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CAN THE EUROPEAN MONETARY SYSTEM BE COPIED OUTSIDE EUROPE?
LESSONS FROM TEN YEARS OF MONETARY POLICY COORDINATION IN EUROPE

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ABSTRACT

This paper addresses the question of whether the European Monetary System can be copied outside Europe. Our answer is negative. The EMS is just one element of a more comprehensive design of institutional integration within Europe: the presence of the European Economic Community, and the dependence of EEC institutions upon exchange rate stability lend credibility to EMS exchange rate targets in a way that would not be present, say, among the United States, Europe and Japan. The EMS has also reproduced previous experiences of fixed exchange rates by not imposing the exchange rate constraint symmetrically upon all member countries: the system has de facto worked as a DM-zone, thus confirming that the institution of fixed rates per se cannot induce international monetary cooperation. Finally, the differences in the use of the inflation tax among European countries and the divergent behaviour of government debt after 1979 indicate that the pursuit of monetary convergence among countries with different fiscal structures might entail substantial fiscal reforms.

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1. Introduction

The European Monetary System (EMS) greeted with considerable skepticism in 1978, is now enjoying remarkable popularity. The causes of this shift in public opinion are plausibly to be found in the experience with the the international monetary system in the two periods: from 1971 to 1978, and from 1979 to the present. The period following the collapse of the Bretton Woods system was characterized, in Europe, by several attempts to limit exchange rate fluctuations, represented by the experiments with the "snake". These experiments proved to be a failure for the large "romance" countries: France and Italy. The two countries made respectively two and one attempt to join the snake, which were definitely abandoned in 1976 and 1973. The Belgian franc the Dutch guilder and the Deutsche mark, by contrast, entered the snake in 1972 and never left it until the start of the EMS.

The failed attempts of France and Italy, and the suspicion that the new technical features that characterized the EMS would look more like gimmickry than substantial reforms, justify the skepticism of observers in 1978. On the other hand, during the most recent decade, the events in the world financial markets have renewed and exasperated the dissatisfaction with flexible exchange rates. The unprecedented swings of the nominal and real dollar exchange rate, associated with a dramatic worsening of the US current account balance and the new position of the US as the largest debtor in the world economy, have led many observers to believe that there is something inherently unstable about flexible exchange rates, and that it would be desirable to reform the international monetary system. All the main proposals for world

monetary reform advocate, in a form or another, the limitation of exchange rate flexibility.

In stark contrast with the gyrations of the dollar, European currencies and intra-European competitiveness indices have kept relatively stable over the past ten years¹; at the same time inflation rates, and inflation-rate differentials across Europe, have been dramatically reduced. Hence the shift in the public opinion, and the renewed interest in the EMS. This paper discusses some aspects of the EMS experience with the objective of helping to answer the question of whether the EMS can be copied outside Europe.

The paper is organized around two main questions. The first is, why is the aversion to exchange rate fluctuations stronger in Europe than elsewhere? European countries are highly integrated and have built institutions--the common market for agricultural products in particular--that are dependent upon exchange rate stability. European exchange rate stability is justified by a much broader, and more important trend towards economic unification, which in part transcends purely economic motivations. Section 2 discusses the economic and historical justifications for limiting exchange-rate flexibility in Europe, while section 3 reviews the working of the EMS exchange-rate arrangements.

The second question is: how does the EMS hold together? What are

¹ An important exception is the United Kingdom, that remained outside the EMS.

the macroeconomic benefits from belonging to the system?² It is often stated that joining the EMS has helped high inflation countries like France and Italy to disinflate. Theoretical models suggest that such an arrangement is desirable, for the inflation-prone countries, when the nominal exchange rate target is more credible than money stock targets, or interest rate targets. There is not, however, an accepted explanation of why nominal exchange rate targets are more credible. The explanation we propose is based on the claim that the EMS exchange-rate targets are a part of a broader agreement that includes the common market, and the other community institutions. Abandoning the EMS targets is equivalent to abandoning this larger system. An additional complication is that the the country exporting its reputation as an "inflation fighter" tends to suffer, in the EMS, higher inflation than it would otherwise. Sections 4 and 5 discuss the disinflation which occurred after the start of the EMS, and the stabilization of West Germany's real effective exchange rate.

The achievement of monetary convergence, which can be credited in part to the EMS, has been reached at the expense of divergent fiscal performances. In section 6 we discuss the effects of the EMS on the fiscal performances on the countries that joined it, while in section 7 we offer a few concluding remarks.

² Ideally this question should be answered by integrating the analysis of the informational benefits of a common currency (or fixed exchange rates) with the analysis of the macroeconomic effects of alternative exchange rate regimes. Unfortunately, the current models of money are still ill-suited for such an ambitious task. Hence we concentrate here on the macroeconomic aspects.

2. Why did Europeans set up the EMS?

The coordination of macroeconomic policies has a long tradition in Europe: it dates back at least to the 1950s when six European countries signed the Treaty of Rome. The immediate effect of the Treaty was the establishment of a customs union and of a common market for cereals-- later extended to all agricultural products. But its intentions were much more ambitious. The Treaty lays down a set of principles for the conduct of macroeconomic policy among its members: mutual consultations in the area of short run macroeconomic policy; the commitment to "regard exchange rate policy as a matter of common interest"; and the possibility of mutual assistance to overcome balance of payments crises. The Monetary Committee of the European Communities also dates back from 1958: its role was to promote the coordination of monetary policies, and it was formed by two representatives for each country, one from the Treasury, the other from the central bank.

Behind these early steps for policy coordination in Europe lies the special European aversion for exchange rate fluctuations. This aversion is motivated by three factors. The first is rooted in Europe's recent history. In the 1920s and '30s many European countries had sought to defend themselves against external shocks through competitive exchange rate depreciations. Many in Europe today hold those policies responsible for the disruption of international trade and economic activity, and the

ensuing collapse of European democracies.³ The experience of the 1920s and '30s is important to understand the postwar quest for exchange rate stability which led to the Bretton Woods system.

Openness is the second explanation for the European distaste for exchange rate fluctuations. The EEC as a whole is not a particularly open region--no more for example than the United States or Japan: the share of imports in GDP was--in 1987--12.3 percent in the EEC, 10.1 percent in the United States and 11.4 percent in Japan. Therefore there is no particular reason why Europeans should worry about the fluctuations of the ECU relative to the dollar or the yen--no more at least than Americans and Japanese worry about fluctuations of their own currencies. But what is special in the EEC is that the region is not a common currency area. Individual countries have different currencies and are also much more open than the region as a whole. Even before the creation of the customs union the share of imports in GDP was as high as 40 percent in Belgium and the Netherlands, 16 percent in Germany. The trade creation and trade diversion effects of the union rapidly raised these figures: now they are around 60-70 percent in the small northern countries, and 25-30 percent in Germany, France, Italy and the UK. Openness however is mostly an intra-European affair: thus, to the extent that exchange rate fluctuations pose problems for an economy, it is the fluctuation of intra-EEC exchange rates that Europeans view as worrisome.

³ The memory of these events is kept alive by the Nurske's illuminating account of the effects of the exchange rate policies of the 1920s. See Nurske [1944].

The third explanation for the European aversion to exchange rate fluctuations lies in the very institutions set up with the Treaty of Rome, and in the common agricultural market in particular. As we shall now explain, the survival of the common agricultural market depends upon the stability of intra-European exchange rates. Consider French and German grains for example: they are almost perfect substitutes. Thus, the "Law of One Price" for cereals should hold exactly. However input prices in agriculture--labour costs in particular--do not follow the "Law of One Price": exchange rate realignments could thus produce large shifts in the profitability of the farming sector across Europe, and induce swings in agricultural trade in the region. The problem is aggravated by the fact that across European agricultural markets the "Law of One Price" rules by law. This is so because the European Commission regulates the cereals' market setting an EEC-wide price for each product. The price is set in ECUs and translated in local currencies at the ongoing exchange rate.

Europeans have agonized on the difficulty of running a common market in a region that does not use a common currency, at least since the early 1960s. The rules of Bretton Woods permitted excursions of up to three percent between any two European currencies.⁴ Such excursions were big enough to interfere with the functioning of the cereals market. The problem precipitated in 1969, with the August devaluation of the

⁴ The rules set one percent margins around the dollar parity of each currency, thus in principle permitting bilateral excursions of up to 4 percent. European countries however had agreed to maintain their dollar parities within smaller margins: 0.75 percent.

French franc, and the October revaluation of the Deutsche mark. The response to the realignments was the temporary suspension of the free cereals market. France prevented a jump of cereals' prices on the home market by converting the common ECU price at an artificial exchange rate--that did not reflect the devaluation. Germany avoided being flooded with French cereals by imposing a tariff on imports and granting an export subsidy to its own farmers. After the fall of Bretton Woods, responding to realignments with the introduction of tariffs and subsidies became common practice. By 1974 a German farmer exporting butter to Italy received a subsidy equal to 28.3 percent of the price; if the butter was shipped the other way, a corresponding tax was levied on the Italian exporter.

Beyond infringing the basic principle on which the EEC was set up, the tariffs and subsidies introduced to cope with realignments have also been costly for the EEC budget. For two reasons. The first is that it proved easier to remove the tariffs by letting agricultural prices rise in the devaluing country, than to remove the subsidies by cutting prices in the revaluing country. Therefore the revenue from the tariffs did not match the expenditure on the subsidies. The persistence of export subsidies in strong-currency countries aggravated Europe's chronic overproduction of food. By the mid-1970's two thirds of the financial resources available to the EEC were absorbed by the cost of running the agricultural market--leaving very little room for action in other areas.

Exchange rate stability then became a vital issue for the EEC, and it thus natural that the Commission would become a strong supporter of schemes designed to limit intra-European exchange rate fluctuations.

The problem has not disappeared in the EMS. The "agri-monetary" consequences of a realignment are an important item in the negotiations, as documented by the realignment Communiqués that always carefully spell out the provisions for agricultural markets--the timing of price adjustments, etc.

For many years the common agricultural policy has been the only important activity of the EEC and the main reason for its existence. In the early 1970's the agricultural market absorbed 90 percent of the total EEC budget; in 1985 the figure was still as high as 73 percent. It is unlikely that the EEC would still be there had it failed to keep the common agricultural market alive. Over the years the operation of the agricultural market provided the testing ground for cooperation in other areas. The EEC is now moving in new directions. The planned liberalization of 1992 is its first major initiative outside of agriculture: if successful it will reduce the importance of agriculture among the activities of the EEC and enhance the role of this institution in the coordination of economic policies across Europe. To some extent the evolution of the EEC has been possible because this institution survived the difficulties of operating the cereals market. Exchange rate stability has thus been an important condition for institutional developments in Europe.

Trying to understand the EMS without considering the grounds for the particular European aversion to exchange rate fluctuations would be misleading. For the countries that belong to the EMS leaving the system is a step that many would associate with the abandonment of other areas of European cooperation as well. In some crucial occasions, the links

between the EMS and other institutions of European cooperation has been instrumental to force policy shifts that in turn have made the survival of the exchange-rate system possible.

3. The EMS is an (Imperfect) Greater Deutsche-Mark Area

Ten years of operations of the EMS provide an important case study to those who are interested in designing new forms of international monetary policy coordination. In any fixed-exchange-rates regime, the task of running monetary policy is not explicitly assigned to any one country. Supporters of the hypothesis that international monetary policy coordination is feasible, claim that in commodity standard systems like the gold standard or the Bretton Woods regime, the establishment of nominal parities in terms of an external numeraire forced all countries to pursue the nominal target in a symmetric fashion. This mechanism, it is claimed, imposes a sort of implicit coordination of monetary policies. In a fiat currency system like the EMS, systematic cooperation by monetary authorities could help to define common monetary targets, to be pursued jointly by all countries.

Are the use of an external numeraire--like gold in the earlier fixed-exchange-rates regimes--or the institution of consultation bodies--like the EEC Monetary Committee and the Committee of Central Bank Governors--effective enough measures to induce international monetary policy cooperation? The evidence from the EMS suggests a negative answer to that question. The EMS, like the gold standard and the Bretton Woods system, is characterized by a "center" country--West

Germany--whose central bank pursues its own monetary targets independently of the policies pursued by the other members.⁵ The other countries, which have--to a significant extent--converged to West Germany's monetary policies, have maintained limited independence by the systematic use of capital controls, and the adoption of periodic exchange-rate devaluations.

The strongest evidence in support of the hypothesis that the EMS actually worked as some imperfect Greater Deutsche-Mark Area comes from the study of interest rates: West German interest rates are unaffected by most intra-EMS shocks, like the expectations of parity realignments, while interest rates denominated in the other currencies are those that suffer the full impact of intra-EMS portfolio disturbances. Countries like Italy and France have prevented the wide fluctuations in their own interest rates observed in the (unregulated) Euro-markets to affect their domestic economies by imposing capital controls. This evidence, as Giovannini [1988] shows, is similar to that of the gold standard and the Bretton Woods period, when countries other than Great Britain and the United States, respectively, sought to defend their policies from the influence of the "center" country by imposing various forms of regulatory hurdles on the international transmission of monetary

⁵ See Giovannini [1988] for an historical comparison of the gold standard, Bretton Woods and the EMS, a formal statement of the "asymmetry" hypothesis, and an analysis of the empirical evidence.

policies.⁶

4. Macroeconomic Effects: Inflation

One of the most dramatic changes in the economies of the EMS member countries since 1979 has been the decrease in the rate of inflation. Table 1 compares inflation rates of various European countries at the start of the EMS with the present. The table suggests both a significant convergence of European inflation rates towards the West German levels, and a general decrease of inflation, which is not limited to the countries belonging to the EMS. Since the conclusion of the preceding section is that West Germany's monetary policy has been at the center of the EMS, and since West German authorities built a wide reputation as "inflation fighters" in the second postwar period, the natural question raised by this experience is whether the structure and working of the EMS, and in particular the central role played by the German monetary authorities, have played any role in the disinflation experience of countries as different as Denmark, France and Italy. In this section we review the argument according to which pegging the exchange rate can help a country in the disinflation effort, and present

⁶ In the form of changes in regulations affecting the gold market, and controls on international capital flows.

the evidence for a number of EMS countries, and a country outside the EMS: the United Kingdom. The theoretical model points to the problem of the credibility of the exchange rate target, and the costs of the exchange rate union for the center country--West Germany. In our empirical analysis we attempt to measure both the credibility of intra-European exchange rate targets, and the size, timing, and effects of shifts in expectations after 1979.

4.1 Breaking the Inflation Inertia: The Role of Expectations

One fundamental feature of the inflationary process in modern industrial economies appears to be its persistence, a phenomenon that has been linked to the mechanics of wage and price setting. Firms and unions--for a number of reasons that we do not need to explore here⁷--find it more convenient to set prices and wages much less frequently than the rate of arrival of economic news. Therefore wages and prices are crucially affected by workers' and firms' expectations. Workers and firms are concerned, for example, to preserve the purchasing power of their income, and incorporate in their output prices their forecasts of the future evolution of the general price level. Indirectly, wage and price setters concerned about the evolution of the general price level need to forecast stance of monetary policy.

The special nature of wage and price setting therefore creates a

⁷ See, for example, Blanchard [1988] and Rotemberg [1988] for excellent surveys.

problem of coordination between the central bank and the public. The central bank might want to use monetary policy to steer the economy towards a higher output path, but the public, anticipating future expansionary policies, can sterilize them fully, by incorporating in their current pricing decisions the expectation of future monetary expansion and higher inflation. This process, by itself, generates inflation and tends to force the monetary authority to accommodate the higher rate of growth of prices, in order to avoid a severe recession. Hence in equilibrium there is higher inflation, and less output growth, than initially desired by both the public and monetary authorities. This is the inflationary bias of monetary policy in the presence of price and wage inertia, first described and analyzed by Barro and Gordon [1983].

The coordination problem of of monetary policy and sluggish prices and wages is also at the core of the issue of disinflation. Bringing inflation down requires a change in inflationary expectations on the part of price setters. How can the monetary authorities "convince" price setters that an announced contraction will be lasting and credible? The reputation that a central bank needs to bring down inflation can be obtained in two ways. The first, and more painful method for society as a whole, is by showing that, even in the worst of a depression, the announced monetary targets are not reneged. The initial monetary contraction after the announcement of a disinflation plan generates a recession, since it is imposed in a economy where inflation and money growth expectations are high. The recession would tend to be longer and harsher, the slower is the response of the private

sector expectation to the monetary contraction, because the very fact that the monetary authority sticks to the announced contractionary path comes to private agents as a surprise.

Alternatively, the monetary authority could avoid going through this prolonged "initiation" period by seeking a way to influence expectations with some institutional reform. The institutional reform of interest for us is a change in the exchange rate regime. How can the transition from flexible to fixed exchange rates bring about an improvement in the output-inflation tradeoff, and facilitate the disinflation effort? Under fixed exchange rates, a central bank tends to lose control on the domestic supply of money, since the changes in international reserves needed to support the exchange rate parity produce changes in the domestic supply of money which, in principle, the monetary authority cannot influence.

Now, suppose a country decides to passively peg its exchange rate to another country, whose monetary authority enjoys the reputation of being an inflation-buster. By "passive peg" we mean that the former country's monetary authority, after announcing the exchange-rate parity, simply accommodates the latter country's monetary policies, without any attempt to directly influence their choice of targets. What happens to the inflation expectations of the private sector? Wage and price setters need to evaluate the credibility of this institutional reform, that is they need to determine the likelihood that the announced exchange rate targets will be pursued consistently. If, and only if, the exchange-rate target is a credible one, expectations will adjust and the process of disinflation will be facilitated.

In practice, the EMS has not completely eliminated inflation differentials. Countries with higher inflation rates have resorted to periodic exchange-rate realignments to recover the losses in competitiveness caused by persisting inflation differentials and fixed exchange rates. The disruptions caused by speculators' expectations of these exchange-rate realignments have been limited--as we stressed above--through the systematic use of capital controls. Even when the exchange rate are periodically realigned, though, pegging to a low inflation country can improve the output-inflation tradeoff. This happens because the terms-of-trade fluctuations that occur during the intervals when exchange rates are not changed provide a strong-enough deterrent to central banks not to deviate from the center-country monetary policies as much as they would under a pure floating rate regime. With periodic realignments, however, the center country's output-inflation tradeoff is affected as well. During the intervals when exchange rates are kept fixed, the center country's terms of trade worsen, because the partner's inflation rate is higher than its own. As a consequence, the center-country's output-inflation tradeoff also worsens: the inflation-buster exports reputation and imports inflation.

In summary, the argument that pegging to West Germany has helped high inflation countries in the disinflation efforts of the 1980s rests crucially on the assumption that exchange-rate targets are more credible than monetary targets. In the next section we try to measure the effects of the EMS on inflation expectations and the short-run output-inflation tradeoff among member countries, and confront the issue of credibility of exchange-rate targets.

4.2 Measuring the Shifts in Expectations

Our discussion in the previous section suggests that one important macroeconomic benefit of the EMS for countries other than West Germany could have been associated with a shift in inflationary expectations originating from the public's awareness that in a fixed-exchange-rate regime like the EMS monetary policy is run, by and large, by the Bundesbank. In order to assess the empirical relevance of these effects, we need to measure these shifts of expectations. Consider the dynamics of wages and prices. As we argued above, private agents (firms and unions) set prices and wages by forming expectations on future macroeconomic variables, like the overall rate of inflation. These expectations are necessarily a function of agents' available information, reflected in current and past realization of all relevant macroeconomic variables. If a monetary reform like the EMS is put in place, private agents who believe that the reform will actually change monetary policies in the way described above, have to reevaluate the methods they use to extrapolate from past macroeconomic variables their expectations about future inflation and economic activity. Hence the shift in expectations, and its effect on the inflationary process, will be reflected in a shift of statistical equations relating wages and prices to available information. In this section we study the process of disinflation in Denmark, France, Germany, Ireland, Italy, and, for comparison, the United Kingdom, by comparing how the relation between price and wage inflation and output has shifted after the start of the

EMS. We are concerned both with the timing of the shifts, and with their magnitude.

We estimate a (quarterly) system of three equations specifying the dynamics of CPI inflation, wage inflation, and output growth, which we measure using industrial production indices. Each equation includes on the right hand side a time trend, seasonal dummy variables, 4 lags of wage inflation, CPI inflation and industrial production growth, and dummy variables representing country-specific events that the model cannot explain.⁸ We also include 4 lags of M1 growth rates, as well as changes in the relative price of imported intermediate and final goods. This last set of variables are assumed to be determined outside of the system: while innovations in wage and price inflation are plausibly correlated with money growth and changes in relative prices of intermediate and final goods, these variables are assumed to affect inflation and output growth only with a one-quarter lag.⁹

The first question we address is whether there is evidence of a significant shift in these statistical equations after 1979. A test of stability of the parameter estimates was performed for each equation and

⁸ The dummies are the following. For all countries, from 1971:3 to the end of the sample, fall of the fixed-rates regime. For Italy, 69:2-70:1 Autunno Caldo, 73:3-74:1 price freeze. For France, 63:4-64:4, 69:1-70:4, 74:1-74:4, 77:1-77:4, 82:3-83:4, wage and price controls; 68:2-68:3 "May 1968". For the UK, 67:4 sterling devaluation, 73:4-74:4 wage controls.

⁹ The estimates are obtained assuming that superneutrality holds, i.e. the sum of the coefficients of nominal variables is equal to 1 in the equations explaining wage and price inflation, and is zero in the equation explaining output growth. These constraints were not rejected in the largest majority of cases.

each country, using as a cutting point the first quarter of 1979.¹⁰ The results of the test indicate the presence of a structural shift only in the case of France: in no other country the shifts of wage-price dynamics after 1979 are statistically significant. While this evidence is against the hypothesis that the EMS has been associated with a shift in expectations, the negative result is very likely to be caused by the low power of the parameter stability tests we employ.

The next question we address regards the timing and the direction of the shifts in the inflation processes. Using parameter estimates obtained over the 60-79 sample, and the actual realizations of the forcing variables (money growth and relative prices of intermediate and final goods) we compute dynamic simulations of wage and price inflation and output growth. Table 2 reports the timing and the direction of estimated shifts in inflation and output dynamics obtained from the simulations. For every country we show the date when the simulated paths of inflation and output growth start diverging in a persistent way from the actual paths, and the sign of the divergence. The words "higher" and "lower" reported in parenthesis under each date indicate that the actual realizations of the variables were respectively higher and lower than their simulated values.

The table shows a number of impressive regularities. First, for all countries except West Germany, and possibly Denmark, actual and

¹⁰ In Giavazzi and Giovannini [forthcoming] we report a more detailed analysis of the model, and all the statistical results. Detailed statistics for Ireland, which do not appear there, are available from us on request.

simulated inflation and output paths start diverging later than the beginning of the EMS. Second, simulations for output growth tend to be less clearcut than simulations for inflation. And third, the direction of the divergences are opposite for Germany and the other countries in the table. In Germany actual inflation after 1979 is higher than its simulated value, and output growth is lower. The opposite results of Germany and the other countries are consistent with the model of imported reputation. The delayed shifts in the output-inflation tradeoffs for most countries, which occur well after the start of the EMS, and the very similar pattern followed by UK inflation and output, raise the question of the nature of the shift in expectation, and the role played by the reform of the exchange-rate regime.

Further evidence on the effects of the exchange-rate reform on expectations is reported in figures 1 to 3, which depict the Euro-interest-rate differentials between 3-month kroner, franc and lire deposits and Deutsche-mark deposits. Interest-rate differentials contain both expectations of exchange rates and risk premia. The presumption is that, if exchange rate targets were perfectly credible, both components of the interest rate differentials would tend to zero: expected changes in exchange rates would disappear, and the substitutability between eurodeposits denominated in francs, marks, liras and kroner--which is presumably inversely related to risk premia--would increase. The figures, by contrast, show that interest-rate differentials are not stabilized after 1979. In particular, the years 1982 and 1983 are associated with a crisis of confidence in the EMS, as shown by the large increases in interest-rate differentials.

In summary, the evidence from the simulation of the output-inflation model suggest a delayed response in expectations, while interest rate differentials indicate that expectations and risk premia did not decrease after the start of the EMS. Is this evidence consistent with the theory? The failure of interest-rate differentials to disappear is clearly not enough to dismiss the imported-credibility model. Although higher interest rates on lira, franc, and kroner deposits most likely indicate that private agents attached a positive probability to devaluations of these currencies relative to the Deutsche mark, European countries were subject to the effects of the unprecedented dollar appreciation in the early eighties and the second oil shock: the exchange rate mechanism might have limited the expected devaluations relative to a pure floating regime. Hence, while the forward exchange rates data seem to be inconclusive on the issue of the credibility of the exchange-rate targets, there is no prima-facie inconsistency between the simulation results and the behavior of forward premia.

Finally, we turn to the analysis of the magnitudes of the shifts in the output-inflation tradeoffs. Table 3 reports changes in inflation and cumulative output growth that occurred in European countries since 1979, and compares them with simulations of the same magnitudes obtained from the model described above. Contrast, for example, the experiences of Germany, Ireland and Italy. According to our simulations, every percentage point of inflation reduction since 1979 would have afforded Germany 10.7 percent growth: by contrast, the output growth for every point of inflation reduction was only 4.10. In the case of Ireland and

Italy, our simulations predict that every point of inflation reduction could have afforded those countries 4.10 and 0.67 percent growth, respectively. But in reality, real growth for every point of inflation reduction was higher in both cases: 6.94 percent in Ireland and 2.18 percent in Italy. Similarly, our simulations predicted a fall in output by 1.34 percent for every percent point reduction of inflation in Denmark, whereas in fact output has increased by 10.6 percent for every percent point reduction of inflation. These comparisons vividly illustrate the estimated effects of shifts in expectations, and their uneven distribution among Germany and the European partners.

It is however puzzling that price and wage expectations seem to have adjusted with a lag. One possible interpretation of this puzzle is that the effects of the EMS on expectations were not as direct as predicted by the Barro-Gordon model. The experience in France, Italy and Ireland, and our estimates of the timing of the shifts in expectations, suggest that the shifts in expectations were prompted by shifts in domestic policies.

In Italy we estimate a shift in expectations in the first quarter of 1985, in the aftermath of a government decree which had set a ceiling on wage indexation. That decree had been challenged by the unions, and was eventually ratified by a national referendum, in June 1984.

In Ireland there was a major turnaround in economic policies in the Summer of 1982, marked by an announcement of tighter guidelines for monetary policy, a decision of not to devalue the central parity of the punt in the February and June 1982 EMS realignments, and to freeze pay

increases in the public sector.¹¹

In France, the turnaround in macroeconomic policies occurs in March 1983, after the expansionary experiment of the first Mitterand government had produced a large current account deficit (3.5 percent of GDP) and a speculative attack on the franc. The government accompanied the EMS exchange realignment with a freeze in budgetary expenses, an increase in income taxes, and a dramatic tightening of credit.¹²

What was the linkage between these policies and the EMS constraint? In the case of Ireland and France the linkage is apparent. In particular, French authorities justified the unpopular policies as a necessary step to insure EMS membership, and linked the membership in the EMS to the participation in the EEC.¹³ In the case of Italy, we were unable to find any important reference to the EMS in the government pronouncements after the decree on wage indexation, but cannot exclude that the external constraint might have motivated that unpopular policy. In conclusion, EMS membership might have helped countries other than West Germany in their disinflation efforts only to the extent that they provided a justification for unpopular policies vis-a'-vis the domestic public, which could have helped to strengthen the credibility of the exchange-rate targets. The unpopular policies were justified, by French government officials, arguing that EMS membership is an integral part of EEC membership.

¹¹ Dornbusch [1988].

¹² Sachs and Wyplosz [1986].

¹³ Sachs and Wyplosz [1986].

5. The "European Alliance"

The view of the EMS as a system designed to enhance the credibility of inflation-prone countries leaves us with a puzzle. What incentives does Germany have to belong to such a system? The imported credibility model suggests that the center country may be the loser in an agreement in which it provides the nominal anchor that helps its partners to disinflate. If the decision to peg to a stable currency produced an instantaneous adjustment of expectations, the center country would be unaffected by the decisions of others to peg to its currency. But if learning takes time and disinflation is a dynamic process, during the transition the terms of trade of the center country worsen, and so does its output-inflation tradeoff. These effects are obviously smaller the larger is the center country relative to its partners: the United States were not concerned when Grenada or Belize decided to peg to the dollar. But even if we consider Germany and the Netherlands a de-facto monetary union and we sum their economic size, the joint GDP of the two countries (one thousand billion ECUs in 1985) is still only two-thirds of the joint GDP of the other members of the EMS. The EMS area also accounts for some 30 percent of total German and Dutch trade.

The empirical results described in section 4.2 seem to confirm that Germany's output-inflation tradeoff worsened since the start of the EMS. The evidence would thus justify the initial reluctance of the Deutsche Bundesbank to join the system. It remains to explain, however, why German policymakers tried, since the late 1960s, to avoid an uncoordinated response of European countries to the fall of Bretton

Woods. As it became clear that the Bretton Woods system was approaching its final days, German policymakers became increasingly worried that other European currencies might not be able to follow the appreciation of the DM vis-a-vis the dollar: they were preoccupied that the realignment of intra-European parities would disrupt the European customs union as well as the common agricultural market--two institutions that they considered important for the German economy.¹⁴

In this section we look for evidence of Germany's incentives to stay in the EMS analyzing the behavior of Germany's terms-of-trade from the Bretton Woods era to the 1980s. The terms-of-trade index we use is the real effective exchange rate of the Deutsche mark built using relative wholesale prices and the IMF-MERM weights, that are designed to measure a country's competitiveness relative to its trading partners. We are interested in finding out whether the EMS has stabilized Germany's terms of trade relative to previous periods.

The definition of "stability", however, is not unambiguous. One possibility is to look at the variability of unanticipated changes in the real effective exchange rate. This measure however eliminates most of the low frequency component of the series. Indeed, it could be argued that those low-frequency components are worthy of special attention. Williamson [1983] suggests that while exchange rate volatility (measured by the standard deviation of unanticipated exchange rate changes) might have a negative impact on trade and welfare, exchange rate misalignment

¹⁴ For an account of the German position in those years see Emminger [1977] and Kloten[1978].

(that is prolonged deviations of the exchange rate from some fundamental level) are likely to bring about the largest costs.¹⁵ Table 4 reports the simplest possible measure of the variability of the real effective exchange rate: its standard deviation. The data are monthly, from 1960 to 1985. The volatility of the effective real rate increases dramatically after the end of Bretton Woods, but stabilizes in the EMS. The second column in the Table suggests why this might have happened. We construct the real effective exchange rate of the Deutsche mark vis-a'-vis its EMS partners and compute the correlation between the index of "global" competitiveness and that of Germany's competitiveness inside the EMS. In the 1960s and '70s the correlation between the two indices is very high, indicating that the French franc, the lira and the other EMS currencies did not follow the Deutsche mark--particularly at the time of its large appreciation vis-a'-vis the dollar, after the collapse of Bretton Woods. The phenomenon reverses after 1979: the correlation between the global and the intra-EMS indices becomes negative indicating that the EMS has limited the effects of the fluctuations of the dollar/DM rate on Germany's competitiveness. Similar computations for the other EMS countries show that the phenomenon documented in Table 4 is specific to Germany. Belgium for example offers the mirror image of the German experience: the correlation between the global and the intra-

¹⁵ Recent research by Krugman and Baldwin [1987], Baldwin and Krugman [1986], Dixit [1987], and especially Krugman [1988], provides the first attempt at formalizing the linkage between the uncertainty and slow mean-reversion in exchange rate movements and the speed of adjustment of intersectoral factor movements and investment.

EMS indices increases after 1979. Given that Belgium is one of Germany's major trading partners, this has stabilized Germany's real exchange rate. The cost for Belgium has been an increase in the volatility of real effective exchange rate.

The evidence on Germany's terms-of-trade seems to support the "European Alliance" view of the EMS: the system has protected Germany from the effects of dollar fluctuations. In the early 1970s, at the time of the first dollar collapse, Germany appreciated both vis-a'-vis the dollar and vis-a'-vis its European partners: the result was a large swing in the country terms-of-trade. After the dollar fall of 1985 the EMS currencies followed the DM much closer and attenuated the impact on Germany's terms-of-trade. The comparison between the two periods clearly shows the extent to which the EMS has stabilized Germany's overall competitiveness. From November 1969 to March 1973 the Deutsche mark appreciated 25 percent vis-a'-vis the dollar; this was accompanied by an 18.6 percent worsening of Germany's overall competitiveness. From January 1985 to December 1987 the DM appreciation was similar--27 percent--but this time it was accompanied by a loss of competitiveness only half as large--9 percent.

6. Fiscal implications of monetary convergence.

Our discussion of the European disinflation has so far neglected the fiscal implications of monetary convergence. The important interactions between inflation and the financing of budget deficits open up an additional set of issues on the economic effects of the EMS, and

the prospects of financial markets liberalization planned for 1992. What has been the effect of the convergence of inflation rates on the government debt in the high inflation countries? There are two channels through which a disinflation affects the budget. The first is direct: a monetary contraction reduces the portion of the budget deficit that can be financed by printing money. The second channel stems from the rise in real interest rates and the fall in output associated with the disinflation. When the gap between the real rate and the growth rate widens, debt starts to grow. The larger a country's initial stock of public debt--as a percent of GDP--the more serious will be the impact on the budget of any increase in the real rate and of any reduction in the rate of growth.

All these problems are particularly important in Europe because high debt levels and dependence on money financing were the norm in many countries before the start of the EMS. Table 5 shows the fiscal situation of Ireland, Italy, Denmark and Belgium before the start of the EMS. We concentrate on these countries, neglecting France, Germany and the Netherlands, because the latter were characterized neither by high debt levels, nor by significant money financing--and not surprising it is the first four countries that eventually developed a fiscal problem. In 1978 none of these countries, with the possible exception of Belgium, could be characterized as facing a dramatic fiscal problem. Ireland and Italy had a high debt ratio and a primary deficit that exceeded the revenue from money financing, but real rates were well below the growth rate of income, and the ratio of debt to GDP was stable. Denmark had a small primary surplus and a large revenue from money financing: the sum

of the two was more than enough to service the debt, even at high real rates. Belgium is the only country where debt was growing.

To analyse the effects of inflation convergence on debt and deficits, we need to isolate the components of government deficits, and of debt dynamics. We study the government budget constraint:

$$B_t - B_{t-1} = (1+i_{t-1})B_{t-1} + (C_t - C_{t-1}) + D_t \quad (1)$$

The increase in the stock of government debt, B , equals the capitalized value of last period's debt, less the increase in credit to the government by the central bank ($C_t - C_{t-1}$), plus the non-interest (or primary) budget deficit. B_t and C_t denote stocks of credit at the end of period t , i_t is the interest rate on government borrowing, from the end of period $t-1$ to the end of period t . Dividing both sides of the equation by nominal income at time t , Y_t , and applying the usual approximations, we obtain:

$$b_t - b_{t-1} = (r_{t-1} - n_{t-1})b_{t-1} + d_t - (c_t - c_{t-1}) - (\pi_t + n_{t-1})c_{t-1} \quad (2)$$

where lowercase letters denote the corresponding variables in uppercase letters expressed as percent of GNP. Equation (2) says that the increase in government debt is higher, the higher the real interest burden on the existing stock of debt--measured by the real interest rate in excess of the rate of growth of the economy--and the higher the primary deficit. An alternative means of financing deficits is represented by the last two terms on the right hand side of equation

(2): the increase of credit to the government by the central bank (in percent of GNP), seigniorage and the inflation tax. Seigniorage is represented by $n_{t-1}c_{t-1}$, i.e. the non-inflationary growth of the total stock of credit from the central bank. The inflation tax (in percent of GNP) is $\pi_t c_{t-1}$.

In the steady state, barring nonneutralities of the tax system, the only fiscal consequence of a slowdown in the rate of inflation is the change in seigniorage revenue and in the inflation tax. If the economy is along the efficient portion of the revenue curve, both seigniorage and the inflation tax fall. Thus a country that prior to the disinflation relied on seigniorage and on the inflation tax as a source of revenue must sooner or later correct its primary deficit. If the country could simply jump from the high to the low-inflation steady state and the fiscal correction occurred simultaneously with the jump in inflation, the debt level would be unaffected by the change in monetary regime. But if the country postpones the fiscal correction, debt grows: the longer the postponement, the larger becomes the change in the primary deficit required to stabilize the debt, because in the meantime the stock of debt has grown.

The response of European fiscal authorities to the revenue loss induced by the disinflation was uneven. Denmark and Ireland swiftly turned the primary deficit into a large surplus; Italy waited. The question thus arises of what is the cost of waiting. How fast does the required change in the primary deficit grow if you delay the fiscal correction? Figure 4 helps answering this question. On the vertical and on the horizontal axis we have the primary deficit and the debt

level respectively. The two downward sloping schedules describe steady states in which the ratio of public debt to GDP is constant. They are drawn for two different levels of $(\pi+n)c$, the steady state revenue from money financing in equation (2). Money financing is higher along the upper schedule than it is along the lower one. The slope of the two schedules is $-(r-n)$: if the interest rate is above the growth rate of income a higher debt level requires a smaller primary deficit. As $(r-n)$ becomes smaller, the schedules flatten out, since the cost of sustaining higher debt levels also becomes smaller.

Consider now a country starting off from a point such as A, and assume that inflation jumps to zero, so that it loses all the revenue from the inflation tax. If the fiscal authorities correct the budget immediately, the country simply moves from A to B at an unchanged stock of debt. But if the fiscal correction is delayed, the economy starts drifting from A towards a point such as A'. How fast does the required fiscal correction grow? The difference between the budget correction required in A and in A' is $(r-n)$ times the increase in the stock of debt: i.e the required fiscal correction grows at $(r-n)$.

Suppose a country starts off with a seventyfive percent ratio of public debt to GDP, and a primary deficit equal to 2 percent of GDP. Assume that prior to the disinflation money financing brought 3.5 percent of GDP each year in the coffers of the Treasury, and that $(r-n)$ is equal to 0.02. If the fiscal correction is done immediately, it must fully offset the loss in money financing: if this falls to zero the primary deficit must move from a 2 percent deficit to a surplus of 1.5

percent.¹⁶ If the fiscal correction does not take place, ten years later the debt level will have grown from 50 to 90 percent of GDP, but the fiscal correction required to stabilize it will have grown only from 1.5 to 1.8 percent of GDP.

This simple example suggests that, if policymakers' public support is negatively affected by a fiscal contraction, there is a strong incentive to wait. A delay in fiscal adjustment increases the chances of reelection of the current government. Come tomorrow, the fiscal contraction--and the accompanying loss of consensus--will be only slightly higher. Waiting can be very attractive.

The output response to the monetary contraction and to the turnaround in fiscal policy adds further effects on the dynamics of the stabilization. As discussed in section 3, the decision to peg to a stable currency does not produce an instantaneous shift in expectations: thus, the impact effect of the central bank's decision to embark on a new monetary path, consistent with the peg, is an increase in real interest rates. The rise in interest rates will depress output, so that during the transition $(r-n)$ will be higher: this is the secondary burden of the disinflation. In addition, lower output will reduce tax revenues and add a cyclical component to the primary deficit. If on top of this the primary deficit is abruptly cut, it is unclear whether the simple jump from A to B described in figure 1 is at all possible.

In Table 6 we show the results of simple simulations designed to

¹⁶ In reality, even if inflation falls to zero, not all money financing will be lost. At $\pi=0$ money financing is equal to nc .

capture the dynamics of debt in the presence of a response of output, real rates and the budget to the monetary contraction. Lines 1), 2) and 3) illustrate the example discussed above. 2) and 3) correspond, respectively, to the instantaneous fiscal correction and to the case when the correction comes ten years later. The simulation reported on line 4) allows for a temporary increase in $(r-n)$, which jumps from 2 to 3 percent at the outset of the disinflation and then gradually falls back to 2 percent¹⁷. The fiscal correction occurs, as in case 3) after ten years. Line 5) extends the example by including the effect of the recession on the budget. The recession is assumed to worsen the budget by an amount equal to 3.5 percent of GDP in the first year, which gradually returns to zero in six years.

The results of these simulations suggest that the effects of the monetary convergence on the government debt of some EMS members has been sizeable, and could make the fiscal situation of countries like Italy and Ireland more and more difficult to manage. Such convergence is however necessary to achieve a sustainable elimination of inflation rate differentials.

¹⁷ The precise figures are shown on the bottom of the Table.

7. Concluding Remarks

In this paper we have reviewed the experience of the EMS to identify the lessons that this experiment in monetary coordination could provide to those who are considering a reform of the international monetary system.

Clearly, an institution like the EMS would not work outside of Europe, for a number of reasons. First, the incentives that countries have to belong to the EMS--the high degree of integration of European economies, and the more comprehensive design of institutional integration of which the EMS is just an element, and which lends credibility to the EMS exchange-rate targets--are not present, say, among the US, Europe and Japan. Second, the operation of monetary policies has not been linked to the exchange-rate constraint by all countries: West Germany appears to have pursued its own monetary targets without attempting to accommodate international influences, while the other countries have either accommodated Germany's policies, or changed exchange rates, or imposed capital controls. The striking similarity between the EMS and previous experiences of fixed exchange rates suggests that the institution of fixed rates cannot per se, induce international monetary policy cooperation. Finally, the differences in the the use of the inflation tax among European countries and the divergent behavior of government debt after 1979 indicate that the pursuit of monetary convergence among countries with different fiscal structures might entail substantial fiscal reforms.

Table 1

The European disinflation
(GDP deflator: annual growth, percent)

	1978	1987
Belgium	4.3	2.1
Denmark	9.9	4.6
France	9.5	3.3
Germany	4.3	2.1
Ireland	10.5	2.9
Italy	13.9	5.5
Netherlands	5.4	-1.0
United Kingdom	11.3	4.0

Source: European Economy.

Table 2

The timing and direction of the shift in expectations:

	Denmark	France	Germany	Ireland	Italy	U.Kingdom
Price						
Inflation	80:1	83:2	79:2	82:3	85:1	81:3
(direction)	(lower)	(lower)	(higher)	(lower)	(lower [*])	(lower)
Wage						
Inflation	80:2	83:2	79:2	80:2	85:1	81:1
(direction)	(lower)	(lower)	(higher)	(lower)	(lower [*])	(lower)
Output Growth	80:3	none	79:2	none	none	none
(direction)	(higher)		(lower)			

Note: The words "higher" and "lower" indicate that the actual realization of the variables are respectively higher and lower than their simulated values. The word "none" indicates that no systematic divergence between actual and simulated values can be detected. In the case of Italy, the divergence between actual and simulated variables occurs close to the end of the simulation period

Table 3

The shift in the output-inflation tradeoff

	Denmark	France	Germany	Ireland	Italy	U.Kingdom
End of the Simulations	84:4	85:4	86:4	88:1	86:4	87:1
Change in Inflation	-1.83	-4.86	-3.37	-9.72	-8.38	-6.23
Predicted Change in Inflation	-2.57	6.78	-5.51	-8.57	-12.87	6.63
Cumulative Change in Output	19.43	5.06	13.82	39.84	18.30	12.10
Predicted Cumulative Change in Output	-3.45	26.18	58.95	59.60	8.25	9.98

Table 4

Germany's Terms-of-Trade

	Standard Error of the Real Effective Exchange Rate (global index)	Correlation between the Global and the Intra-EEC Indices of Competitiveness
1960:1-1971:8	.041	.824
1960:1-1979:1	.127	.911
1960:1-1985:12	.124	.620
1979:2-1985:12	.114	-.033

Sources: IMF, IFS. Real exchange rates are constructed using wholesale prices. Effective exchange-rate weights are the IMF-MERM weights for 1977, normalized to account for Germany's competitiveness vis-a'-vis its eight major trading partners--in the case of the global index--and its four major EMS partners--in the case of the intra-EMS index. Weights are as follows. Global index: Belgium, 0.0588; France, 0.2016; Italy, 0.151; Japan, 0.152; Netherlands, 0.074; Switzerland, 0.043; United Kingdom, 0.058; United States, 0.262. Intra-EMS index: Belgium, 0.121; France, 0.416; Italy, 0.311; Netherlands, 0.152.

Table 5

Fiscal conditions at the start of the EMS
(percent of GDP: 1978)

	debt level	money financing	money financing plus primary surplus	r	(r-n)
Belgium	0.65	0.0	-2.0	3.0	0.0
Ireland	0.82	1.8	-3.5	-0.6	-7.8
Italy	0.51	2.2	-2.2	-2.4	-5.1
Denmark	0.18	3.4	+5.2	5.5	4.0

Definitions:

Debt level is the stock of public debt on the market, i.e. total debt net of debt held by the central bank. Money financing corresponds to the public sector borrowing requirement financed by the central bank. Primary surplus is the budget deficit net of interest. r is the ex-post short-term real rate of interest, and n is the growth rate of GDP at constant prices.

Sources: the fiscal variables for Ireland and Italy are from the local central bank Bulletins. For Belgium and Denmark debt levels are from Chouraki et al. [1986]; money financing and the debt held by the central bank are computed from line 12a of IFS. Interest rates and growth rates for all countries are from European Economy.

Table 6

Disinflation, debt and the budget

	debt	monetary financing	budget surplus required for debt stabilization
1) initial conditions	0.75	0.035	-0.020
2) instantaneous fiscal correction	0.75	0.0	0.015
3) fiscal correction after 10 years	0.91	0.0	0.018
4) fiscal correction after 10 years with (r-n) effect	1.07	0.0	0.021
5) fiscal correction after 10 years with (r-n) and cyclical effects	1.20	0.0	0.024

In all simulations the steady state value of (r-n) is 0.02. In cases 2) and 3) the stabilization has no effect on real variables. In case 4) output falls and real rates rise during the disinflation, but there are no cyclical effects on the budget. The path of (r-n) is:

year 1: 0.07
year 2: 0.07
year 3: 0.05
year 4: 0.04
year 5: 0.03
year 6: 0.02.

In case 5) (r-n) rises and the recession raises the budget deficit. The paths of (r-n) and of the cyclical component of the budget are:

	(r-n)	cyclical
year 1:	0.07	0.035
year 2:	0.07	0.035
year 3:	0.05	0.020
year 4:	0.04	0.010
year 5:	0.03	0.005
year 6:	0.02	0.0

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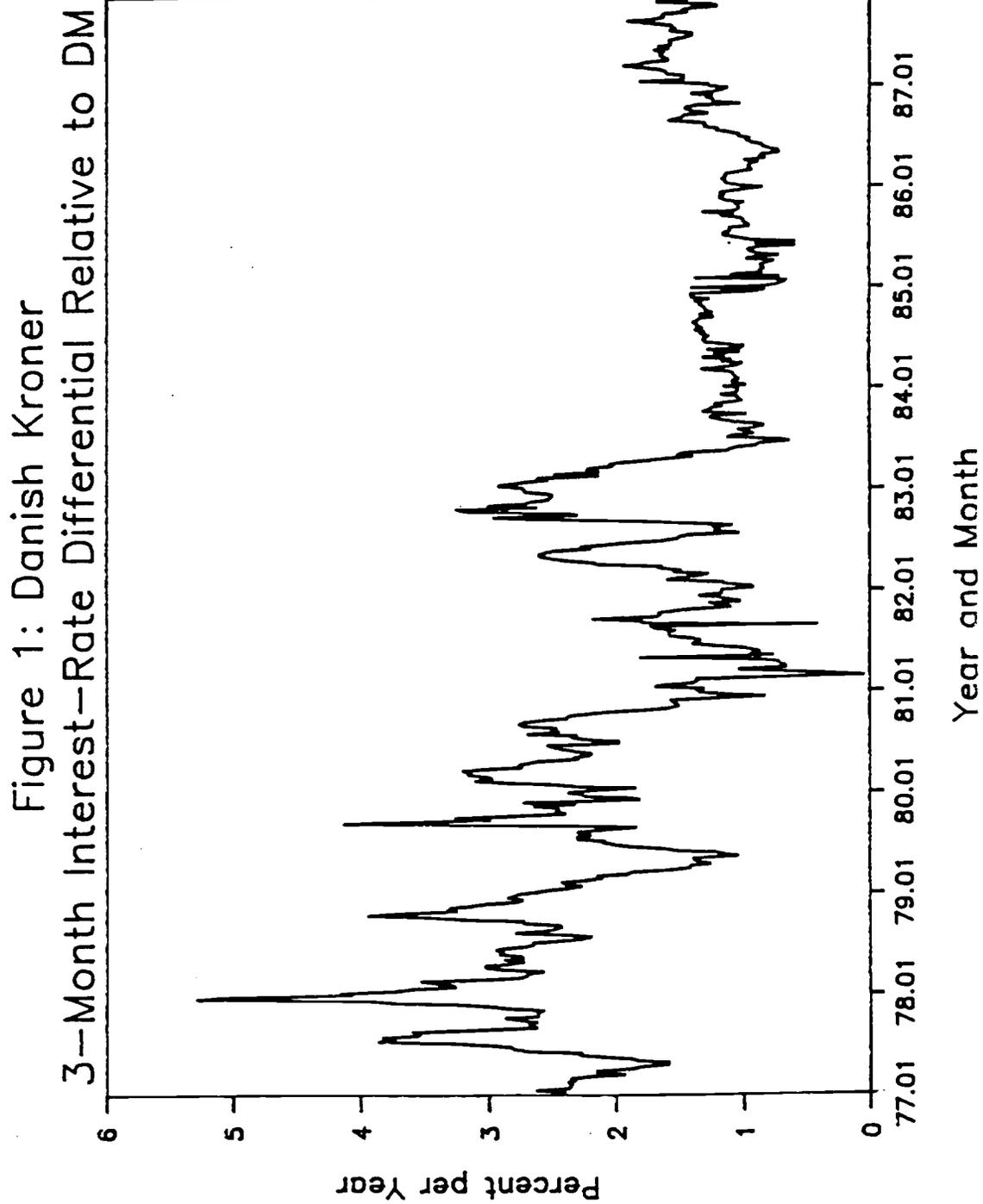


Figure 2: French Franc
3-Month Interest-Rate Differential Relative to DM

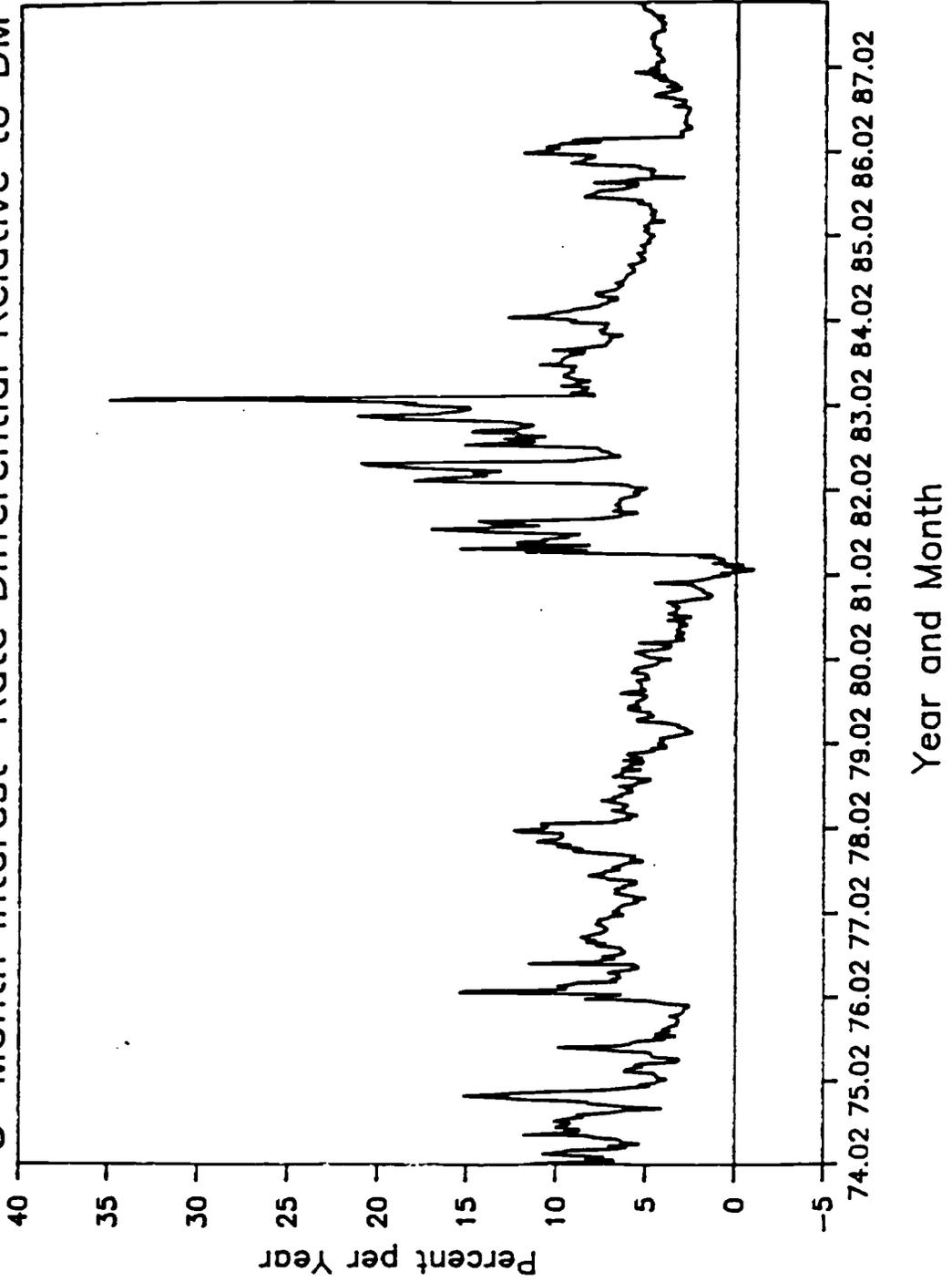


Figure 3: Italian Lira
3-Month Interest-Rate Differential Relative to DM

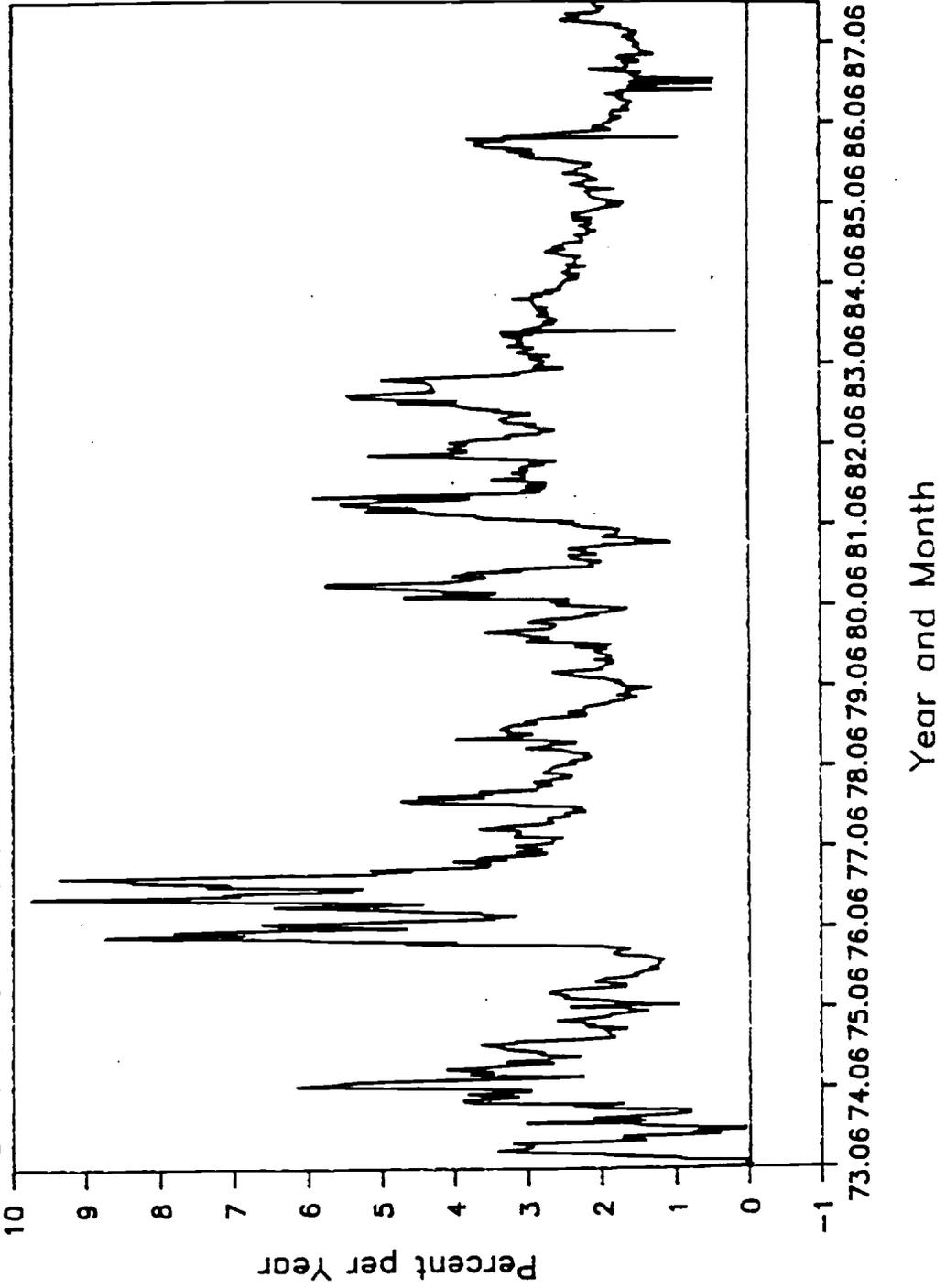


Figure 4

