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THE EUROPEAN MONETARY UNION: AN AGNOSTIC EVALUATION

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ABSTRACT

The European Monetary Union: An Agnostic Evaluation*

The debate about a European Monetary Union (EMU) revolves mainly about two issues: the costs of the loss of a national policy instrument, in the form of stabilization and revenues of seigniorage, and the gains from policy coordination. We argue that the costs of giving up national seigniorage are small, but that, on the other hand, policy coordination is not optimally achieved through monetary integration, owing to trade balance externalities. Yet, the EMU should not be compared with an infeasible first-best scheme, but with its alternative, the EMS.

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NON-TECHNICAL SUMMARY

After 1992 the Single Act will have removed most, if not all, remaining trade barriers. As early as 1990 capital movements should, in principle, be free between most EC countries. A natural further step is monetary integration, which might be expected to result in a degree of economic integration similar to that achieved at national levels, with considerable gains from returns to scale rewarding such a bold move. Despite these potential economic gains, from a political point of view the prospect of a European Monetary Union (EMU) is remote. Indeed, it may be surprising that movements toward free trade are uncontroversial despite their likely distributive effects, while monetary integration, which is supposedly neutral in the long run, encounters so much resistance.

The debate about the EMU centres upon two issues. Opponents of EMU object to the loss of a national policy instrument, which not only is a tool for stabilization but also offers revenues from seigniorage. Supporters of EMU, on the other hand, argue that the benefits from policy coordination warrant the sacrifice of some degree of freedom and that monetary policy is a prime candidate. We reject both arguments: seigniorage is only a second-order effect except, perhaps, during the transition to monetary union, while monetary integration will not lead to optimally coordinated policies.

We assess the 'non-strategic' aspects of monetary integration. It has been argued that some countries simply cannot afford to join an EMU. Countries such as Ireland, Italy and Spain require significant tax revenues in order to service their high levels of public debt. Optimal taxation theory suggests that the burden of such taxes should be spread widely. These countries have a relatively high and inelastic money base, however, and giving up seigniorage would exacerbate the inefficiency of their taxation and may render them unable to service their debt, and the threat of government insolvency may follow. It appears, however, that the revenues from seigniorage are small. Furthermore, at the European level seigniorage will still be extracted through the issue of the common currency, so there is room for at least some compensation at the European level.

Surprise inflation is another option for countries facing high levels of public debt, but this option would have to be given up in an EMU. It may be necessary to offer these countries some form of relief or to devalue their debt one way or another. But the disciplinary effect of the EMU would reassure the public in high-debt countries that monetization on a large scale is ruled out, and this may reduce expectations of inflation.

The creation of the EMU would transform the ECU into a strong competitor to the dollar in world portfolios. This rise in the demand for ECU-denominated assets would initially lead to an appreciation of the ECU and/or a fall of the

European real interest rate, but it is impossible to predict the significance of these effects. How big could that be? A simple 'back-of-the-envelope' calculation goes as follows. Suppose world trade is 10% of world GNP and half of it is mediated in ECUs. If the EC's GDP is one third of world GDP and world GNP grows at 5% per year, we find that the demand for ECU generated by world trade would grow at 0.75% of EC's GNP. Even allowing for a large margin of error, this calculation yields two interesting insights. First, the value of this 'external' seigniorage, while large in absolute value, is quite limited relative to GDP and tax revenues. Second, this estimate is strikingly similar to the 'internal' seigniorage available to most EC countries as discussed earlier. We conclude that non-strategic aspects can not clearly lead to an unambiguous conclusion either for or against monetary integration.

In the second part of this study we discuss the 'strategic' aspects of an EMU. The literature on policy coordination has shown that the real exchange rate between two countries is like a public good which may be produced inefficiently when the countries do not act cooperatively. In the presence of a common adverse supply shock, each country has an incentive to appreciate its currency relative to the other country. The outcome is likely to be inefficient unless they cooperate and recognize that they cannot both appreciate. The inefficiency that results from the lack of cooperation will be greater the more integrated the two countries are, since integration increases the wrongly perceived benefit from exchange rate manipulation. Recent work that attempts to assess the quantitative importance of this externality for the United States, Japanese and European economies has not yielded very conclusive results. Trade interactions within Europe are much stronger, however, and this suggests that cooperation within the EC may be more desirable.

The traditional literature on policy coordination has shown that a monetary union is fully desirable when shocks that affect the union are symmetric. When shocks are asymmetric, a monetary union is not an optimal response as it forces countries facing different problems to pursue a joint monetary policy . The socially optimal response would involve an asymmetric inflation rate, which a monetary union cannot deliver.

A realistic assessment of the EMU requires a framework in which fiscal policies are set independently in each country. While monetary integration (may) set a socially desirable European inflation rate, such a framework helps illuminate the problems facing an EMU, for which the joint determination of the ECU vis-à-vis the dollar or the yen will be a crucial task of the European Central Bank. We show that in such a case it matters not only whether shocks are symmetric or asymmetric, but also whether they are permanent or transitory. Because Europe is not well-integrated in world goods markets, its overall trade balance determines the joint real exchange rate vis-à-vis the rest of the world. Europe's

trade balance is in effect a public good which may be delivered inefficiently when countries act non-cooperatively. This may happen, for example, if governments try to smooth out the effects of transitory shocks by adopting policies that affect national savings and therefore the trade balance.

To illustrate this we set up a simple three-country model designed to show the role of the trade balance externality. Two countries, e.g. France and Germany, which are perfectly integrated in both goods and financial markets, form a zone, Europe. Europe and the other country, e.g. the United States, are perfectly integrated in the financial market, but not in the goods market. The externality arises because one country over-estimates the responsiveness of its own trade balance to a real depreciation which results from a fiscal expansion, as it assumes that the other European country remains passive and does not expand. If each country attempts independently to enact optimal monetary and fiscal policy under the (mis)perception that the other European country does not follow suit, they will discover ex post that they achieve a collectively inefficient position.

This trade balance externality is irrelevant in the case of permanent shocks, when each optimizing government adjusts demand in the long run, and this individually optimal policy is also the collectively optimal solution for the zone. A transitory shock, however, provokes an offsetting response by the individual governments, which leads to a trade imbalance and change in the real exchange rate. In the case of a transitory asymmetric shock the favourably hit country would seek a trade surplus and a depreciation of the real exchange rate. But the other country would try to achieve the opposite, a deficit and appreciation. This prompts a series of inefficient conflicts over the zone's trade balance and real exchange rate.

Even in the case of a symmetric transitory shock this inefficiency can occur as each individual country wishes that the other country takes more of the burden of adjustment. Each government fails to realize that its own response to a shock will be accompanied by an exactly identical response from the other country. As a result not enough action is taken (relative to the socially optimal solution). Thus, in the case of asymmetric and temporary shocks a monetary union may be undesirable.

We also investigate the nature of the disturbances in the last decades to test the empirical relevance of our theoretical analysis. All variables of interest are transformed into sums and differences. Sums describe the aggregate 'European' economy and reveal symmetric shocks; differences reveal the asymmetric disturbances. Our task is to extract from each composite its permanent and temporary components. We use a variety of methods to examine the relative proportions and the symmetry of the temporary components of economic time series for the two largest members of an EMU, France and Germany. It appears that symmetric shocks are much larger than asymmetric shocks. Furthermore,

symmetric shocks tend to be more permanent than transitory, while the reverse characterizes the asymmetric shocks. We then compare France and Germany to make up 'Europe' and calculate the sums and differences for 'Europe' and the United States. We find that symmetric shocks no longer prevail over asymmetric shocks. The results support the view that monetary integration makes more sense between France and Germany than between Europe and the United States. However, they do not imply whole-hearted support for the EMU because even symmetric shocks generate a trade-balance externality in our model.

While the EMU does not deliver the first-best collective outcome for Europe, the socially optimal solution requires such a precise monetary and fiscal policy coordination that it seems politically infeasible and incredible. Therefore it makes more sense to compare the EMU with the present form of cooperation, the EMS. In the final section we assess the performance of the EMS. It has been argued that the EMS has been functioning as a Deutschmark zone, but the evidence is not overwhelming. We perform vector auto-regressions on interest rates and the growth rates of base money for the EMS countries and find that there is no clear-cut evidence for any unidirectional influence of Germany on the other member states.

To see whether the EMS can consolidate a socially optimal solution, we investigate whether it has overcome the credibility problem. We look at the interest rate risk premium of the French interest rate and find that, although it has not been significantly reduced in the EMS, it has increasingly been driven by fiscal innovations rather than monetary (inflation) innovations, as was the case in the pre-EMS period. Hence, it seems that the EMS has helped to establish the credibility of the monetary authorities. Private current account innovations do not appear to contribute significantly to the interest rate risk premium, but the budget deficit, (the public current account) does. Our theoretical arguments suggest that a shift from the EMS to an EMU would lead to an identical riskless interest rate everywhere. Each borrower, public or private, would face the same riskless rate and pay a premium according to its own riskiness. In contrast, the EMS, as we have seen, imposes on all agents in a given country an interest premium related to the public sector's borrowing, but not to the private current account. On these grounds, the EMU should be favoured over the EMS.

We conclude that full integration of goods and financial markets, as is to be introduced in 1992, does not necessarily imply full monetary integration in the EMU but may simply require an adaptation of the existing rules of the game. The merits of monetary integration should not be compared with an infeasible socially optimal solution, but with those of a possible reform of the EMS.

1 - INTRODUCTION

Europe will wear new clothes in 1993. The Single Act will have removed most, if not all, remaining trade barriers. As early as 1990, capital movements should, in principle, be free between most EC countries.[1] A natural further step, it is argued by the EC Commission, is monetary integration. The expected result is a degree of economic integration similar to what is achieved at the national level, with considerable gains in returns to scale rewarding such a bold move.

From a political point of view, the prospect of a European Monetary Union (EMU) is, paradoxically, remote. Indeed, it may be surprising that free trade is unanimously agreed upon, despite its likely distributive implications, while monetary integration, which is supposedly neutral in the long run, encounters so much resistance.

The debate about the EMU revolves mainly about two issues. Opponents object to the loss of a national policy instrument, which is both a tool for stabilization and which offers the revenues from seigniorage. Supporters argue that the benefits from policy coordination warrant the sacrifice of some degree of freedom, monetary policy being a prime candidate. We reject both arguments: seigniorage, we argue, is a second order effect except, perhaps, during the transition; policy coordination is not optimally achieved through monetary integration.

Section 2 presents our assessment of the non-strategic aspects of monetary integration. In particular, we show that the revenues from seigniorage are small and of the same order of magnitude as the seigniorage revenues that could be raised with the ECU from the rest of the world. The strategic argument, the policy coordination gains from monetary integration, is assessed within the framework of a formal model which is presented in Section 3. The model shows that the EMU would leave unsolved a key issue of policy integration, namely how to collectively determine the trade balance of the zone vis a vis the rest of the world. Importantly, we show that this externality arises even though each country follows its own intertemporal

1. Spain, Portugal and Greece have been allowed to extend this deadline to 1992.

budget constraint. Yet, it is unfair to gauge the EMU against the background of a first best scheme which, we argue, faces considerable credibility problems. The proper yardstick should be the likely alternatives. Section 4 is devoted to a comparison with the European Monetary System (EMS). Section 5 concludes on an agnostic note.

2 - NON-STRATEGIC ASPECTS OF THE EMU

2.1. Seigniorage

According to Dornbusch (1987), Giavazzi (1988) and Drazen (1988), some countries simply cannot afford joining a EMU. These countries are those where the money base is relatively large and where the public debt is high and its servicing requires, now and for the long run, a significant tax pressure. Optimal taxation suggests that the tax pressure ought to be carefully spread out. With a large and relatively inelastic money base, giving up seigniorage would exacerbate the inefficiency of taxation. A worst case scenario includes the inability of servicing the debt in the absence of seigniorage and the threat of government insolvency.

There are some questions whether the money base should be taxed at all. Assuming these issues away, the strength of the argument is largely empirical. Table 1 provides some evidence. Seigniorage revenues in 1987 are shown in column (2) as a proportion of GDP Y,

$$\frac{\dot{H}}{Y} = \mu.h$$

where $\mu = \dot{H}/H$ is the growth rate of the money base H and $h = H/Y$ is the tax base shown in the first column. By 1987, with monetary policies everywhere held in check by concern for inflation, seigniorage revenues typically amount to less than 1 per cent of GDP. In many countries, however, seigniorage has sometimes provided much more significant revenues: the third column shows the maximum amount recorded in each country since 1960. This maximum level ranges from 1.2 in the Netherlands to 11.4 per cent in Spain. Such levels, however, are not sustainable over any significant period. They

are the outcome of a surprise inflation, an issue to which we return in the next section. Sustainable seigniorage is closer to the numbers shown in column (4), where μ is set equal to the average real GDP growth rate recorded over the EMS period 1979-1987. This would be a steady state situation should the income elasticity be unity and inflation nil. As income elasticity is typically less than unity, the numbers in column (4) overestimate seigniorage revenues under zero inflation. Column (5) shows the case where inflation is set at 5 percent p.a. Only for Ireland, Italy and Spain - because of the size of their money base - do these numbers become meaningful (and are also likely to be so in Portugal and Greece). Furthermore, at the global level seigniorage will still be extracted, thus there is room for at least some compensation.

The only cases of concern are those of the three large money base countries. For Ireland and Italy which face very high public debt, it may have been rational for the authorities to maintain a large taxable money base. The situation of Spain is more likely explained by its relative backwardness, now quickly fading away. In any case, a clear implication of the EC Single Act is that by 1992 the pressure of competition will dent the existing regulations which have led to such large money bases. While the EMU is not, as we argue in Section 3, implied by the Single Act, a convergence towards low money bases is inevitable, which removes the first argument against the EMU (except of course during the transition period).

2.2. The Possibility of a Surprise Inflation

Having asserted that seigniorage is not a major source of steady government revenue, we certainly do not wish to argue for sustained high inflation rates. However, for countries facing high public debt - Belgium, Ireland and Italy - the inflation surprise option may be difficult to give up. After all there are numerous historical examples of how high public debts have been significantly eroded through inflation: an interesting case is that of the UK as described by Buiter (1985).

There are, however, two important provisions. First, inflation must come as a surprise so that nominal interest rates do not compensate fully for its effect. Importantly therefore, if the public debt is indexed, or if

its maturity is short, the benefits of inflation are very limited. Given the costs of an eventual disinflation, the incentive for a surprise inflation may then be most limited.

Table 2, borrowed from Giavazzi and Pagano (1988), provides evidence for the EC countries. Interestingly, only the non-EMS member countries (Spain, Greece and Portugal) have a high proportion of short term debt. For the other countries, including highly indebted Belgium, Ireland and Italy, the average maturity is 3.5 years or more. For the current indebted EMS members, the option of an inflation surprise exists and may not be relinquished lightly. For these countries to join the EMU, it may be necessary either to offer some relief mechanism[2], or that they devalue their debts one way or another.

The second reinforcing provision is the Sargent-Wallace (1981) argument. If the foreseen path of government deficits violates its budget constraint, the public should rationally anticipate the possibility of an eventual pick-up in money growth and inflation. Under such circumstances, inflation accelerates immediately. It may well be the case that, today, the disciplinary effect of the EMS reassures the public in high debt countries that monetization on a large scale is ruled out. Clearly, the EMU would mightily reinforce this effect. We return to this issue in the broader context of the discipline argument in Section 4.

2.3. Exchange Market Interventions

A benefit from the EMU is that exchange market interventions within the EMS would become unnecessary. Data provided by Mastropasqua et.al. (1987), however, show that a large majority of EMS member countries carry out exchange interventions in dollars. While part of these interventions were no doubt related to intra-EMS parities, it is quite obvious that the EMU will

2. It is interesting to remember that when the Reichsbank was created in Germany in 1876, the Reich took over the debts of the newly unified member states. (See Holtfrerich (1988).

not free European monetary authorities from intervening on the exchange market. The expected savings are therefore limited.

In neo-classical models designed to compare exchange rate regimes, Helpman (1981) and Frenkel and Razin (1987) have shown that the main difference between flexible and fixed exchange rate regimes is the need, in the latter case, for central banks to face the opportunity cost of holding foreign exchange. An upper bound of these costs is presented in Table 3 where the reserve holdings of Central Banks are assumed to be held in non-interest bearing dollars. Multiplying these amounts by the yield on dollar government bonds provides the upperbound. This is a vastly exagerated cost for two main reasons. First, as argued above, EMU Central Bank(s) would still intervene in dollars, and this has been at least 50 percent of their interventions so far. Second, most reserves are yielding market-related interest payments, so that the opportunity cost is a fraction of the one shown. The upperbounds shown in Table 3 clearly dispel the notion that such considerations are of any practical interest.

2.4. World Portfolio Diversification

In many respects, we still operate in a world dominated by the Bretton-Woods era. The dollar remains the most common mean of exchange for international trade and the most widely held reserve currency. While a number of explanations have been advanced (e.g. the sophistication of US financial markets or the unwillingness of other countries to allow their currencies to become widely held internationally), the current state of affairs is most probably due to the size of the US and dollar-related markets.[3] In this view, the lack of competing currencies is largely due to the fact that countries like Japan, Germany or Switzerland are much smaller than the U.S. The creation of the EMU will make available such a competing currency.

3. Eichengreen (1987) relates explicitly the ability of a country to act as an "hegemon" to its size and ability to affect prices and quantities worldwide. The theoretical basis for the size effect is spelled out in Mundell (1968).

Assuming that world portfolios react by giving, say, equal weights to the dollar and the ECU, ceteris paribus, what effects can be expected ?

The first effect is a once-for-all increase in the demand for ECU-denominated assets. As a result their price should rise or their yield decrease permanently. In other words, either the ECU will appreciate in effective terms, or the real interest rate will decrease, or a combination of both will occur. This much is understood. What is impossible to know is the size of these effects. Because we are concerned with a serious change in regime, estimates based on past data are likely to be completely misleading.

The second effect is seigniorage at the world level. If, as is reasonable to assume, world holdings of ECU-denominated assets will grow along with world wealth, there will be a continuous demand for such assets. As far as interest yielding assets are concerned, this is nothing but an implication of the portfolio rebalancing effect of the previous paragraph. There remains a flow demand for non-interest bearing assets, namely ECU currency. How big could that be ? A simple "back-of-the envelope" calculation goes as follows. Suppose world trade is 10 percent of world GNP and half of it is mediated in ECUs. If the EC's GDP is one third of world GDP and world GNP grows at 5 per cent per year, we find that the demand for ECU generated by world trade would grow at 0.75 percent of EC's GNP. Even allowing for a large margin of error, this calculation yields two interesting insights. First, the value of this "external" seigniorage, while large in absolute value, is quite limited relatively to GDP and tax revenues. Second, this estimate is strikingly similar to the "internal" seigniorage available to most EC countries as discussed in Section 2.1. Those who fear a loss of internal seigniorage should the EMU lead to zero inflation rates should be reassured that external seigniorage might come to offsett such revenue shortfalls.

3 - STRATEGIC CONSIDERATIONS

3.1. Exchange Rates as a Public Good

The non-strategic aspects of the previous section clearly fail to tilt the advantage against or in favor of the EMU. Could strategic considerations be decisive? The literature on policy coordination (see among others Hamada

(1985), Sachs (1983), Canzoneri and Henderson (1988)) has shown that the real exchange rate between two countries is like a public good which may be delivered inefficiently when the countries do not act cooperatively. For example, in the presence of a common adverse supply shock, each country has an incentive to appreciate relatively to the other country. The outcome is likely to be inefficient unless they cooperate and recognize that they cannot both appreciate. The inefficiency which results from the lack of cooperation will be greater the more closely integrated are the two countries since integration increases the (wrongly) perceived benefit from exchange rate manipulation.

Recent work on the quantitative importance of cooperation (see e.g. Oudiz and Sachs (1984), Bryant et.al. (1988)) is not very conclusive. Yet, if gains from coordination between the US, Europe and Japan are indeed quite limited, this is most likely because of the limited trade interactions among these zones. Within Europe, in contrast, trade interactions are much tighter: each EC country is relatively open whereas the EC as the whole is as closed as the US or Japan. The Single Act will accentuate this feature and make European cooperation more desirable. Drawing on the traditional literature on policy coordination, the desirability of a monetary union may appear to hinge on the symmetric or asymmetric nature of the shocks which affect the European community. Indeed, when the shocks are asymmetric, a monetary union is not likely to be an optimum response to the extent that it forces a joint monetary policy upon countries which face different problems. However, in most of the models examined in the literature, a monetary union is fully desirable when the shocks which affect the economies are symmetric. Indeed, a common Central Bank will set a collectively chosen monetary policy and avoid a beggar-thy-neighbor competition on exchange rates.

The traditional literature on policy coordination, however, usually postulates a two-country world economy in which the only inefficiency that arises stems from the determination of the exchange rate linking the two currencies. Such frameworks are ill-suited to the problems facing Europe, for which the joint determination of the ECU vis-a-vis the dollar or the yen will appear to be a crucial task of the European Central Bank. In order to assess the implication of this question we now suggest a simple framework of analysis in which fiscal policies are set independently in each country, while monetary integration (may) set a socially desirable European inflation rate. We shall see that the relevant characteristic of the stochastic shocks

which affect the European economy is not (only) whether they are symmetric or asymmetric, but also whether they are permanent or transitory. The intuition comes as follows. Because Europe is not well integrated in world markets, its overall trade balance determines the (joint) real exchange rate vis a vis the rest of the world. Europe's external trade balance is in the nature of a public good and the provision of this public good may be inefficient when countries act non-cooperatively. This will be indeed the case when the shocks are transitory, because it is rational that governments undertake to smooth out the effects of transitory shocks by adopting measures which affect the national saving and therefore the trade balance.

3.2. Trade Balance as a Public Good

The point can be made by considering a world composed of two zones and three countries. The first zone, which we call Europe, consists of two countries, France and Germany which are perfectly integrated in both goods and financial markets. Practically we assume that only one good is produced in each country and that the law of one price prevails.

The other zone is composed of only one country, the US. While Europe and the US are perfectly well integrated financially - thus the interest parity condition holds - the goods markets are not perfectly integrated across the two zones so that the law of one price is not satisfied. Limited arbitrage in goods exists however so that trade flows between the two zones reflect the price discrepancy. This price discrepancy, and the associated trade flows, are the potential source of inefficiency that coordination must solve and which, we shall show, monetary integration fails to internalize.

We present in the Appendix a simple three-country model designed to show the role of the trade balance externality. By assuming that France and Germany have the same real exchange rate vis-a-vis th US, we eliminate the familiar exchange rate externality. On the other side, the common real exchange rate determines Europe's trade balance with the US, given the imperfect degree of good market integration. Thus, when France and Germany are identical, each country's trade balance is half of Europe's trade balance, which we show on Figure 1 as the TT schedule.

The externality arises because one country, France say, does not necessarily perceive the relationship between its own trade balance and the (common) real exchange rate that way. Suppose that France expends domestic

spending through fiscal policy. If it assumes that Germany remains passive, France foresees a one to one relationship between its own trade balance and Europe's trade balance. An example of how such a misperception arises is when one country, say France, assumes that the other country, Germany, keeps its inflation and spending unchanged in the face of a joint real depreciation. France overestimates the responsiveness of its own trade balance to a real depreciation on two counts. First, if Germany's trade balance is taken as given, France expects that the full effect of the depreciation on Europe's trade balance is reflected one-for-one into its own trade balance. Second, France recognizes that Germany's trade balance will worsen, given inflation and demand, because German output falls in response to the increase in imported (American) materials. Given the overall trade balance of Europe, Germany's deficit implies a further surplus for France.

The overestimated trade balance responsiveness is shown on Figure 1 as the PP schedule. The comparison between the TT and PP schedules illustrates the trade balance externality. If each country attempts to independently enact optimal monetary and fiscal policies under the perception that they move along PP, they discover ex-post that they are along TT at a collectively inefficient position. This generic externality may well have important implications. It certainly suggests a reassessment of the nature of an EMU.

In our simple framework (see the Appendix) fiscal and monetary policies allow each government to control inflation and domestic spending in its efforts to stabilize these variables as well as output. While we allow for a misperception about the trade balance responsiveness to real exchange rate changes, we explicitely account for each country's intertemporal constraint via the trade account. This constraint leads to a clear separation between permanent and temporary disturbances.

Consider for example a permanent adverse output shock. The trade balance constraint imposes a corresponding fall in demand: any (longrun) optimizing government responds by accepting immediately the permanent fall of demand. Consequently, the trade balance remains in equilibrium and the trade balance externality is irrelevant (except during an interim period if the shock is asymmetric and there is some degree of nominal rigidity, more on that below). As a result, when each country choses its optimal policies in isolation, the outcome is the socially optimal solution (SOS) and the

real exchange rate is entirely driven by the need to maintain a balanced trade account in both France and Germany.

A transitory shock, on the contrary, ellicits a policy response designed to smooth out spending. To simplify, consider a supply shock which is of sufficiently short duration that the present value of current and future outputs remains approximatively unchanged. The optimal policy response, therefore, is to maintain spending approximatively unchanged. This is achieved via a trade account imbalance. Thus, for each country, there exists an optimal trade deficit and an optimal rate of real appreciation. When the country is hit by an adverse supply shock, it will try to engineer an appreciation of the real exchange rate so as to import from abroad and to sustain the inflationary impact of the shock. Conversely, when hit by a favorable supply shock, the country will produce more than its spends and seek a depreciation of the real exchange rate.

The inefficiency of the resulting equilibrium is best understood when France and Germany are hit by a transitory asymmetric shock of equal magnitude. Each country optimally keeps spending unchanged. As output increases in one country by the same amount as it decreases in the other country, Europe's trade balance remains in equilibrium, and the common real exchange rate remains unchanged. However, it is in each country's advantage to attempt to cushion the supply shock through a change in output, and in doing so each country overreacts. For example, the adversely hit country will want a trade deficit to borrow abroad and thus it seeks an appreciation. The appreciation, if achieved, would worsen the favorably hit country's trade balance, precisely as it wishes to run a surplus to cushion its own temporary positive shock. The favorably hit country then counteracts, prompting a round of innefficient conflicts over the zone's trade balance and real exchange rate.

The same inefficiency would occur in the case of a symmetric shock, albeit to a lesser extent. The reason is that both countries wish to go in the same direction (e.g. a trade deficit in persence of an identical joint adverse shock). Yet, each individual country wishes that the other country takes more of a drop in output to achieve the sought-for appreciation. As a result, not enough action is taken relatively to the SOS.

3.3. Monetary Integration

It should be clear that an asymmetric shock cannot be appropriately dealt with by a monetary union. Indeed the socially optimum response in such a case must involve an asymmetric inflation rate in each country, which a monetary union cannot deliver.

Neither is a transitory symmetric shock efficiently dealt with by a monetary union. Indeed, in a monetary union only the inflation rate is set effectively. It is left to each country to determine which trade balance they want to achieve and the trade balance of the zone itself, hence the real exchange rate of Europe vis-a-vis the rest of the world, is not determined efficiently. In a monetary union as in the non-cooperative one which we addressed in the previous section, each government fails to realize that its own response to a (symmetric) shock will be accompanied by an exactly identical response of the other country.

To summarize, we see that it is not enough to check whether shocks are symmetric or asymmetric in order to conclude that a monetary union is efficient or not. We have suggested to add another distinction to this typology and to check whether the shocks which hit Europe are more of a transitory than of a permanent nature. Only permanent shocks fail to trigger the inefficiency of the determination of the trade balance of the EMU.

4 - EMPIRICAL INVESTIGATION

The costs of deviating from the SOS that the EMU - or any other non-cooperative set of policies - would impose are related to the stochastic nature of the disturbances. We have found that temporary shocks matter more than permanent ones[4] and that asymmetric shocks run more against the rationality of the EMU than symmetric ones. Thus the worst case of the EMU would be a preponderance of temporary asymmetric disturbances. Indeed, it is transitory shocks which should lead to trade imbalances - where the externality arises - and it is with asymmetric shocks that common inflation rates are likely to be dominated by the SOS.

4. More precisely, what matters in permanent shocks is the transition period.

In order to gauge the empirical relevance of these arguments, we attempt to detect in the recent experience the nature of the disturbances. In line with the model, we focus on the two largest countries of what could become the EMU, France and Germany. All variables of interest are transformed into sums and differences.[5] Sums describe the aggregate "European" economy and reveal symmetric shocks. Differences reveal the asymmetric disturbances. Our task is to extract from each composite its permanent and temporary components.

There is now a significant literature on how to decompose non-stationary time series into permanent and temporary fluctuations. The key issue is whether the permanent component is allowed to be stochastic. Non-stochastic permanent components may be captured by regression on a linear trend and possibly higher degrees of the trend. Stochastic permanent trends require filtering techniques as presented in Beveridge and Nelson (1981), Nelson and Plosser (1982), Prescott (1986), or Blanchard and Quah (1988). Stochastic trends normally follow more closely the original series than non-stochastic trends so that they allocate a much larger share of fluctuations to the permanent components. [6]

In principle, there is little basis to choose one method over the other. We do not get deeper into this issue as our objective is not to separate out trend and temporary components for the sake of it. Rather, our objective is to compare the relative proportion of the temporary component for "Europe" - the sum of France and Germany - thus capturing the symmetric shocks, and for the difference between France and Germany - thus identifying the asymmetric shocks. For this reason, quite agnostically we adopt a variety of methods: a linear trend, a quadratic trend and the stochastic trend method proposed by Beveridge and Nelson (1981). All data are used in level form. The stochastic trend is allowed to follow a random walk with a non-stochastic drift and random disturbances. Table 4 presents the ratio of the standard deviation of the temporary component to the standard deviation

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5. Such models are used in Oudiz (1985), Begg and Wyplosz (1987), among others, to study policy coordination.

6. Recently, Clark (1987) has proposed a maximum likelihood estimator which happens to provide a result strikingly close to the linear trend for the (log of) US GNP.

of the original series. A high ratio, therefore, indicates a preponderance of temporary fluctuations.

We consider three variables for France and Germany: the real GDP, the real wage and the price level. We also consider separately the French and German current accounts as a proportion of their respective GDPs. For the whole sample period (1965:1-1987:4), Table 4 suggests that symmetric shocks are much larger than asymmetric shocks, at least as measured by the standard deviation. Further, symmetric shocks tend to be more permanent than transitory, while the reverse characterizes the asymmetric shocks. It is interesting to compare these results with those shown in Table 5. In Table 5, France and Germany are aggregated to make up "Europe" and the sums and differences are applied to "Europe" and the US. In contrast with the intra-European results, it is no longer true that symmetric shocks prevail over asymmetric shocks and there is no overwhelming association between asymmetric and temporary disturbances.

The results support the view that monetary integration makes more sense between France and Germany than between "Europe" and the US. They do not imply, however, wholehearted support for the EMU in view of our model because symmetric shocks, while compatible with the equalization of inflation rates, still generate a trade balance externality which put full coordination at a premium.

5 - EMU VERSUS EMS

5.1. Doubts about the Feasibility of an SOS

While the EMU does not deliver the first best collective outcome to Europe, two questions must be answered before concluding about the desirability of monetary integration. First, is the superior SOS feasible ? And, second, if the SOS is not feasible, which of the feasible alternatives are preferable ? In particular how does the EMU compare with the EMS, either in its current form or suitably modified ?

What the SOS achieves in our model is an agreement on a real exchange rate vis-a-vis the rest of the world. For that to be achieved each member

country must set its own trade balance in accordance with the whole zone trade balance so that the joint real exchange rate which is agreed upon is indeed enforced. The requirements in terms of credibility appear formidable. Not only the SOS member countries must commit to this task their policy mix, i.e. a combination of both monetary and fiscal policies. It is doubtful that such precise fiscal policy coordination is politically feasible and credible among sovereign states. There is not much support from the EMS experience that it has moved in this direction. This stands in sharp contrast with the case of the US, often considered as an example for the EMU. The relative proportion of federal and state budgets effectively solves this difficulty. It may be the key reason why political unification always precedes monetary integration.

5.2. Has the EMS been Effective?

In the previous section we do not model the EMS. Two particular characteristics would be required to do so. First, one distinctive feature of the EMS is that it stabilizes the real exchange rates. Since we assume the law of one price, this aspect cannot be considered here. Second, the EMS has important credibility effects both on inflation and on the balance of trade. Our model focuses on the balance of trade and would need to be amended to account for the inflation aspect.

What is puzzling is the wide agreement among most policy makers and researchers (Giavazzi and Giovannini (1988), Mélitz (1987)) that the EMS has been functioning as a Deutschemark zone. The reason, it is argued (Giavazzi and Pagano (1988)) is that the other Central Banks have borrowed from the Bundesbank credibility regarding their tolerance to inflation.[7] Evidence about the DM zone hypothesis is not overwhelming. Giavazzi and Giovannini (1988) show that forward premia on the FF/DM and Lira/DM rates are entirely mirrored by the FF or Lira off-shore interest rates, not at all the DM rate. Yet, as noted by De Grauwe (1988), domestic French and Italian interest rates are not any more responsive to the premia than the German rate. It is altogether irrelevant that capital controls provide the means to avoid a

7. Wyplosz (1988) suggests that any fixed and adjustable exchange rate system has a tendency to regress to the least inflationary monetary policy stance.

policy conflict. Euro-interest rates have no effect on the domestic economy and are therefore of no help in assessing the outcome of the game, nor do they help predict what will happen once controls are removed and the rules of the game are modified.

In our views, the evidence needs to be confirmed by a somewhat more formal treatment of the data. One way is to perform vector auto-regressions (VAR) on base money growth figures as well as on one-month (domestic) interest rates. Table 6 shows the results of tests of significance using 4 lags (similar results were obtained using 6 lags). There is some evidence that Germany's monetary instruments influence the other countries. Yet Italy and France are seen to exert some influence on Germany. The German monetary instruments significantly affect money growth, or interest rates, or both, in all other countries. At the same time, the German variables are affected by the French and Italian instruments. These VAR estimates can be used to simulate the effects of a unit interest rate disturbance arising in each country on the other countries' own interest rates. In doing so, we have to arbitrarily set the order in which these disturbances affect each country. The results presented in Table 7 correspond to the order indicated there. Reported are the sources of interest rate variability 2 and 10 months after the initial impulse. Clearly again, the results attribute a more powerful influence to Germany than to other countries, but France, Italy and the Netherlands also appear to transmit their interest rate innovations. Similar results are obtained with the money base figures.[8] There is no pretense that these results establish meaningful causality link. They are proposed to suggest that the unidirectional influence of Germany is not based on clear cut evidence. There is room to suspect that strategic behavior is at work within the EMS. This is of course compatible with a SOS, more so than if the EMS were to operate effectively as a DM zone.

For the EMS to be a SOS, though, it must have successfully solved the credibility problem described in Section 4.1. In order to approach this

8. De Grauwe (1988), using Granger causality test on interest rates, is able to reject more often the hypothesis that Germany's policy causes the other countries' policies.

issue, we have attempted to measure the "interest premium" separating out French and German interest rates. The interest premium ψ_t is defined as:

$$(28) \qquad \psi_t = i_t - i^*_t - {}_te_{t+1} + e_t$$

where i_t and i^*_t are the French and German interest rates, e_t the FF/DM exchange rate and ${}_te_{t+1}$ its expected value next period. This interest premium includes the usual risk premium and a Peso-type premium given that for most of the sample period, e_t has been limited to move within the narrow band of the EMS. Following Hansen and Hodrick (1983), we estimate ${}_te_{t+1}$ by regressing e_t on four of its lags and on once-lagged values of its possible determinants, updating the regression each quarter. The determinants are taken here as the differences between France and Germany's CPI inflation rates, current accounts and budget deficits. Then ${}_te_{t+1}$ is generated by using the regression on variables known as of time t. The interest premium is calculated as in (28) and shown on Figure 2. Credibility should have led to a reduction of the interest premium. Separating the sample at the time of the creation of the EMS (1979:1), we find no clear evidence of a reduced premium: its average and standard errors are 3.8 and 3.3 respectively for the period 1975:1-1979:1, and 3.2 and 3.1 for the period 1979:2-1987:2. If anything, Figure 2 shows a strong "Mitterrand effect".

Still, it is interesting to check whether the sources of the interest premium have changed after the creation of the EMS. In order to investigate this issue, we have regressed the premium on its own lag and on innovations of the determinants used to compute the interest premium. The innovation for each variable is interpreted as the risk premium. For each quarter, we regress the variable on its first four lags and on the other determinants of the premium lagged once. Updating once, we generate a forecast and take as the innovation the difference between the actual variable and the forecast. The results, shown in Table 8, show that until 1979:1, the interest premium is influenced by monetary (inflation) innovations; after 1979:2, it is influenced by fiscal policy innovations. The first obvious interpretation is that the EMS has contributed to establish the credibility of the French monetary authorities. It provides some empirical support to the view that

the EMU, seen as the ultimate stage of evolution of the EMS, will reduce real interest rates in the traditionally inflation-prone countries.

There is however another, more novel, interpretation of the results presented in Table 8, which fits directly the theoretical development of the present paper. We note that the private current account innovations do not appear to contribute significantly to the interest rate risk premium. Along with the significant influence of the budget deficit, it suggests that what matters is the public current account. Within our framework of analysis, it means that the EMS has not succeeded in internalizing the (public) trade balance. As we showed, this is a feature also to be expected from the EMU: indeed this is the reason why the EMU cannot be a SOS.

6 - CONCLUSION

The theoretical arguments of Section 3 point to a potentially important shortcoming of the EMU, namely that uncoordinated fiscal policies fail to recognize the balance of trade externality. We interpret the empirical evidence as suggesting that the EMS has not been successful at dealing with this externality. On the surface, one would be tempted to look for other criteria to guide the choice between the two competing systems. This would be unwarranted. A shift from EMS to EMU would lead to an identical riskless interest rate everywhere in Europe. Each agent, public or private, would face the same riskless rate and pay a premium according to its own riskiness. In contrast, the EMS, as we have seen, imposes on all agents in a given country an interest premium related to the public sector's borrowing, but not to the private current account. On these grounds, the EMU should be favored over the EMS.

In theory, a system of sophisticated contingent rules will always dominate a one-money-for-Europe system. The superiority of such a system, however, is only established relatively to the inefficiencies which arise in the absence of policy coordination. Much recent work has focused on the inflation externality associated with the setting of the exchange rates. For this externality, a DM-dominated zone exhibits some desirable features. We have suggested the existence of another externality, the collective

determination of the zone's balance of trade. No doubt, other reasons can be found which require particular sets of contingent rules. Under current political conditions, at least, such sophisticated coordination is far too ambitious.

The current debate on the EMU is prompted by the Single Act due to take effect in 1992. We have argued that the EMU is not implied by the full integration of goods and financial markets. On the other hand, this integration will undoubtedly require an adaptation of the existing rules of the game. The issue is not, we believe, a formal and exhaustive evaluation of the merits of monetary integration, but a comparison with the merits of a possible reform of the EMS. The EMS has achieved some progress in monetary policy coordination and discipline. But on this criterion the EMU is bound to do better and to free the private sector from the interest premium associated with public finances. Both the EMS and the EMU are likely to fail to enforce the extent of fiscal policy coordination required for a proper internalisation by each country of Europe's overall trade balance constraint.

Consequently, the EMU must not be judged in comparison with an abstract socially optimal system, but relatively to the other feasible alternatives. This is reminiscent of Guesnerie's (1977) survey on second best taxation which concludes that it is preferable, in practice, to improve an existing system rather than to attempt the design of a grandiose optimal system. Maybe the key consideration is whether the extreme simplicity of the EMU is an advantage or a drawback.

APPENDIX: THE MODEL BEHIND THE ANALYSIS

Exchange rates and trade

Let $e_{1,t}$ be the (log) of the French Franc rate per US dollar, $e_{2,t}$ the Deutschemark rate. The logs of the price levels in France and Germany are, respectively, p_t and p^*_t. The law of one price implies:

$$(1) \qquad p_t = (e_{1,t} - e_{2,t}) + p^*_t$$

The common European real exchange rate vis a vis the US is:

$$(2) \qquad z_t = e_{1,t} - p_t = e_{2,t} - p^*_t$$

Whenever a divergence from the law of one price occurs between Europe and the US, i.e. when $z_t \neq 0$, arbitrage takes place, but on a limited scale, leading to a European-wide trade imbalance (in volume):

$$(3) \qquad \overline{\overline{TB}}_t = h\, z_t$$

In what follows, we assume that transatlantic shipping of goods is undertaken by US traders.

Supply of goods

Price and wages are determined in the spirit of Taylor's staggered mechanism. Wages contracts are set for two periods, half of them being reviewed each period so as to keep unchanged the expected (average) real wage:

$$(4) \qquad w_t = (p_t + {}_tp_{t+1})/2$$

where ${}_tp_{t+1}$ is period's t rational expectation of period t+1's price level.

Prices, in turn, are set as a markup over average wages, the markup itself being an increasing function of output Q_t and a decreasing function of US's competitiveness z_t:

$$(5) \qquad p_t = (w_t+w_{t-1})/2 + (a/2)z_t + (b/2)Q_t + \varepsilon_t/2$$

where ε_t is a stochastic shock, which we will allow to be either permanent or transitory.

If $\pi_t = p_t - p_{t-1}$ is the inflation rate, (4) and (5) yield:

$$(6) \qquad \pi_t = ({}_{t-1}\pi_t + {}_t\pi_{t+1})/2 + az_t + bQ_t + \varepsilon_t$$

Equation (6), an expectations-augmented Phillips curve, will be interpreted as a supply curve.

Demand

For simplicity, we let aggregate demand A_t be a government's instrument, which we interpret as fiscal policy. As will become clear, demand management is only used as a transitory instrument so that the model is consistent with a Barro-Ricardo equivalence imposed on government's finances.

The other policy instrument is money m_t. We postulate a much simplified money demand function:

$$(7) \qquad m_t = p_t$$

In other words, the authorities can set directly the inflation rate π_t.

Policy objectives

The government uses its two instruments A_t and π_t to minimize the following loss function:

$$(8) \qquad L = 1/2 \sum_{t=0}^{\infty} \beta^t [\phi_o (A_t - \bar{A})^2 + \phi_1 (Q_t - \bar{Q})^2 + \phi_2 \pi_t^2]$$

where $\beta = 1/(1+r)$ is the time discounting factor. We assume that r is equal to the real US interest rate and applies to all countries given the complete integration of world financial markets.

All variables should be seen as written as deviations from their steady state equilibrium level. The loss function (8) indicates that the authorities favor a zero inflation rate but wish to achieve spending and production levels ($\bar{A}_t > 0$, $\bar{Q}_t > 0$) above their feasible long run levels.

Goods are sold abroad at their domestic price since we assume no transport costs in Europe and transatlantic shipping of goods is undertaken by the US traders. Under this condition, the value in dollars of the country's trade balance is:

$$V_t = (Q_t - A_t)\, e^{-z_t}$$

which is linearized as:

$$V_t = (Q_t - A_t)\, (1 - z_t)$$

Assuming zero initial net debt, the budget constraint is written as:

$$(9) \qquad \sum_{t=0}^{\infty} \beta^t (Q_t - A_t)(1 - z_t) = 0$$

The above equations describe one European country, say France. The other European country, Germany, is assumed to be exactly identical so that the same equations apply, with German variables being starred. In solving for the optimal government program, we look for the time-consistent policy,

i.e. we assume that governments are expected to choose the best policy available each period.[9]

The trade balance externality

When each country optimizes individually, it must make an assumption about the other country's trade balance. In a Nash feedback equilibrium, France, say, assumes that Germany sets A^*_t and M^*_t as a given function of ε_t and ε^*_t. Then, given (6), it expects:

$$(11) \qquad Q^*_t = -(a/b)z_t + f(\varepsilon_t, \varepsilon^*_t)$$

$$(12) \qquad TB^*_t = -(a/b)z_t + g(\varepsilon_t, \varepsilon^*_t)$$

Given (3), this implies that the trade balance constraint perceived by France is:

$$(13) \qquad Q_t - A_t = (a/b + h)z_t - g(\varepsilon_t, \varepsilon^*_t)$$

This is where the externality appears. A European social planner would, instead, optimize, using (3) instead; and, with full symmetry, setting: $TB_t = TB^*_t = (h/2)z_t$. Thus the perceived effect of z_t on TB_t is different.

9. See Cohen (1989) for a similar structure in which the time-inconsistent solution is considered.

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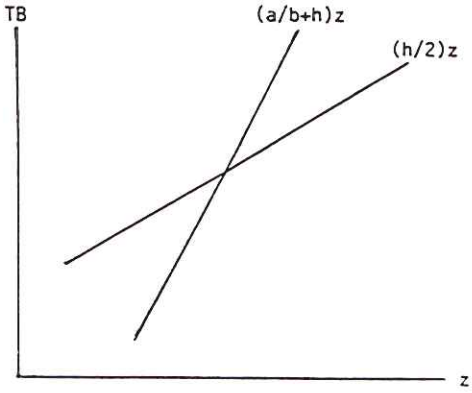

Figure 1

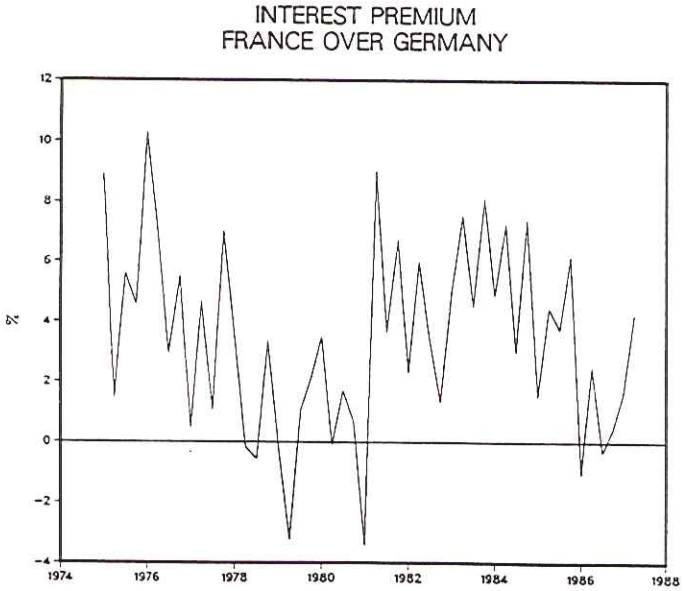

Figure 2

Table 1. Seignorage (% of GDP)

	Tax base (1987)	Seignorage		Steady-state theoretical	
		Actual (1987)	Maximum (Year)	zero inflation	5% inflation
	(1)	(2)	(3)	(4)	(5)
Belgium	8.0	0.2	1.8 (1972)	0.6	1.0
Denmark	3.4	0.5[a]	4.6 (1985)	0.4	0.6
France	6.2	0.4	3.1 (1972)	0.8	1.1
Germany	9.9	0.8	1.8 (1970)	0.5	1.0
Ireland	10.2	0.3	4.3 (1968)	1.6	2.1
Italy	15.2	1.2	6.7 (1975)	3.1	3.9
Netherlands	8.1	0.7	1.2 (1964)	0.3	0.7
Spain	19.8[b]	1.5[b]	11.4 (1983)	2.5	3.5
U.K.	3.5	0.1	2.3 (1973)	0.5	0.7

Source: International Financial Statistics, IMF

Note: a) average 1979-1987; b) 1986

Table 2. Maturity of public debts

	Short term debt (% total debt)	Average maturity (years)
Belgium	21.8	3.6
Denmark	14.5	3.6
Germany	1.8	-
Greece	92.5	-
Spain	60.8	1.5
France	45.3	4.0
Ireland	6.5	4.3 - 8.8
Italy	30.3	3.5
Netherlands	9.1	5.9
Portugal	62.5	-
U.K.	30.3	8.2 - 9.1

Source: Giavazzi and Pagano (1988)
Note: Short term debt is T-Bills and other short term debt, i.e. less than 1 year maturity.

Table 3. Maximum opportunity costs of exchange reserves (% of GDP)

Belgium	Denmark	France	Germany	Ireland	Italy	Netherlands	Spain	UK
0.7	0.6	0.9	0.7	1.3	1.1	1.1	0.6	0.4

Source: International Financial Statistics, IMF

Note: Computed as i.(R/Y) where i is the yield on long term US government bonds, R the foreign exchange reserves of the monetary authorities and Y the GDP.

Table 4. Decomposition in permanent and temporary components: France and Germany (Ratio of standard deviations of temporary component to the standard deviation of the original series in %)

Whole Period: 1965:1-1987:4

Variable :	Real GDP		GDP Deflator		Real wages		Current Account/GDP	
	Sum	Difference	Sum	Difference	Sum	Difference	France	Germany
Standard deviation of original variable	0.252	0.056	0.864	0.271	0.335	0.031	0.234	0.306
Ratio (%) with :								
- linear trend	34.9	43.2	8.2	29.5	31.6	99.0	99.4	94.6
- quadratic trend	19.0	32.6	8.2	15.5	11.1	65.0	93.0	92.2
- stochastic trend	7.5	27.6	1.3	4.1	NA	43.9	71.9	50.6

Source: International Financial Statistics

Data definition: GDP: sum is log of sum of French and German GDPs in constant FF; difference is log of ratio of French over German GDP. Other variables: sum (difference) is sum (difference) of logs of the original variables.

Table 5. Decomposition in permanent and temporary components: US and "Europe" (Ratio of standard deviations of temporary component to the standard deviation of the original series in %). Whole Period: 1965:1-1987:4

Variable :	Real GDP		GDP Deflator		Real wages	
	Sum	Difference	Sum	Difference	Sum	Difference
Standard deviation of original variable	0.203	0.213	1.291	0.438	0.316	0.357
Ratio (%) with :						
- linear trend	33.0	92.9	8.8	8.2	36.9	27.8
- quadratic trend	26.6	70.7	8.8	7.9	14.8	10.4
- stochastic trend	7.0	20.5	1.1	2.4	NA	NA

Source: International Financial Statistics

Note: Data definition: GDP: "Europe" is the sum variable of Table 4, i.e. France and Germany taken together. Given this, the data are defined as for Table 4: GDP: sum is log of sum of US and "European" GDPs in constant US $; difference is log of ratio of US over "Europe" GDP. Other variables: sum (difference) is sum (difference) of logs of the original variables.

Table 6. Vector Auto Regression: Tests of significance of explanatory variables. 1981:3-1987:3

Dependent Variable		EXPLANATORY VARIABLE					
		US	Germany	France	UK	Italy	Netherlands
US	money		0.14	0.49	0.12	0.29	0.79
	int.rate		0.02*	0.35	0.77	0.97	0.15
Germany	money	0.05*		0.03*	0.29	0.08*	0.12
	int.rate	0.02*		0.01*	0.26	0.69	0.17
France	money	0.40	0.55		0.06*	0.26	0.79
	Int.rate	0.00*	0.00*		0.01*	0.06*	0.00*
UK	money	0.77	0.03*	0.28		0.07*	0.06*
	int.rate	0.93	0.95	0.94		0.08*	0.75
Italy	money	0.58	0.03*	0.08*	0.11		0.22
	int.rate	0.50	0.13	0.69	0.67		0.12
Netherlands	money	0.40	0.06*	0.12	0.19	0.86	
	int.rate	0.12	0.09*	0.17	0.44	0.58	

Notes: Entries show the significance level for the corresponding F-statistic. Stars have been added when the level is less than 10% to allow for easier reading.

Table 8. Determinants of the Interest Premium

Dependent Variable: ψ_t

	Constant	ψ_{t-1}	Innovations in differences of			$\bar{R}^2$	DW
			Inflation Rates	Current Accounts	Budget Deficits		
1975:2-1979:1	3.11	0.30	3.48	-2.97	0.15	0.31	2.38
	(2.80)	(1.32)	(2.08)	(-1.59)	(1.32)		
1979:2-1987:2	2.31	0.23	-0.69	0.09	0.11	0.22	1.88
	(3.34)	(1.45)	(-0.72)	(0.21)	(3.33)		

Source: OECD

Note: The interest premium is defined as in (28) and $\hat{e}_{t+1} = \sum_{i=0}^{3} \hat{a}_i e_{t-i} + \sum \hat{b}_j x_{jt}$ where $x_t = \{R_t - R^*_t, CA_t - CA^*_t, BD_t - BD^*_t\}$. The estimates $\hat{a}_i$ and $\hat{b}_j$ are updated each quarter with the regression $e_t = \sum_{i=1}^{4} a_i e_{t-i} + \sum b_j x_{j,t-1} + u_t$. Similarly, the innovations for, e.g. x_{jt} are $\hat{e}_{j,t+1} = x_{j,t+1} - \hat{x}_{j,t+1}$ where $\hat{x}_{j,t+1} = \sum_{i=0}^{3} \hat{a}_i x_{j,t-i} + \sum_{k \neq j} \hat{b}_k x_{k,t}$ where $\hat{a}_i$ and $\hat{b}_k$ are updated each quarter with the regression $x_{j,t} = \sum_{i=1}^{4} a_i x_{j,t-i} + \sum_{k \neq j} b_k x_{k,t-1} + v_i$. The current account and budget deficit figures for Germany are converted in French Francs. The interest rates are the money market 3 months rates.

Table 7. Decomposition of variance

Dependent	Horizon	G	F	I	NL	UK	USA
G	2	87.9	1.5	0.8	0.2	1.1	8.5
	10	59.6	8.0	3.0	3.8	2.8	22.8
F	2	3.4	71.7	0.0	3.7	12.2	9.1
	10	33.7	18.2	0.1	32.7	9.6	4.8
I	2	2.0	5.6	92.0	0.2	0.1	0.1
	10	18.2	11.9	50.5	15.3	2.8	1.2
NL	2	15.0	1.8	1.9	74.1	0.0	7.3
	10	38.6	3.8	3.0	35.7	1.2	17.7
UK	2	0.1	0.5	8.0	17.9	73.5	0.0
	10	5.8	1.7	12.5	22.1	56.4	1.4
USA	2	1.6	10.7	0.9	0.8	0.9	85.0
	10	26.4	10.9	2.9	11.2	6.2	42.4