflation than the Bundesbank.

Differences in policies and outcomes in EMS countries have been relatively large. For 1979–87, the average inflation rates ranged from about 2 percent in Germany to double digits in Italy and Spain. Average inflation rates are closely related to average changes in relative prices and costs. As shown in Table 12, the rank correlation for the 12 countries for which data on average inflation is most readily available is above −0.9 (in absolute value) when both variables are ranked from highest to lowest. (The negative correlation reflects the fact that a high rate of domestic unit labor cost or wholesale price change, relative to foreign costs or wholesale prices, lowers the values of P_{ULC} or P_{WP}.) The rank correlations also suggest that average rates of change of the nominal exchange rate for 1979–87 are closely related to country rates of inflation. The rank correlation of changes in nominal and real exchange rates is much weaker, and the correlation is negative but not significant for R_{ULC}. These data suggest that changes in nominal exchange rates during the period studied have mainly reflected the effects of inflation operating on relative unit labor costs and relative prices of domestic and foreign goods.

TABLE 12

RANK CORRELATIONS, CHANGES IN NOMINAL EXCHANGE RATES FOR 12 COUNTRIES[a]

N, P_{ULC}	=	.99[b]	N, P_{WP}	=	.96
N, inflation[c]	=	−.95			
P_{ULC}, inflation[c]	=	−.91	P_{WP}, inflation[c]	=	−.95
N, R_{ULC}[d]	=	−.23	N, R_{WP}[d]	=	.45

[a]Data for the 12 countries omit Austria, Denmark, Finland, Ireland, and Norway, which were not available in the source.
[b]For 17 countries = .99 also.
[c]GNP or GDP deflator; inflation rates are compound annual rates for 1975–87, from *International Economic Conditions*, Federal Reserve Bank of St. Louis, July 1989. For Spain, the inflation rate is available only through 1986.
[d]For 17 countries in Table 8.

Underlying the correlations in Table 12 are relatively large changes in relative prices and costs and in nominal exchange rates. The EMS group includes both the country with the third largest average exchange rate revaluation (Germany) and the largest average rate of devaluation (Italy), the third largest average increase in unit labor costs (the Netherlands), and the largest average reduction (Spain). If Europe had been a currency bloc with no exchange controls, then these differences would have required larger and more frequent changes in exchange rates. Countries would have been forced to forego independent policy actions or to adjust exchange rates.

Further, if the rate of inflation in the principal EMS countries had remained at the EMS average instead of being reduced toward the German rate, the rank correlations in Table 12 suggest that the changes in nominal exchange rates and in relative costs and prices would have been larger. The variance of relative price changes for the (partially) fixed rate countries would most likely have been larger as well, and the information costs of the fixed rate system would have been higher.

If the European Community removes and remains free of capital controls, then the working of the system and its cost or benefit will depend on the system's policy rule. The decision to remove all capital controls and to reduce, and finally eliminate, changes in parities is inconsistent with the continuation of independent monetary policies. If monetary control is concentrated in a single European central bank or monetary authority, then variability and costs of information for the new system will depend on the policy rule followed by the new central bank. The public will face increased uncertainty about the new bank's activism and about the way the bank will respond to real and nominal shocks, to unemployment and inflation, to individual governments, and to the European Community. The relation of money growth to country deficits or to an EC deficit would only become clear over time.

A single currency for the EMS bloc, produced under a clear rule for maintaining stability of the expected price level within the bloc, would enhance welfare. The public would face lower transaction costs and would benefit from greater stability of prices, permanently fixed exchange rates within the bloc, and the elimination of exchange controls within the currency area.

The advantages of gradual evolution toward a system of irrevocably fixed exchange rates are less clear. Changes in the relative price and real exchange rate between member countries can be much larger than under the EMS. Much will depend on the type of shocks that

occur, on the compatibility of the monetary rules followed by the different monetary authorities, and on the public's belief that fixed exchange rates will remain fixed. Failure to agree in advance on a rule for monetary policy that applies to each country repeats the principal Bretton Woods error, generates avoidable uncertainty, and increases the risk that the system will fail.

Conclusions, Limitations, and Suggestions

It seems obvious that transaction costs and the costs of acquiring information can be reduced by eliminating multiple currencies and establishing a single money for the European Community. The Delors Report does not do that. In stage one, exchange controls and restrictions on capital movements are eliminated and monetary coordination is to be increased. As part of stage two, the report proposes a European System of Central Banks. Responsibility for policy would remain with national authorities, but the individual country central banks would attempt to coordinate policies; later an EC monetary authority would gradually accept authority and responsibility. Eventually, exchange rate changes would be eliminated, and national currencies would be replaced by a single money.

A common currency should not be regarded as the limit reached by a system of fixed exchange rates between national monies as exchange rate changes approach zero. With a single currency, Europe would not face the difficult task of reconciling independent monetary authorities, fixed exchange rates, price stability, and unrestricted capital movements. Adopting a single currency would change anticipations about the way in which adjustment to real and nominal shocks would occur in the future, eliminate any prospect of devaluation or revaluation of nominal exchange rates, and change expectations about future prices and costs and their variability. The magnitude of such changes and even their direction would depend on the design of the new monetary institution and the type of monetary rule adopted.

Little can be known now about these matters until we know about the design of the future system. Yet, without such knowledge, there is no basis for concluding how the proposed system will work in practice. Experience with the Bretton Woods agreement is instructive. The designers of Bretton Woods did not specify a rule for monetary policy or provide a safeguard against U.S. inflation. Neither they nor the signatories anticipated that within 20 years U.S. policy would become the engine of world inflation. The problem on which they spent much time at Bretton Woods was avoiding deflation, the problem of the 1930s. One of the most contentious issues was the "scarce

currency clause," an attempt to prevent the consequences of U.S. deflation from spreading to the rest of the world. In the end, the scarce currency clause was irrelevant, and the system proved incapable of preventing the spread of United States inflation.

The same type of problem arises in the European Monetary System. It is a fact that the Bundesbank has followed a less-inflationary policy than most of its neighbors, but it is uncertain whether that policy will persist under different political and economic circumstances. A rule for monetary policy avoids reliance on Bundesbank decisions to continue its policy rule and, if properly designed, reduces uncertainty about future prices and exchange rates.

The paper attempts to extract information about the performance of alternative monetary systems from the experience with different types of mixed systems in the recent past. The problem in interpreting these findings is to separate the effects of particular policy rules or procedures from the effects of monetary standards. The problem is made more difficult by the types of systems examined. The fixed rate systems have fixed but adjustable rates; all of the fluctuating rate countries have intervened to adjust exchange rates. Intervention often increases exchange rate variability. Countries have used exchange controls and other restrictions to reduce exchange rate fluctuations. Despite these limitations, some generalizations appear to be robust. Changes in real and nominal exchange rates appear to depend more on policies than on an exchange rate regime. Multilateral exchange rate changes for Germany and Japan are more highly correlated than for changes in Germany and many EMS members. The variability of changes in real exchange rates is higher for both measures of real multilateral exchange rate changes in countries with fluctuating exchange rates and independent monetary policies (Japan, Switzerland, the United Kingdom, the United States) than in EMS countries. Fluctuating exchange rates appear to increase the costs of information about future real exchange rates. The increased variability of changes in multilateral exchange rates in fluctuating rate countries, however, is less than the increase reported by Mussa (1986) using bilateral rates. And the relatively low variability of changes in relative unit labor cost in the countries with a fluctuating rate suggests that there may be some offsetting welfare benefits. The more rapid decline in unemployment rates in non-EMS countries is consistent with a welfare gain.

The problem for the European Monetary Union is to capture the gains from a common currency without incurring the losses from variable monetary policy, from inflation or deflation, from uncertainty about future prices and inflation, or from low credibility. One way to

learn about the benefits of a common currency is to introduce a parallel currency that would be legal tender for private and public payments throughout the European Community. The parallel currency—call it the ECU—would be issued by a monetary authority on demand. The monetary authority would not have authority to change the quantity of ECUs in circulation except in response to demand. It would purchase or sell ECUs against the currencies of member countries, on demand, at fluctuating exchange rates.

Money-holders concerned about inflation, deflation, or devaluation would hold or use the ECU if it had a relatively stable domestic purchasing power. This would restrict the policies of national central banks and provide an opportunity for money-holders to hold a more stable currency basket at low cost. If a large demand for ECUs developed, then individual currencies might be displaced. If the ECU became the dominant money, then a new rule would be required to control the production of ECUs.

A better alternative, I believe, is to capture the gains from a single currency by replacing the current European currencies with a common currency that has stable value now. This would reduce the costs of information and transactions. Further, there are unexploited opportunities to increase welfare by increasing price and exchange rate stability, since no country has achieved either stable exchange rates or stable prices during the postwar years. The common currency would be issued in exchange for currently outstanding currencies. Its future supply would be governed by an adaptive rule to maintain anticipated price stability. In practice, this could be achieved by setting the growth rate of base money equal to the average rate of growth of output minus the average growth of base velocity. Because these growth rates may change, a three- or four-year moving average should be used to set the average growth rates of output and velocity (McCallum 1988, Meltzer 1986).

The proposed common currency would avoid the uncertainties the Delors Committee's proposals engendered about future policy and the evolution of the monetary system. Because Europe is an integrated trading area, it can gain from having a common currency supplied according to a stable and credible rule. It is less clear whether European countries gain by following the path recommended by the Delors Committee. Neither the Delors Committee nor subsequent discussion has suggested how the new system would avoid the principal error of Bretton Woods, that is, the failure to specify a rule that maintained stability of money and other nominal values. If that rule can be agreed upon, there seems to be no advantage to delaying the development of a common currency. If a rule

cannot be agreed upon, there is no evidence of a welfare gain from accepting the committee's proposal.

Data Appendix

The series for stock prices and consumer prices are given as index numbers. The OECD used three base dates in Main Economic Indicators (MEI): 1975, 1980, and 1985. We adjusted to a constant base year, 1985.

Inflation was determined as the log difference between consecutive values of the CPI, except for Japan, where the absence of a consumer price level necessitated using the GNP deflator. Data were then annualized.

Real values for the interest rate series (*ex post* real rates) are computed as the difference between the nominal rate on government debt and the one-period inflation rate. Real stock values were computed as the ratio of the stock market price level to the consumer price level and do not reflect dividends.

For the ULC series, both the OECD disk and MEI gave values for the 1970–79 period. Those from the MEI were averaged to produce semi-annual observations and thus match the values obtained from the OECD disk. These were then rebased from 1975 to 1982.

Certain series are not available for the entire 1960–89 period. The omissions are noted in the tables.

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