THE EUROPEAN EXCHANGE RATE MECHANISM AND THE EUROPEAN MONETARY UNION

BY

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1 INTRODUCTION

Since January 1, 1993, the European Union has become a single market in which most of the existing barriers to the free flow of goods, capital and labor have been eliminated, at least formally. As a result economic interdependence between member states has increased. In the Treaty of Maastricht negotiated in 1991 a precise route for the Economic and Monetary Union (EMU) is stipulated leading to the introduction of a common European currency. The blueprint for the Maastricht Treaty was provided in 1990 in the report of the Delors Committee of which the governors of the national central banks were the core members and which was chaired by Jacques Delors. The agreement outlines the institutional structure of a European Central Bank (ECB), designs its objectives of future monetary policy, gives a timetable for the EMU and defines the conditions under which individual countries can be admitted to the EMU.

This article will address two central questions related to likely steps to be taken in the years ahead on the lengthy road to monetary union. These questions are: first, is the current exchange rate mechanism viable in the transition stage to EMU or in the period to come if the EMU should be postponed? (as stipulated in the Maastricht Treaty, the EMU will start at the latest in 1999; at the European summit meeting in Madrid in December 1995, the starting date was fixed at January 1, 1999); second, is a monetary union necessary in an economically fully integrated European Union or would the current or an alternative exchange rate mechanism suffice an integrating Europe?

In order to understand the process of monetary integration, it is worthwhile to look at the arguments for and against monetary union. This is done in section 2. In section 3 we shall briefly review the history of the European Monetary System

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(EMS) and of the Exchange Rate Mechanism (ERM) and the steps to be taken as agreed in the Maastricht Treaty on the way to the EMU. Section 4 is devoted to theoretical insights and empirical findings on the functioning of target zones, in particular the ERM. In section 5, we shall discuss likely developments of and the future prospects for the ERM and the EMU. A final section concludes the paper.

1.1 Costs and Benefits of a Monetary Union

The political and economic rationale for monetary unification has been extensively debated in the scientific literature and in public. Detailed accounts of costs and benefits of a monetary union can be found in Bean (1992), Cohen (1988), de Grauwe (1992) and Eichengreen (1993). We limit ourselves to an overview of the main arguments from economics and of the results of empirical studies.

In the political debate, the EMU is often seen as putting the lid on economic integration. The protagonists argue that the completion and longevity of a large single internal market which is required for Europe to keep up with competition from other economic blocks, is only secured in an economic and monetary union. For antagonists of unification, the advantages of a monetary union do not outweigh the loss of national sovereignty.

In economics two theories have played a central role in the discussion about costs and benefits of a currency union. Since the pioneering contributions of Mundell (1961), McKinnon (1963) and Kenen (1969), the theory of optimum currency areas has dominated the cost-benefit analysis of monetary union.

The costs result from the fact that when a country joins a monetary union, it loses the ability to conduct an independent national monetary policy and to change the price of its currency in terms of foreign currencies. Countries can use exchange rate changes or other instruments of monetary policy to adjust for differences in economic conditions with other countries. For instance, if one country faces a demand shift for its products (a case considered by Mundell (1961)), which does not affect its trade partner (or which affects it in an opposite way), both countries face an adjustment problem. One country will see unemployment increase and its current account deteriorate, the other country will experience an increase in employment and an improvement of its current account. Wage and price flexibility and/or labor mobility could restore the equilibrium in both countries. Alternatively, fiscal policy could be used for this purpose as well. Increasing taxes in the country facing increased demand and transferring the proceeds to the country experiencing an economic trough could bring back equilibrium in the two countries. With flexible or fixed but adjustable exchange rates, the price mechanism on foreign exchange markets will absorb the asymmetric shocks to demand in the two economies. To summarize, to the extent to which wages and prices are flexible, labor is mobile and/or redistribution of fiscal proceeds can be implemented, exchange rate adjustments are not needed to restore equilibrium after an asymmetric shock and the conditions for an optimum currency area are
satisfied. As a corollary of this theory, one could state that when asymmetric shocks are very unlikely to occur (for instance because the economic structure of the countries is similar), labor market rigidities may not be prohibitive to forming an optimum currency area. Finally, asymmetric country-specific shocks resulting from national monetary policy will disappear altogether with the introduction of a common currency.

Empirical studies of the type of shocks affecting the European economies are scarce. Countries with similar industrial structures will be affected in similar ways by sector-specific shocks. Comparative studies of sectorial specialization in Europe and the United States (see e.g. Krugman (1992) and Bini-Smaghi and Vori (1992)) indicate that the degree of sectorial specialization in the U.S. is consistent with a currency union. For France and Germany, Cohen and Wyplosz (1989) find that symmetric shocks are much profounder than asymmetric disturbances. Similar conclusions were reached by Weber (1991) for other European Union countries.

These types of comparative studies may even suffer from a bias. Asymmetric country-specific nominal shocks will disappear with the introduction of a common currency. Moreover, completion of the economic and monetary union may lead to a more similar industrial structure across the European Union (see e.g. Gros and Thygesen (1992)) and therefore increase the likelihood of the occurrence of symmetric shocks. This view has been questioned by the view supported by empirical evidence for the U.S. that the absence of barriers to trade will lead to greater regional specialization and geographical concentration of industry and an increased likelihood for regions to be affected by idiosyncratic shocks (see Krugman (1991a, 1992)). In Europe, such a process of regional concentration has not taken place as yet. Also, it is unlikely that in an integrated Europe industrial concentration would occur within the borders of member countries.

An interesting study in this respect is Bayoumi and Eichengreen (1992) (see also Eichengreen (1993)). They used a structural vector autoregressive model to extract estimates of demand and supply shocks for the countries of the European Community and for the main regions of the U.S. for the period 1962–1988. Next, they computed the correlation of the supply and demand shocks for each country against an anchor region or country (the mid-Atlantic for the U.S. and Germany for Europe). The scatter diagrams plotting correlations for demand shocks against those for supply shocks for the U.S. and Europe, respectively, are very similar.

In each case a set of ‘core’ regions or countries was found. For Europe, France, Denmark and the Benelux were found to have both high demand and supply shock correlations with Germany. For the other members of the European Community the correlation with Germany appeared to be much lower. These findings suggest that for the above group of ‘core’ countries, shocks are predominantly symmetric. Therefore, for these countries the costs involved in relinquishing the exchange rate as a policy instrument might be small. However, if only a group of
core countries joined the monetary union, the positive scale effects of a common currency would not fully materialize.

Van Hagen and Neumann (1994) study the question "Is Europe ready for a common currency?" by comparing the conditional variance given the information available at time \( t \) and the persistence of real exchange rate shocks within the German monetary union and between Germany and eight European countries. By the end of the 1980s, when averaged over the Länder, monthly real exchange rate standard deviations between six German Länder and Austria, Belgium, Luxembourg and the Netherlands are comparable to those between the Länder in the 1970s, but still roughly twice as large as those between the Länder in the late 1980s. For Denmark, Italy and the U.K., the differences were larger. Moreover, when quarterly data were used, the standard deviations were large both within Germany and between the Länder and other countries in the European Community. Similarly, the presence of high first-order autocorrelation in the monthly real exchange rates with respect to the DM for all countries in the 1970s indicates a relatively low degree of economic integration. This pattern changed in the 1980s. In the mid and late 1980s no significant autocorrelation is left in the real exchange rate for the Benelux, Denmark and Italy.

For France and the U.K., the first-order autocorrelation disappears by the end of the 1980s. The authors finally conclude "... the empirical evidence on real exchange rates favors a "Europe of Two Speeds" with Germany, Austria, Belgium, France, Luxembourg, and the Netherlands forming the initial core of the monetary union, and the remaining countries joining after having reached a comparable degree of real exchange rate variability" (p. 244).

The second economic theory bearing on the costs and benefits of a monetary union is based on principles of public finance. Seigniorage is a form of tax that can be imposed to raise the government's revenue. Tax structures differed across Europe, so did tax revenues raised by seigniorage. For instance, the Southern European countries raised seigniorage revenues of the size of approximately 2.25 percentage points of gross domestic product over the period 1982–1985 (0.9% over 1986–1989) whereas for Germany the corresponding figures were .41 and .72 percent, respectively (see Gros and Thygesen, 1992, p. 171). Public finance provides an explanation for the differences of tax structures: tax rates should be set such that the marginal disutilities from raising the last revenues are the same across revenue sources. The implication of this principle is that countries or regions which raise the same inflation tax may form a single currency area.

Both theories stress the costs involved in relinquishing policy instruments which can be used to (at least temporarily) eliminate sizable macroeconomic disequilibria after a serious shock or to spread the distortions which taxes create.

Among the benefits from having a single currency are the increased transparency of the price mechanism in commodity and factor markets and the elimination of currency conversion costs incurred by firms and individuals. Emerson et al. (1991) estimate that these costs average to about 0.4 percent of the gross
domestic product in the European Union (EU). This figure appears to be substantial but is much lower than one would expect on the basis of transaction costs charged to people travelling through Europe. The elimination of transaction costs will reduce the scope for price discrimination and lead to more transparency between national markets.

Another obstacle to intra-European trade is the exchange rate uncertainty implied by national currencies. To a large extent forward foreign exchange markets allow traders to hedge currency risks at reasonable costs. Exchange rate uncertainty may affect intra-community investment more heavily than trade as for long-term projects hedging through the forward market is not always possible. On the other hand, diversifying economic activities by investing in different countries could eliminate, at least partly, exchange rate risk.

Among the benefits for high-inflation countries, one should mention the gain in credibility and the reduction of inflation achieved by joining a monetary union with a stable currency (although the adjustment costs will be far from negligible for these countries). Of course, the ECB will have to build up credibility and a reputation for being tough on inflation. This will take time so that the transition to EMU will be costly, an aspect analyzed by Currie, Levine and Pearlman (1992). This union may also need less foreign reserves to defend its own currency’s value against other currencies such as the U.S. dollar than its members would need when they had to defend their currencies’ value. For instance, in 1990, the members of the European Community held the equivalent of 222.7 billion ECU in international reserves. In the U.S. and Japan, international reserves in that year amounted to the equivalent of 37.4 and 51.6 billion ECU, respectively. In fact, a common currency is a logical implication of economic integration under unrestricted international mobility of financial capital.

In conclusion, the introduction of a common currency will eliminate currency conversion costs and exchange rate risk and increase the transparency of the price mechanism in the single currency area. The benefits from the elimination of transaction costs and exchange rate risk will be the more important the more open countries are to foreign trade and investment (in particular the small countries).

The costs of abandoning the parity realignment as a policy instrument decline with an increasing degree of openness to trade of the country concerned. The benefits of moving towards a common currency are likely to outweigh costs for countries which are open to intra-European trade as has been insightfully illustrated by de Grauwe (1992). Countries with a low trade share, however, may find it advantageous to wait until the balance of benefits and costs becomes favorable towards abandoning their own currency. Gros and Thygesen (1992) take the intra-EC trade expressed as a percentage of GDP of a member country as a measure of the benefits from EMU. In 1990, intra-EC trade exceeded 20% of GDP in Belgium, Ireland, The Netherlands, and Portugal. For the remaining member states, this percentage lay between 10% and 20%. Costs of the EMU are measured by the extent to which the economic structure of a country diverges from
the structure of the European Community. The differences in economic structure affect the likelihood of country-specific shocks which could be absorbed by exchange rate adjustments. Costs are measured as the adjusted correlation coefficient between national values and Community averages of the shares of about thirty branches in total value-added. After subtracting one, this measure is expressed in percentage points. This cost measure ranges from −0.71 for France to −14.01 for Greece.

When using these measures for Belgium and The Netherlands, two open economies, benefits largely exceed costs. France, Germany, Italy, and Spain would also benefit from EMU as their economic structure is similar to that of the EC. For the U.K. and Denmark the net gains from EMU would be small whereas for Greece the balance between benefits and costs is found to be negative. These findings largely confirm the findings by Von Hagen and Neumann (1994) and by Bayoumi and Eichengreen (1992) mentioned above.

Finally, compared to the current situation, the countries which have joined the ERM and thereby have in practice transferred their sovereignty in monetary policy to the German monetary authorities (although they keep the possibility to realign the parity of their currency and even to leave the ERM) will regain the right of co-determination of the course of actions in monetary matters when an ECB is created. As shown by Currie et al. (1992), in the presence of shocks impinging differently on Germany than on the rest of the EMS, the ECB will take better account of the interests of the rest of the EMS than the Bundesbank will.

Recently, using a formal model, Gerlach (1995) calculated the value of the realignment option which is available under a system of adjustable pegged exchange rates but is lost with the introduction of a common currency. Countries in which nominal prices are sticky, shocks in real exchange rates are large, the political costs of realigning are low, and policymakers have low discount rates, are likely to prefer adjustable fixed exchange rates to a single currency. But for an economically integrating Europe as a whole, the costs of frequent parity realignments between member countries are likely to be significant. Without monetary integration, the economic union will probably be deemed to become a free trade zone or even disintegrate, thereby preventing the European economy from strengthening to keep up with international competition.

In conclusion, the theoretical considerations and the empirical evidence presented in this section indicate that on the whole the benefits from European monetary integration outweigh its costs.

2 STEPS TOWARDS EUROPEAN MONETARY INTEGRATION

An extended account of the history of European monetary integration is given in Gros and Thygesen (1992) and in Vanthoor (1996). We shall only briefly discuss the most important milestones on the way to EMU. In October 1970 when the EC had completed the customs union and the Bretton Woods system showed signs
of rupture, a committee under the chairmanship of Pierre Werner (then Prime
Minister of Luxembourg) produced a plan sketching the route to EMU in stages
by 1980. Monetary union was described as the irrevocable fixing of parity rates,
the elimination of fluctuations in exchange rates and the full liberalization of capi-
tal movements. A system of central banks similar to the US Federal Reserve Sys-
tem would conduct internal monetary policy and exchange rate policy vis-à-vis
third currencies. A single currency was not necessarily seen as the ultimate form
of monetary union. The committee saw a system of fixed exchanges rates as a
visible alternative to a common currency.

After the collapse of the Bretton Woods Systems, the so-called 'snake' arrange-
ment was agreed on in March 1972. The arrangement limited bilateral exchange
rate fluctuations for European currencies (the six EC members at that time:
Belgium, France, Germany, Italy, Luxembourg, and The Netherlands and the three
members in waiting: Denmark, Ireland and the U.K.) to ±1.125% fluctuation
margins. Under the impact of the first oil shock, some currencies had to be de-
valued, others were revalued. Countries left the arrangement temporarily or per-
manently.

In 1978, on the initiative of the then French President Giscard d'Estaing and
the German Chancellor Schmidt, the Bremen European summit decided to create
the European Monetary System in March 1979. The system aimed at stabilization
of exchange rates mainly through the Exchange Rate Mechanism. Each currency
has a central rate expressed in terms of the European Currency Unit (ECU), a
basket of currencies of the countries which are members of the EMS. These cen-
tral rates determine a grid of bilateral rates. Each currency is allowed to fluctuate
within ±2.25% margins (±6% for the Italian lira until 1990) around these cen-
tral rates called parities. The countries participating in the ERM are obliged to
intervene in the foreign exchange markets if a bilateral rate hits the boundary of
the band. Special credit facilities were created to be used for these interventions.
Adjustment or realignment of the parities is possible provided all members in the
ERM agree. Participation in the ERM comprised eight of the nine members of
the EC. The U.K. decided to stay outside. When Greece joined the EC in
1981, it decided to stay outside the ERM as well. Italy used the option of the 6
percent margins. As there was a lack of policy coordination between countries,
tensions arose. In particular in the period 1981–1983 several realignments of the
central parities had to be decided upon.

In the second phase after March 1993, it was agreed that more emphasis should
be laid on policy coordination. Germany, the country with the lowest inflation
rate and interest rates provided a monetary anchor for the EMS. The other coun-
tries pegged their currencies to the D-Mark and followed economic policies re-
quired to establish exchange rate stability and reach credibility of the monetary
policy. As a result of growing economic convergence, the frequency and size of
realignments declined.

The system was further strengthened in September 1987 by the Basle-Nyborg
agreement which extended the credit facilities to include intramarginal interventions. Also, it was agreed to use interest rate differentials more extensively to defend the parities and to use the fluctuation bands more fully. Besides a technical devaluation of the Italian lira in January 1990 which accompanied the narrowing of its fluctuation band to ±2.25%, no realignment took place until September 1992. The Spanish peseta joined the ERM with ±6% fluctuation margins in June 1989, the British pound in October 1990 and the Portuguese escudo in April 1992.

In the relatively stable period, political initiatives to relaunch the EMU were taken. In April 1989, the Delors Committee submitted its report to the European Council of Ministers of Finance. The Committee proposed to achieve monetary union in three stages in less than a decade, emphasized independence of the future European Central Bank and the need for fiscal harmonization. The priority of the ECB should be price stability. Fiscal discipline should be achieved by imposing upper limits on budget deficits of individual member countries.

Most of the recommendations of the Delors Committee formed the basis for the Maastricht Treaty on the EMU in December 1991. The treaty goes beyond the proposals of the Delors Committee by giving a specific timetable for achieving the EMU. The treaty also defines the criteria which member countries have to satisfy in order to join the monetary union. These criteria are: (1) the average rate of the consumer price index inflation over the 12 months preceding the start of EMU must not exceed the inflation rates of the three lowest inflation member countries by more than 1½ percentage points; (2) qualifying countries must have maintained their exchange rates within the normal EMS fluctuation bands for two years prior to joining the monetary union; (3) long-term interest rates over the preceding year must have been no more than two percentage points above those of the three best performing member countries in terms of inflation; (4) budget deficits should be no larger than three percent of GDP; (5) gross public debt should not be larger than 60 percent of GDP.

The time schedule for the monetary union agreed upon in the Maastricht Treaty is as follows. In stage I towards EMU, which started in July 1990, capital controls were removed in Europe and the independence of national central banks was strengthened. The aim of a reduction of inflation and interest rate differentials was only partly achieved. Stage II started in January 1994 with the creation of the European Monetary Institute (EMI). It coordinates member country monetary policy and prepares the creation of the European Central Bank. During this stage and no later than December 31, 1996, the Council of Ministers assesses whether a majority of the member states meets the criteria for monetary union and decides by qualified majority whether to set a date for the start of stage III in which the ECB is established and the responsibility of monetary policy is transferred to the independent ECB. If by the end of 1997 no date has been set, stage III will start on January 1, 1999. Stage III may proceed with the participation of a minority of the member countries. With the start of stage III, exchange rates
will be irrevocably fixed and the ECB will succeed the EMI. The ECB will assume control of the monetary policies of the participating countries. The Council of Ministers will decide when to introduce the single European currency. The Council may decide to do so at the start of stage III. Otherwise, the ECB will instruct the national central banks to convert their national currencies into one another at par until they are replaced by the single European currency.

With the rejection of the Maastricht Treaty in the Danish referendum in June 1992, the optimism about the functioning of the ERM started to erode and tensions built up. The Italian lira devalued by 7 percent on September 8. Tensions reached a peak just before the French referendum on September 20, 1992. With the exception of the D-Mark and the Dutch guilder, all ERM currencies came under pressure. The Italian lira and the British pound had to leave the ERM due to strong speculative attacks. The Spanish peseta, the Portuguese escudo and the Irish pound had to devalue. On August 2, 1993 the speculative pressures led to an enlargement of the fluctuation bands to ±15% for the rates in the ERM with the exception of the guilder-D-Mark rate. On January 9, 1995, the Austrian schilling joined the ERM in which since then ten member countries of the EU participate with the exception of Finland, Greece, Italy, Sweden, and the UK. In March 1995, the peseta and escudo had to devalue again.

These turbulences can be at least partly explained by the fact that currencies like the lira, the peseta and the escudo had undergone a strong real appreciation due to persistently higher inflation rates than those in the other countries in the ERM over a number of years. The British pound was probably misaligned due to the high rate at which it had entered the ERM. The German unification in July 1990 had led to an increase in the German inflation rate followed by a rise in interest rates in Germany and elsewhere in Europe in a period when some European countries were in favor of lower interest rates to fight rising unemployment (see also Svensson (1994) for a review of the explanations of these calamities in the EMS).

The enlargement of the fluctuation margins to ±15% has been remarkably effective in fighting speculative pressures and restoring stability of the system. Fluctuations of the currencies in the system hardly exceeded the smaller ±2.25% bands and the Italian lira might again join the ERM soon.

In May 1995, the European Commission presented its Greenbook on the introduction of the EMU in three steps. Once the decision on the start of the EMU and on which countries will participate has been taken, the ECB will be set up and begin with printing banknotes. This first step will last one year at most. In a second stage, exchange rates will be irrevocably fixed and the instruments for a common monetary policy will be installed. Transactions between financial institutions will switch to the common currency and government bonds will be issued in this currency as well. This measure should lead to a critical mass of monetary transactions to be conducted in the new currency. At most three years later, the common currency will be introduced and will replace national currencies.
At the European summit meeting in Madrid in December 1995, it was decided that stage III should start on January 1, 1999. In early 1998, on the basis of economic data for 1997 the Council of Ministers will assess which countries meet the convergence criteria and are allowed to join the EMU as of January 1, 1999. Also, it was decided that the name of the common currency will be 'Euro.' After a period of three years in which the new currency will be used for interbank transaction, in 2002 the common currency will progressively replace existing currencies of EMU members.

3 THE FUNCTIONING OF TARGET ZONES: THE CASE OF THE ERM

The introduction of exchange rate target zones such as the ERM has been paralleled by research into the functioning of currency bands compared to fixed and flexible exchange rate regimes. Surprisingly, the normative question of the optimality of exchange rate bands has hardly been the subject of investigation. A detailed overview can be found among others in Svensson (1992a) (see also Krugman and Miller (1992) for a critical evaluation). The theoretical research and part of the empirical research on target zones mainly focus on the influence of a known policy intervention on exchange rate expectations. Much of this literature is based on the seminal article by Krugman (1991b) which establishes an S-shape relationship between economic fundamentals and the exchange rate between two currencies. The model assumes that the fundamentals incorporate economic variables that might influence exchange rates such as the domestic and foreign money supplies, output, prices and interest rate levels, and an unobservable stochastic component which follows a Brownian motion (i.e., a normally distributed random walk process in continuous time). Economic policy variables such as the money supply are controlled by the monetary authorities with the aim to accommodate the requirements of the exchange rate system. It is assumed that the stochastic process driving the model and the way in which regulation occurs are fully known to the market and credible.

In Krugman’s (1991b) model, monetary authorities only intervene at the margins in such a way that the exchange rate is kept within the band which is fully credible.

The S-shape relation between the exchange rate and the economic fundamentals results from the forward-looking behavior of rational agents. The expected effect of a policy intervention at the margin drives the exchange rate away from these margins. The implied unconditional distribution of the exchange rate has a U-shape.

The Krugman model has been extended by Lindberg and Söderlin (1991) who allow for intra-marginal policy interventions implying an unconditional bell-shaped distribution. Bertola and Caballero (1992) extend the model by allowing for realignments of the central parity. The public is assumed to know the probability that the monetary authorities support the currency if the margin is reached.
Within the bands, the probability of a realignment is zero. Under these conditions, depending on the value of the probability of a realignment, the relationship between the exchange rate and the fundamentals can be opposite to that in the Krugman model (inverted S-shape). These target zone models rely on the assumption of no arbitrage opportunities and a known policy reaction function. Their empirical support has been weak (see e.g. Flood, Rose and Mathieson (1991), Beetsma (1993), De Jong (1993)).

To dispense with the full credibility of the band, Bertola and Svensson (1993) introduce a stochastic devaluation risk generated by a Brownian motion. The implied relationship between the exchange rate and the fundamentals within the band resembles that in fully credible target zone models. The assumption made about the devaluation risk is found to be inappropriate in several empirical studies. For instance, Rose and Svensson (1991) and Svensson (1993) used this framework to estimate the realignment risk for the EMS. Rates of realignment are usually found to be more volatile than implied by the Brownian motion. Also, the expected depreciation within the band is likely to be influenced by the probability of a realignment. The assumption of publicly known reactions of monetary authorities to changes in economic fundamentals is hardly tenable and the relationship between exchange rates and intervention variables are more complex than suggested by most target zone models.

The bands of the target zone limit the fluctuations of the exchange rate. If parities are realigned however, large depreciations can occur, especially if the bands before and after the parity adjustment do not overlap or if a realignment is not expected by the market. Sometimes, sudden depreciations occur within the bands. They are possibly due to the anticipation of an upcoming realignment. These large fluctuations can be modeled as stochastic jumps (see e.g. Vlaar and Palm (1993a), Nieuwland, Verschoor and Wolff (1991)). According to Vlaar and Palm (1993a), over the period from April 4, 1979 to March 27, 1991, weekly D-Mark rates of the Belgian franc, the Dutch guilder, the French franc, the Danish krone, the Irish pound and the Italian lira can be modeled by the following equation:

\[ s_t - s_{t-1} = \mu + \lambda \theta + \epsilon_t - \psi \epsilon_{t-1}, \]  

(1)

where \( s_t \) denotes the exchange rate, greek letters denote constant parameters and \( \epsilon_t \) is a serially uncorrelated disturbance term which has a Bernoulli-normal mixture distribution

\[ \epsilon_t \sim (1-\lambda)N(\lambda \theta, \sigma^2) + \lambda N((1-\lambda)\theta, \sigma^2 + \delta^2) \]  

(2)

and the conditional variance \( \sigma^2_t \) follows a first-order autoregressive conditional heteroskedastic (GARCH) process

\[ \sigma^2_t = \alpha_0 + \alpha_1 \epsilon^2_{t-1} + \beta_1 \sigma^2_{t-1}. \]  

(3)
The moving average term $-\psi s_{t-1}$ in equation (1) accounts for mean-reversion due to the existence of the bands. With $\psi > 0$, a positive shock $\epsilon_t$ to the exchange rate will have a negative impact one period later.

At each period, the Bernoulli process allows for the occurrence of a jump with probability $\lambda$. With probability $1 - \lambda$, no jump occurs. A jump, when it occurs is an additional shock with a mean $\theta$ and a variance $\delta^2$ to the exchange rate. For instance, a parity realignment at time $t$, which comes as a surprise to the foreign exchange markets is an example of a jump. The GARCH-component $\sigma^2_t$ accounts for time variation of volatility in the sense that a large disturbance $\epsilon_{t-1}$ will lead to an increase of the conditional variance in period $t$ ($\alpha_1 \geq 0$, $\beta_1 \geq 0$).

An implication of the above model is that conditionally on the occurrence of a jump, the expected change of the exchange rate equals $\mu + \lambda \theta - \psi s_{t-1}$ and its variance is $\sigma^2_t + \delta^2$ whereas conditionally on no jump, the expected change of $s_t$ is $\mu - \psi s_{t-1}$ and its variance equals $\sigma^2_t$. As expected on a priori grounds, for the series analyzed by Vlaar and Palm (1993a), the parameters $\lambda$, $\theta$ and $\psi$ are significantly positive. The GARCH and jump process parameters are significant in most instances. The finding of mean-reversion (negative first-order autocorrelation due to $\psi > 0$) is due to the existence of bands. It is at variance with empirical results for free-float currencies which usually do not exhibit significant autocorrelation.

Vlaar (1994) endogenizes the probability of a jump $\lambda$ by assuming that it depends on the country's inflation differential and trade balance surplus with Germany. He refines the mean-reversion mechanism by assuming that the change in the exchange rate in (1) also depends on the deviation in the previous period of the exchange rate from the parity and by allowing the first-order moving average term $\psi s_{t-1}$ to affect $s_t$ only in periods when no realignment occurred at time $t-1$. His results show that jump probabilities depend significantly on at least one of the explanatory variables, that they are highly variable over the entire sample period and exhibit a decline since the mid-eighties, but remain of importance for most EMS currencies through to September 1992. This last finding is clearly evidence in favor of the existence of jump risks even in the period 1987-1991 in which no parity adjustment took place. It is also in line with the finding by Koedijk, Stork and De Vries (1993) that the credibility of the EMS was low up to 1987, and increased since then except for Italy and Denmark. This conclusion is at variance with the finding by Rose and Svensson (1994) that there were few indications of poor ERM credibility before late August 1992.

In line with the result by Vlaar (1994), Vlaar and Palm (1993b) find that weekly excess returns measured as the interest rate differential with respect to Germany minus the exchange rate change for the Belgian franc, the Dutch guilder, the French franc and the Italian lira depend on volatility measured by the conditional standard deviation of excess returns and on the perceived risk of a realignment. The latter is measured by the jump probability assumed to depend on inflation differentials with Germany.
Estimates of the risk premium (i.e. the expected excess return) show that premia are substantial and highly volatile reflecting the changing uncertainty present in the EMS. These results are at variance with those of Svensson (1992b) and Beetsma (1992), who find that the foreign exchange risk premium for an imperfectly credible exchange rate band with devaluation risk is of moderate or of small and constant size, respectively. The existence of high excess returns in the EMS does not necessarily mean that the market was inefficient. It can to a large extent be explained in terms of uncertainty about future levels of exchange rates. The uncertainty is partly related to the size of the inflation differential with Germany, a finding in line with Svensson's (1994) conclusion that fixed (e.g. EMS) exchange rates may be a complement to monetary stability and credibility at home, although they are certainly not a substitute.

To conclude, the behavior of exchange rates in the ERM is not found to be in line with that predicted by the theoretical target zone models. Despite the calm and almost absent realignments in the period 1987–1991, the parities in the EMS had not become fully credible. In fact, the empirical analysis indicates that the turbulences in the EMS experienced from 1992 on could have been predicted using inflation differentials and trade balance deficits between Germany and other EMS countries. The credibility of parities could only have been reached if monetary and economic policies had been sufficiently coordinated.

4 THE TRANSITION TO MONETARY UNION

As decided at the Madrid summit meeting in December 1995, stage III of the monetary union should start on January 1, 1999. In early 1998, the Council of Ministers, consisting of the ministers of economic affairs of finance, will assess which EU countries satisfied the conditions for monetary union in 1997 as detailed in the Maastricht Treaty. Currently, economic convergence as required by the Maastricht Treaty is far from being achieved. Table 1 shows the convergence indicators for 1994 mentioned in the Maastricht Treaty. As mentioned in section 3, in addition to the four criteria shown in Table 1, the currency must have been held within the narrow band of the ERM for two years without a realignment at the initiative of the member state in question. With respect to the sustainability of the financial position, which is defined as a general government deficit no greater than three percent of GDP and a public debt-GDP ratio of no more than sixty percent, the Treaty requires a substantial and continuous decline of fiscal deficits toward the reference value, and the debt-GDP ratio must be approaching the benchmark of 60 percent at a satisfactory pace. As it appears from Table 1, only Germany and Luxembourg satisfied all criteria in 1994. France and the UK fulfilled the criteria except for the government deficit while Ireland has too high a debt-GDP ratio. Most countries are confronted with problems in fulfilling the conditions on public finances. In fact, in 1994 at the request of the Council, 11 of the then 12 member states of the EU submitted a program of policy measures
aimed at pursuing convergence in terms of the Maastricht criteria until 1996. Some countries were requested to amend their proposals. Compliance with the conditions imposed is supervised by the Council which publishes its recommendations to individual countries. The Council may also decide to apply measures (e.g. impose fines, require countries to make a non-interest bearing deposit with the Community) against a member state which fails to avoid excessive government deficits.

From the evidence given in Table 1, it seems to be unlikely that all members of the European Union will, in early 1998, fulfill the preconditions for the start of the monetary union. Moreover, the group of countries which is expected to satisfy the Maastricht criteria is likely to be different from the group of countries which, because of similar economic structures, would form an optimum currency area.

The risks of the Maastricht strategy are discussed by de Grauwe (1995). Not only does this strategy in his view embody the risk of leading to prolonged exclusion of EU members which do not satisfy the convergence criteria. The start could also be accompanied by political conflicts about membership creating turbulence in foreign exchange markets. De Grauwe (1995) advocates an alternative strategy based on the principles that the convergence criteria are dropped and that all other provisions of the Maastricht Treaty remain in force. All EU members qualify to join the EMU and decide themselves when to surrender their monetary sovereignty to that of an independent ECB. The ECB issues the single common currency. It is politically independent. Its objective is to assure monetary stability and it is not allowed to finance government deficits.

The proposal has some advantages. It avoids political conflicts about the membership question. It may create better incentives for Germany to join the EMU provided that the latter is actually turned into a low inflation union. Currently, because of its dominant position in the EMS, Germany has few economic incentives to get the EMU off the ground, besides the political motive repeatedly mentioned by the German Chancellor Helmut Kohl of truly incorporating Germany in Western Europe.

The proposal has several drawbacks which undermine the viability of the EMU. Germany will not allow that the convergence criteria are dropped. Countries with a weaker currency and large government budget problems may have an incentive to join the monetary union in the expectation that in the future the union may be put under pressure to help them resolve their budgetary problems, for instance by purchasing the debts of the lax countries with inflationary consequences for the union. This would then lead to large transfer payments among member countries. Finally, if countries are free to decide under which conditions they join the union, they may join at an exchange rate at which their currency is undervalued with respect to the common currency, thereby leading to competitive advantages of the joining country.

Under the current circumstances, the most likely scenario is that by 1999 a
TABLE 1 - EUROPEAN COUNTRIES CONVERGENCE CRITERIA FOR 1994

<table>
<thead>
<tr>
<th></th>
<th>Consumer Price Inflation</th>
<th>Government Deficit in % of GDP</th>
<th>Gross Government Debt in % of GDP</th>
<th>Long-Term Interest Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>3.0</td>
<td>-4.4</td>
<td>65.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Belgium</td>
<td>2.4</td>
<td>-5.5</td>
<td>140.1</td>
<td>7.7</td>
</tr>
<tr>
<td>Denmark</td>
<td>2.0</td>
<td>-4.3</td>
<td>78.0</td>
<td>7.8</td>
</tr>
<tr>
<td>Finland</td>
<td>1.1</td>
<td>-4.7</td>
<td>70.0</td>
<td>9.1</td>
</tr>
<tr>
<td>France</td>
<td>1.6</td>
<td>-5.6</td>
<td>50.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Germany</td>
<td>3.0</td>
<td>-2.9</td>
<td>51.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Greece</td>
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<td>-14.1</td>
<td>121.3</td>
<td>20.8</td>
</tr>
<tr>
<td>Ireland</td>
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<td>-2.4</td>
<td>89.0</td>
<td>7.9</td>
</tr>
<tr>
<td>Italy</td>
<td>3.9</td>
<td>-9.6</td>
<td>123.7</td>
<td>10.6</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>2.1</td>
<td>1.3</td>
<td>9.2</td>
<td>6.4</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2.7</td>
<td>-3.8</td>
<td>78.8</td>
<td>6.9</td>
</tr>
<tr>
<td>Portugal</td>
<td>5.2</td>
<td>-6.2</td>
<td>70.4</td>
<td>10.4</td>
</tr>
<tr>
<td>Spain</td>
<td>4.7</td>
<td>-7.0</td>
<td>63.5</td>
<td>10.0</td>
</tr>
<tr>
<td>Sweden</td>
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<td>-11.7</td>
<td>81.0</td>
<td>9.5</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2.4</td>
<td>-6.3</td>
<td>50.4</td>
<td>8.1</td>
</tr>
<tr>
<td>Maastricht Convergence Criteria 94</td>
<td>3.1</td>
<td>3.0</td>
<td>60.0</td>
<td>9.8</td>
</tr>
</tbody>
</table>

Source: European Monetary Institute, Annual Report.

group of EU members which satisfies the Maastricht criteria or comes close to satisfying them will start with EMU by irrevocably fixing their exchange rates, surrendering their sovereignty to the ECB and in a later stage replacing their currencies by a single currency. This group is expected to consist of the countries which have strong economic or political incentives to be a member of an inflation-proof monetary union. The set of 'core' countries mentioned in section 2 is likely to be among the founding members of the monetary union.

For those countries which do not yet qualify for membership or which do not yet want to join the EMU (possibly the U.K.) an exchange rate arrangement with the EMU will be desirable for at least three reasons. First, such an arrangement will reduce uncertainty where possible and avoid unnecessary turbulences in foreign exchange markets for the currencies of the nonjoining countries. Second, it may be required to avoid competitive devaluations of the nonjoining currencies. Such competitive devaluations could be a direct threat to the well-functioning of the single market and be a source of continuing tensions within the EU. Examples of such tensions are the recent German and French complaints about an undervalued Italian lira. In fact, as pointed out by De Jong (1995) with the wid-
ening of the fluctuation band to ±15 percent, the need for interventions in exchange markets and thereby the incentive of countries which do not qualify for EMU to pursue a convergence policy have been reduced. These countries might be tempted to adopt a strategy of competitive devaluations which could threaten the stability of the economy of the EU. Third, the member states of the EMU will have to coordinate their budgetary policies and put in practice recommendations of the Council of Ministers of Economics and Finance or otherwise face sanctions as stipulated in the Maastricht Treaty on European Union (1992). The sanctions may consist of one or more of the following measures: 'to require that the Member State concerned shall publish additional information, to be specified by the Council, before issuing bonds and securities; to invite the European Investment Bank to reconsider its lending policy towards the Member State concerned; to require that the Member State concerned makes a non-interest-bearing deposit of an appropriate size with the Community until the excessive deficit has, in the view of the Council, been corrected; to impose fines of an appropriate size' (see Treaty on the European Union, Title VI, chapter 1, article 104C, paragraph 9). By derogation (article 109K, paragraph 3) these measures cannot be taken against the countries which have not (yet) qualified to join the EMU. De Jong (1995) proposes to submit the budgetary policy of the nonmembers of the EMU to similar recommendations and sanctions of the Council whenever the exchange rates of the nonmembers deviate too much from a fixed parity relative to the EMU currency.

As discussed in Eichengreen (1993) one can imagine three alternatives to EMU, should it be postponed. One is the continuation of the EMS whose viability was undermined by the abolition of capital controls under the Single European Act and was restored by the widening of the fluctuation bands to ±15 percent margins for most of the currencies which continued to participate in the ERM. With a capital-control free single market, tensions are bound to arise periodically and realignments may be unavoidable if national monetary policies are not coordinated. Reintroducing capital controls would not be in agreement with the objective of a free single market. To reestablish a stable EMS with smaller margins, economic growth, economic convergence and credibility of monetary policy are required (in French, these conditions are called the three c's: croissance, convergence et crédibilité; see Duisenberg (1993)). But as was forcefully argued by de Graauwe (1993) and by Knot and De Haan (1994), returning to smaller bands could have an adverse effect on the stability of exchange rates.

A second alternative to EMU is floating exchange rates which are incompatible with economic integration to the extent that the greater integration is the larger and more onerous the allocative consequences of big exchange rate changes are. Finally, a third alternative to full monetary integration are firmly fixed exchange rates between existing national currencies. The pegged exchange rates will not be perfectly credible because they allow for an escape at much lower costs than those of leaving a monetary union with a single central bank and a single
common currency. Pegged exchange rates offer at most an imperfect substitute for monetary unification.

In Eichengreen's (1993) view, the Single European Act internal logic required the removal of capital controls undermining the viability of the EMS with narrow fluctuations bands and leaving a choice between greater exchange rate flexibility and monetary unification. Exchange rate fluctuations are obstructive to the common agricultural policy and competitive devaluations may lead to resistance to factor and product market integration. In this sense, monetary unification is the logical follow-up of economic integration.

5 CONCLUDING REMARKS

In this article we have first discussed the costs and benefits of establishing the EMU. Our conclusion was that for the EU as a whole, the monetary union has the advantage of fostering economic integration, thereby strengthening the position of the European economy in international competition. Also, for the EU members with the most open and similarly structured economies, the benefits will outweigh the costs and there remain no convincing economic objections to the EMU. Several empirical studies find that a group of core countries satisfy the conditions for an optimum currency area. On economic grounds, these countries which include Austria, the Benelux countries, France, Germany and possibly Denmark, could quickly start with a monetary union.

Some of the core countries do not or by early 1998 will not satisfy the Maastricht preconditions on economic convergence. Because of the resistance of the strong currency countries, the convergence criteria are not likely to be relaxed or abandoned. It is likely that the decision on the start of stage III will be accompanied with political conflicts and turbulences on exchange markets possibly leading to postponement of EMU.

As the experience with the ERM has shown, stable exchange rates result when monetary policies are coordinated and converging. With freely moving capital, the degrees of freedom for national monetary policies are extremely limited under narrow fluctuation bands. Larger fluctuation margins assure more stability but bear the danger of competitive devaluations which disturb resource allocations on product and factor markets.

In the long run, there will be no viable stable option but the EMU if economic and political integration of Europe is pursued. As historical experience shows monetary unions were successful when preceded by political unification. Because the EMU is expected to be inaugurated before the political union is completed, measures of policy coordination have to be taken within the EU. With the start of a monetary union among core countries, an exchange rate arrangement between the monetary union and the nonmember states will have to be made. Coordination of budgetary policies of members of the monetary union and of nonmembers will be imperative. Coordination is unavoidable as countries have dif-
ferent preferences on economic policy issues such as employment and price stability and fiscal policy is to a large extent at the discretion of national governments.

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**Summary**

**THE EUROPEAN EXCHANGE RATE MECHANISM AND THE EUROPEAN MONETARY UNION**

This article addresses two central questions related to the prospects of the Economic and Monetary Union (EMU) in Europe: first, is the current exchange rate mechanism viable in the transition stage to EMU or in the period to come if the EMU should be postponed? Second, is a monetary union necessary in an economically fully integrated European Union or would the current or an alternative exchange rate mechanism suffice an integrating Europe? The article reviews the arguments for and against monetary union, the history of European monetary integration, the theoretical and empirical insights into the functioning of targets zones, and the likely developments and prospects for the EMU.