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The EMU and the
Theory of
Optimum Currency Areas

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Abbreviations

- **ECB :**   **European Central Bank**
- **ECOFIN:**   **Council of Economic and Finance Ministers**
- **ECU :**   **European Currency Unit**
- **EMI :**   **European Monetary Institute**
- **EMS:**   **European Monetary System**
- **EMU:**   **European Monetary Union**
- **ERM :**   **European Exchange Rate Mechanism**
- **ERM 2**   **European Exchange Rate Mechanism Two**
- **ESCB:**   **European System of Central Banks**
- **EU :**   **European Union**
- **GDP :**   **Gross Domestic Product**
- **NCB :**   **National Cetral Banks**

The EMU and the Theory of Optimum Currency Areas

A monetary union like the EMU is in economic terms a fixed exchange rate system. But unlike most monetary unions such as that of the United States, the EURO area will not have a central political and fiscal authority. There is a budget for the EU as a whole, but it is relatively small. Spending amounts to only a little over one percent of GDP, devoted mostly to the common agricultural policy and the structural funds, and deficit financing is prohibited. As the EU is not likely in the foreseeable future to evolve into a federation, the EU budget can be expected to remain relatively small, and there is little reason to expect it to become a significant instrument of macroeconomic policy. Therefore, budgetary decisions in the EURO area will remain almost exclusively the task of the individual member states.

This raises the problem that in the face of so - called asymmetric shocks - i.e. a decline in aggregate output in some but not in all EU-countries - fiscal policy would not be able to regulate the economies. Exchange rate policy is also not possible, because of the monetary union. That means, the EMU has its price; the price of abolishing the exchange rate mechanism without establishing a uniform fiscal policy within the monetary union. Whether the benefits of the monetary union exceed these costs is a matter of a cost-benefit-analysis. Economic theory contains such a cost-benefit-analysis for monetary union, namely the so called THEORY OF OPTIMUM CURRENCY AREAS.

In the following I would like to discuss two points: First, I will explain a model to illustrate the theory of optimum currency areas.[1] Secondly, I will investigate the question, whether the EMU is an optimum currency area.[2] The second question is, of course, a highly empirical one.[*]

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[1] See Krugmann/Obstfield (1994), Chap. 21
[2] See International Monetary Fund (1997)
[*] Der vorliegende Text ist eine von zwei Vorlesungen, die ich Ende Oktober an der Universidad San Pablo in Madrid halten werde. Inhaltlich fußt der Text im wesentlichen auf den Arbeiten des International Monetary Fund (1997) sowie von Krugmann und Obstfield (1994). Ich danke Herrn Banks für die Verbesserung meines mäßigen Englischs und Herrn Lißner für die technische Verarbeitung. Verbleibende sprachliche und inhaltliche Mängel fallen selbstverständlich in meine Verantwortung.

I. The Theory of Optimum Currency Areas: A Model

There is little doubt that the EMU has helped advance political goals. The survival and future development of the EMU depend more heavily, however, on its ability to help countries reach economic goals. Here the picture is less clear because a country's decision to fix its exchange rate can in principle lead to economic benefits as well as to costs.

It is well known that by changing its exchange rate, a country may succeed in cushioning the disruptive impact of various economic shocks. On the other hand, exchange rate flexibility can have potentially harmful effects, such as making relative prices less predictable or undermining the government's resolve to keep inflation in check. To weigh the economic costs of joining a group of countries with mutually fixed exchange rates against the advantages, a framework for thinking is the theory of optimum currency areas. As we shall see, a country's costs and benefits from joining a fixed exchange rate area such as the EMU depend on how well-integrated its economy is with those of its potential partners. The analysis predicts that fixed exchange rates are most appropriate for areas closely integrated through international trade and factor movements.

I.1 The BB Schedule[3]

Consider how an individual country, for example, Spain, might approach the decision of whether to join an area of fixed exchange rates like the EMU. Our goal is to develop a simple diagram that clarifies Spain's choice.

A major economic benefit of fixed exchange rates is that they simplify economic calculations and provide a more predictable basis than floating rates for decisions that involve international transactions. Imagine, for example, the time and resources American consumers and the business world would waste every day if each of the 50 United States had its own currency that fluctuated in value against the currencies of all the other states! Spain faces a similar disadvantage in its trade with the EMU when it

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[3] BB stands for the monetary efficiency benefit of a common currency.

allows its currency, the Peseta, to float against EMU currencies. The monetary efficiency gain from joining the fixed exchange rate system is equal to the members savings by avoiding the uncertainty and confusion as well as the calculation and transaction costs that arise when exchange rates float.

In practice, it may be hard to attach a precise figure to the total monetary efficiency gain which Spain or any other country of the EMU would achieve as a result of joining the EMU. We can be sure, however, that this gain will be higher if Spain trades a lot with EMU countries. For example, if Spain's trade with EMU amounts to 60 percent of its GDP while its trade with the United States amounts to only 5 percent of GDP, then, other things being equal, a fixed Peseta/Euro exchange rate clearly yields a greater monetary efficiency gain for Spanish traders than a fixed Peseta/Dollar rate. Similarly, the efficiency gain from a fixed Peseta/Euro rate is greater when Spain's EMU trade is extensive than when it is small.

The monetary efficiency gain from pegging the Peseta to EMU currencies will also be higher if factors of production can migrate freely between Spain and the EMU: Spaniards who invest in EMU countries benefit when the returns on their investments are more predictable. Similarly, Spaniards who work in EMU countries may benefit if a fixed exchange rate makes their wages more stable in relation to Spain's cost of living.

Our conclusion is that a high degree of economic integration between a country and a monetary union magnifies the monetary efficiency gain the country reaps when it fixes its exchange rate against the area's currencies. The more extensive the cross-border trade and factor movements, the greater the gain from a fixed cross-border exchange rate!

The following figure demonstrates this conclusion. It shows, that the BB curve combines the relation between a country's degree of economic integration with a fixed exchange rate area and the monetary efficiency benefit to the country from joining the area. The figure's horizontal axis measures the extent to which Spain is economically integrated into EMU product and factor markets. The vertical axis measures the monetary efficiency benefit to Spain by joining the EMU. BB's positive slope reflects

the conclusion that the monetary efficiency gain a country gets by joining a fixed exchange rate area rises as its economic integration with the area increases.
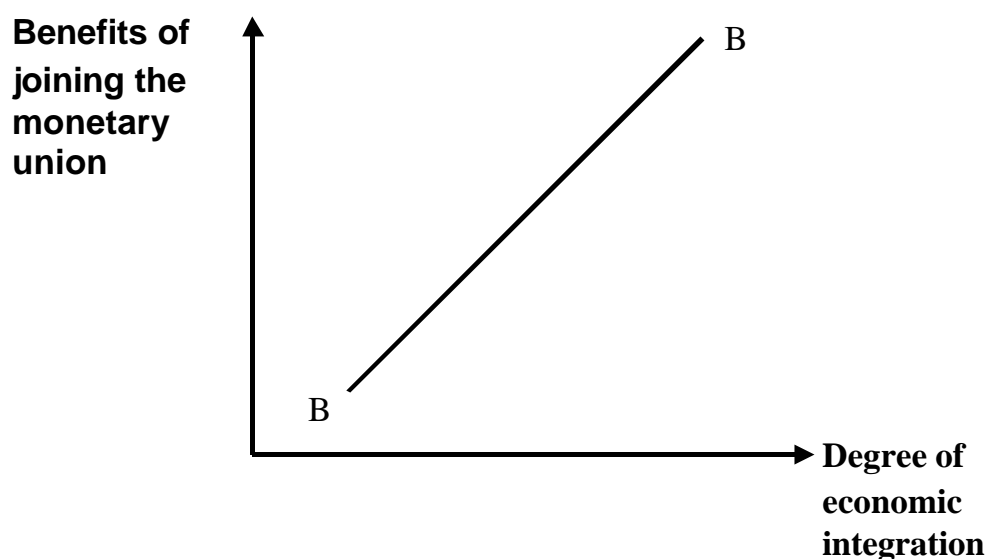
Fig. I: The BB-Schdule

In our example we have implicitly assumed that the EMU has a stable and predictable price level. If it does not, the greater variability in Spain's price level that would follow a decision to join the exchange rate area would be likely to offset any monetary efficiency gain a fixed exchange rate might provide. A different problem arises if Spain's commitment to fix the Peseta's exchange rate has not got the complete support of the economic actors. In this situation, some exchange rate uncertainty would remain and Spain would therefore enjoy a smaller monetary efficiency gain. If the EMU price level is stable and Spain's exchange rate commitment is firm, however, we can summarise our discussion about the BB-schedule as follows:

Spain would benefit from the EMU, and this efficiency gain would be greater the more closely Spain's markets were linked to the EU markets

I.2 The CC Schedule[4]

Membership in an exchange rate area may involve costs as well as benefits. These costs arise because a country that joins an exchange rate area gives up its ability to use the exchange rate mechanism and monetary policy for the purpose of stabilizing output and employment. These costs of joining, like the country's monetary efficiency benefit, are related to the country's economic integration with its partners in the monetary union. Therefore, we can derive a second schedule, the CC schedule, which shows the costs of the monetary union for Spain.

As it is well known, a floating exchange rate has an advantage over a fixed rate if an economy is disturbed by a change in the output market, that is, by a decline in aggregate demand or supply. Floating exchange rates automatically cushion the economy's output and employment by allowing an immediate change in the price of domestic goods in relation to the price of foreign goods. Furthermore, you will recall that when the exchange rate is fixed, purposeful stabilization is more difficult because monetary policy has no power at all to affect domestic output. Given these two conclusions, we would expect changes in demand to have more severe effects on an economy in which the monetary authority is required to fix the exchange rate against a group of foreign currencies.

Therefore: The extra instability caused by a fixed exchange rate is the economic stability cost of a monetary union.

To arrive at the CC schedule we must understand how the extent of Spain's economic integration with the EMU will affect the size of this loss in economic stability. Imagine, for example, that after starting the EMU there is a fall in aggregate demand in Spain, for whatever reason. If the other EMU countries have a simultaneous fall in demand, the Euro will simply depreciate against outside currencies, providing the automatic stabilization as we know it. Spain will have a serious problem only if it faces a fall in demand for its own products.

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[4] CC stands for the monetary costs of the common currency.

How will Spain adjust this idiosyncratic shock? Since nothing has happened to alter the situation of the other EMU countries, the Euro will remain stable against all foreign currencies. Full employment will be restored only after a period of costly recession during which the prices of Spanish products will fall as well as the wages of Spanish workers. The reason for this is the fact, that the exchange rate of the Peseta can't fall because its value is fixed against the Euro.

How does the severity of this slump depend on the level of economic integration between the Spanish economy and those of the other EMU countries? The answer is that the greater integration implies a less drastic recession, and therefore a less costly adjustment to the decline in demand. There are two reasons for this reduction in the cost of adjustment. First, if Spain has close trading links with the EMU, a small reduction in the price of its products will lead to an increase in EMU demand for these products, which will be quite large in relation to the whole output of Spain. Therefore, full employment can be restored fairly quickly.

Second, if Spain's labor and capital markets are closely connected to those of its EMU neighbours, unemployed workers will be able to move abroad easily in order to find work and it will be possible to put domestic capital to more profitable use in other countries. The possibility for migration of workers and capital will reduce the severity of unemployment in Spain and the fall in the rate of return available to investors.

Notice that our conclusions also apply to a situation in which Spain experiences an increase in demand for its output. If Spain is tightly integrated with other EMU countries, a small increase in Spain's price level, combined with some movement of foreign capital and labor into Spain, will quickly eliminate the excess demand for Spain's products.

An additional consideration that we have not yet discussed strengthens the argument that economic stability loss to Spain by joining the EMU is lower when Spain and the EMU countries engage in a large volume of trade. Since imports from the EMU make up a large fraction of Spain's workers consumption in this case, a shift of the Peseta exchange rate against the European currencies may quickly affect the nominal wages in Spain, reducing thereby any impact of employment. A depreciation of the Peseta,

for example, would cause a sharp fall in Spain's living standards if imports from the EU countries were substantial; workers would be likely to demand higher nominal wages from their employers to compensate them for the loss. In this situation, the additional macroeconomic stability that Spain would achieve from a floating exchange rate would be small, so the country has little to loose by joining the EMU.

The CC schedule summarises this conclusion. The figures' horizontal axis measures the member country's economic integration with the fixed exchange rate area, the vertical axis the country's economic stability loss. As we have seen, CC has a negative slope because the economic stability loss from pegging to the area's currencies falls as the degree of economic integration rises.

Costs of joining the monetary union

C

C

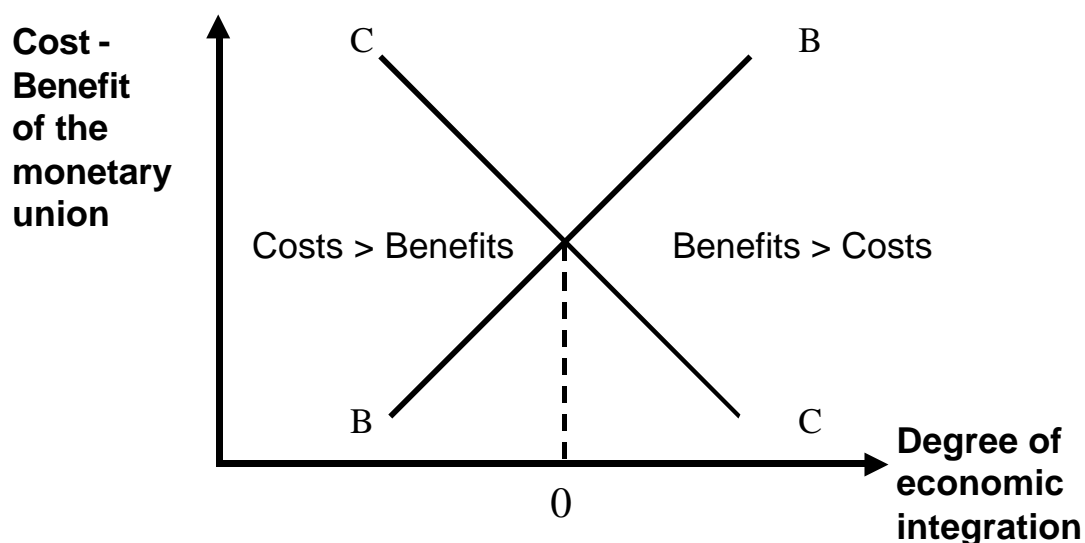**Degree of economic integration**
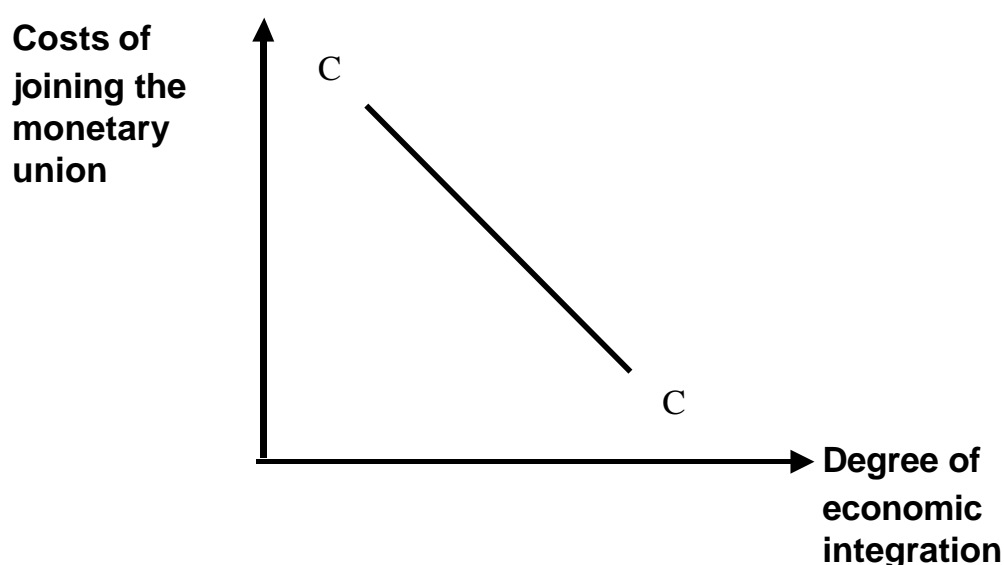
Fig. II: The CC-Schedule

I.3 The BB-CC Model

The following figure combines the BB and CC schedules to show how Spain has had to decide whether to join the EMU.

The figure implies that Spain should join if the degree of economic integration between Spain's goods and factor markets and those of EMU countries is at least equal

to point 0, the integration level determined by the intersection of the BB and CC schedules.

Fig. II: The BB-CC-Schedules

Let's see why Spain should join the EMU if its degree of economic integration with EMU markets is at least 0. The figure shows that for levels of economic integration lower than 0 the BB schedule lies below the CC schedule. That is to say, that the loss Spain would suffer from greater output and employment instability after joining would exceed the monetary efficiency gain, and the country would be better off to stay out.

However, when the degree of integration is 0, or higher, the monetary efficiency gain measured by BB is greater than the stability sacrifice measured by CC, and joining the EMU results in a net gain for Spain. Therefore, the intersection of BB and CC determines the minimum integration level at which Spain will desire to peg its currency to the EMU area.

II. The EMU as an Optimum Currency Area: Empirical Considerations

The theory of optimum currency areas gives us a useful framework for thinking about the considerations that determine whether a group of countries will gain or lose by fixing their mutual exchange rates. A nation's benefits or costs from pegging its currency to an exchange rate area are hard to measure in figures, but by combining our theory with information on actual economic performance we can examine the claim that Europe is an optimum currency area.

First of all, I would like to compare the likelihood and the impact of asymmetric shocks in the EU and the US. Secondly, I would like to investigate the degree of economic integration within the EMU countries. In this case I will look at the intra-EU-trade and the mobility of factors within the EMU countries.

II.1 Asymmetric Shocks: European Union and the United States

A natural benchmark for assessing the likely magnitude and effects of asymmetric shocks in the Euro area is the experience of the US in this regard. The US and the EU are roughly comparable in terms of population, economic size as measured by GDP, and openness to trade. Since the US has been a currency area for a long time, a comparison of the incidence of shocks between the United States and the EU should provide an indication of some of the challenges that the currency union in Europe may face.

One way of estimating the likely effects of asymmetric shocks in the Euro area is to compare the correlation of output fluctuations across EU countries with that of US regions.

The following table demonstrates the correlation coefficients of output growth fluctuations between West Germany and other EU countries, and between the Mideast region of the United States and other US regions, from 1964 to 1990.

U.S. states		EU countries	
Mideast	1,00	West Germany	1,00
New England	0,92	Netherlands	0,77
Great Lakes	0,87	France	0,71
Southeast	0,84	Belgium	0,71
Plains	0,74	Austria	0,70
Far West	0,68	Denmark	0,61
Southwest	0,34	Greece	0,61
Rocky Mountains	0,18	Spain	0,54
		Portugal	0,49
		Ireland	0,48
		Italy	0,47
		Sweden	0,43
		Finland	0,41
		United Kingdom	0,19

Source: International Monetary Fund (1997)

Fig. IV: Correlation Coefficient of Output Growth with Anchor Areas, 1964-90

West Germany, being the largest economy, and having played the anchor role in the ERM, provides the natural example for comparison in the case of the EU for the period considered. The Mideast region of the United States, being economically the largest, provides a corresponding standard for comparisons across US regions. The choice of 1990 as the end-point for the analysis has been suggested by the need to ignore the effects of German unification on the correlations of output fluctuations across EU countries.

As the table shows, fluctuations in output growth, in general, were more highly correlated across US regions than across EU countries over that period. Nevertheless, in both cases there appears to have been a „core". In the case of the EU this core comprised West Germany, France, the Netherlands, Belgium, Austria, Denmark and Greece. In the case of the US it comprised the Mideast, New England, the Great

Lakes, Southeast states, the Plains and the Far West. Output growth fluctuations in the „peripheral" regions were far less highly correlated with their respective anchor areas in both the US and the EU.

An interesting finding shown in the table is that even though the correlation coefficients of output growth fluctuations across the EU core are lower than those across the US core, the differences are not very great: they are considerably smaller than the differences within the US between the core and the periphery.

These results tend to be reinforced by analysis of the aggregate disturbances of supply and demand shocks. Supply shocks refer to unexpected disturbances such as technology or commodity price fluctuations, and tend to have relatively long-lasting effects on output and prices. Examples of supply shocks are the oil price increases of the 1970s. Demand shocks arise from developments such as unexpected disturbances of business behavior, consumer preferences, or export demand, as well as from significant changes in monetary and fiscal policies. Demand shocks, in general, have less long-lasting effects on output, but more permanent effects on the level of prices. German unification, which changed the mix of monetary and fiscal policies in Europe, is an example of an asymmetric demand shock.

The following table shows the correlations of fluctuations in output arising from demand and supply shocks of different countries in the EU with those in West Germany, and the corresponding correlations for the different regions of the US with those in the Mideast states from 1962 to 1988.
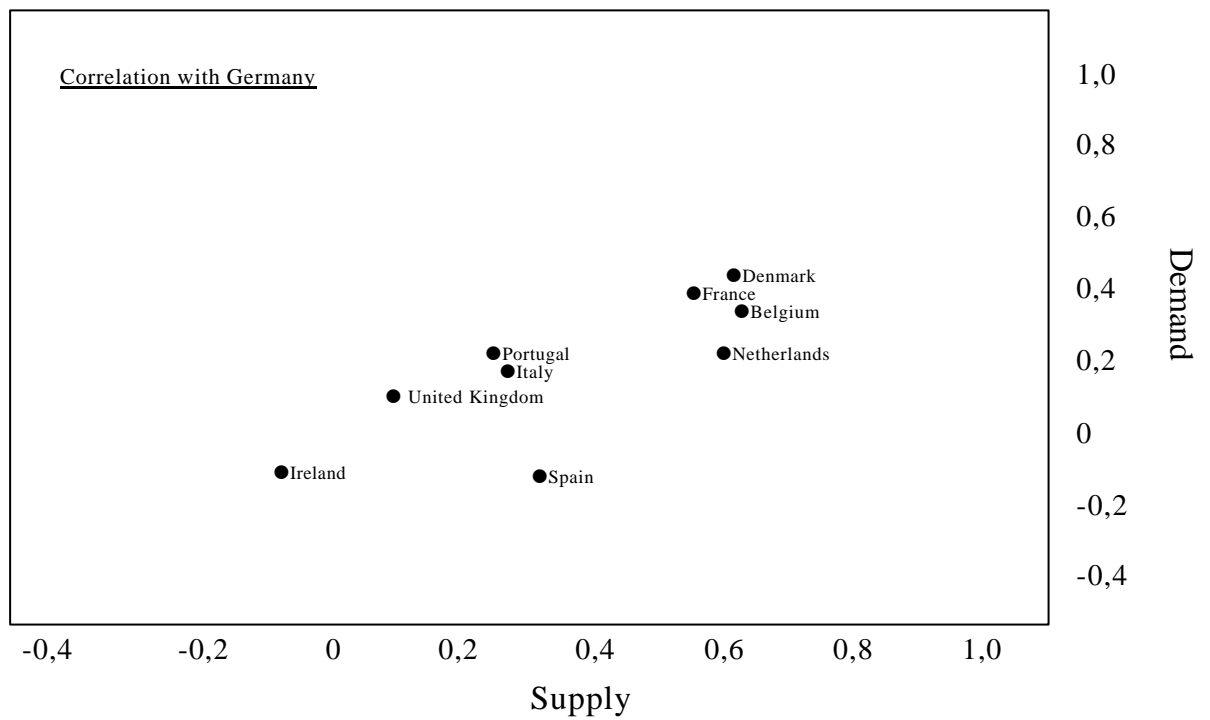
Fig. Va: Correlation of Demand and Supply Shocks in Europe[5]
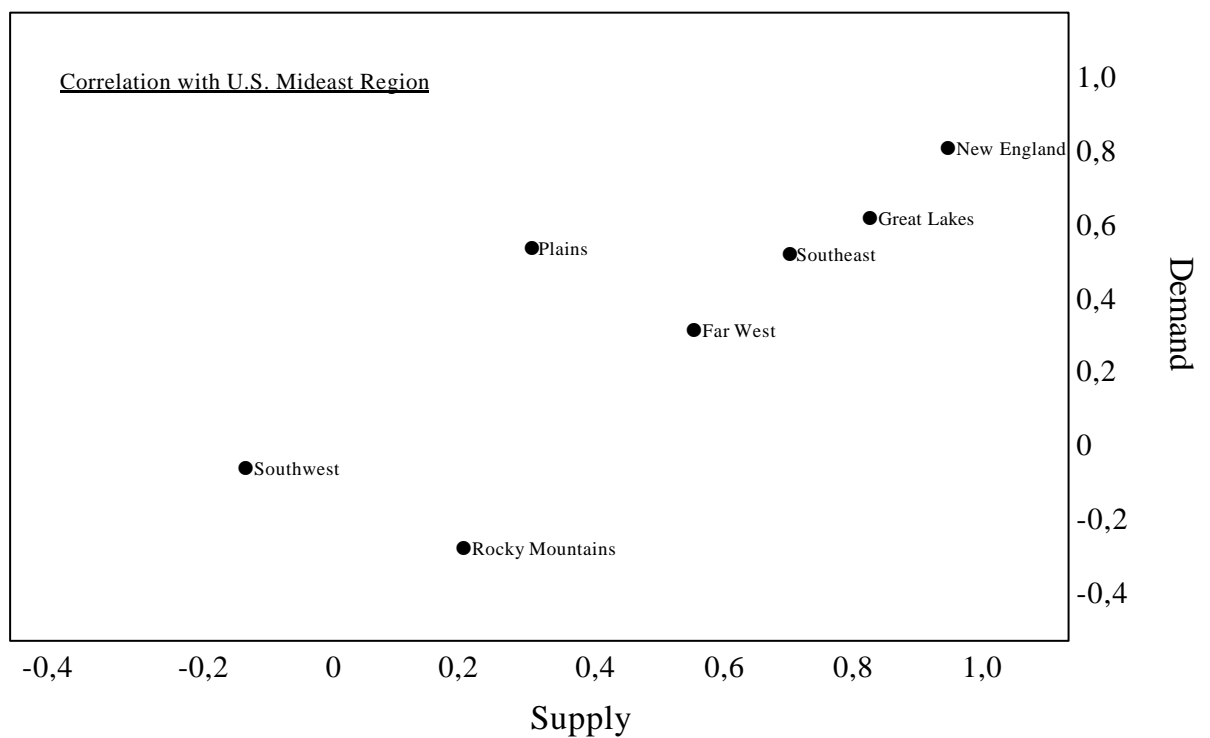
Fig. Vb: Correlation of Demand and Supply Shocks in the USA[6]

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[5] Source: International Monetary Fund (1997)
[6] Source: International Monetary Fund (1997)

Fluctuations in activity due to both supply and demand shocks tended to be more highly correlated across US regions than across EU countries. However, as with aggregate disturbances, fluctuations in output due to supply shocks in the cores of both US and the EU were more highly correlated with their respective anchor areas than was the case with fluctuations in output due to supply shocks in the respective peripheral regions. The same is true of fluctuations arising from demand shocks.

The broad picture that emerges from this analysis is that the asymmetric effects of shocks were relatively more pronounced in the EU than in the US. For the core group of the EU countries, however, the magnitude of the differences does not appear to be substantial. Furthermore, as far as judgements about economic viability of the Euro area are concerned, past cases of asymmetric effects of shocks can provide only a partial guide to what the future holds. The introduction of a single currency will constitute a major regime change that will have significant implications for the pattern of likely shocks in the Euro area. The incidence of asymmetric demand shocks, in particular, is likely to diminish after the single currency is introduced, because the countries in the Euro area will not be able to pursue independent monetary policies, and exchange rate fluctuations within the area will be eliminated.

If this is true, such a change in the likelihood of asymmetric shocks will have important implications for the intersection of the BB and CC schedules and therefore for the critical point of integration. Consider, for example, a decrease in sudden shifts in demand in EMU countries, because of the monetary Union.

As the following figure shows, such a change pushes the CC_1 schedule downward to CC_2 with the result that at any level of economic integration within the currency area, the extra output and employment instability the country suffers by fixing its exchange rate is now lower.
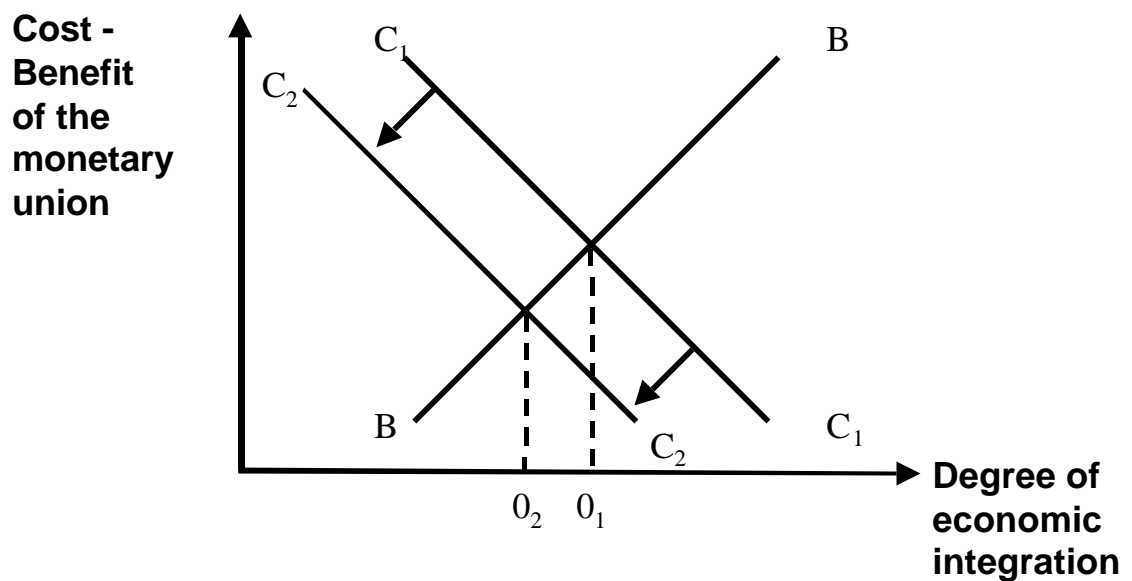
Fig. VI: Shift in the CC-Schedule

That is to say, the level of economic integration at which it becomes worthwhile to join the currency area declines to 0_2. For this reason we can conclude that the EMU creates his own optimum currency area.

Finally, it was pointed out that the effects of an asymmetric shock depend very much on the degree of diversification of a country's production structure.[7] That means that, economic diversification, reflected in export diversification, serves to forestall the need for frequent changes in terms of trade, and, therefore, for frequent changes in national exchange rates. Industrial countries with a high degree of product diversification are therefore better candidates for a currency union than developing countries. In the case of the EU countries, empirical studies have shown that the degree of production diversification is relatively high. According to well known calculations the divergences in the structure of manufacturing industries of EU countries amount to only half the size of divergencies that can be observed for the 12 US Federal Reserve Districts. It therefore doesn't seem very likely that the member countries of the EU could be affected by major idiosyncratic shocks from the outset. In the countries of Southern Europe where the agricultural sector still plays a major role, the EU's common agricultural policy would help absorb the effects of major shocks affecting this sector.

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[7] See Bofinger (1994)

II.2 Economic Integration: Intra-EU-Trade and the Factormarkets

Our theoretical discussion suggested that a country is more likely to benefit from joining a currency area if the area's economy is closely integrated with its own. The overall degree of economic integration can be judged by looking at the integration of product markets, that is, the extent of trade between the member country and the currency area, and the integration of factor markets, that is, the ease with which labor and capital can migrate between the member country and the currency area.

Most EMU countries export between 10 and 20 percent of their output to other EMU members. These figures are larger than those for EU-US trade, which is only around 2 percent of GDP in the US, but smaller than the amount of trade between the regions of the US.

On the other hand, the following table shows that since the early post-war period, intra EU trade has risen to more than 60 percent from about 40 percent of the total trade of all European countries, and it is expected, that this trend will continue, because of the monetary union.

Therefore, if we take trade relative to GDP as a measure of economic integration, the BB-CC model suggests that a joint float of Europe's currencies against the rest of the world is a better strategy for EU members than a fixed Dollar-Euro exchange rate. Furthermore, the extent of intra European trade is large enough to give us reason to believe that the EU itself is an optimum currency area.

This certainly can not be said about the second indicator of economic integration, namely, the factor market, especially the labor market. It is well known that the EU removed the barriers for goods, services, labor and capital on January 1, 1993. The main barriers to labor mobility within Europe are probably not due to border controls, however. Differences in language and culture discourage labor movements between European countries to a greater extent than, for example, between regions of the US. In one econometric study comparing unemployment patterns in US regions with those in EU countries it was found that differences in regional unemployment rates are

smaller and less persistent in the US than are differences between national unemployment rates in the EU.[8]
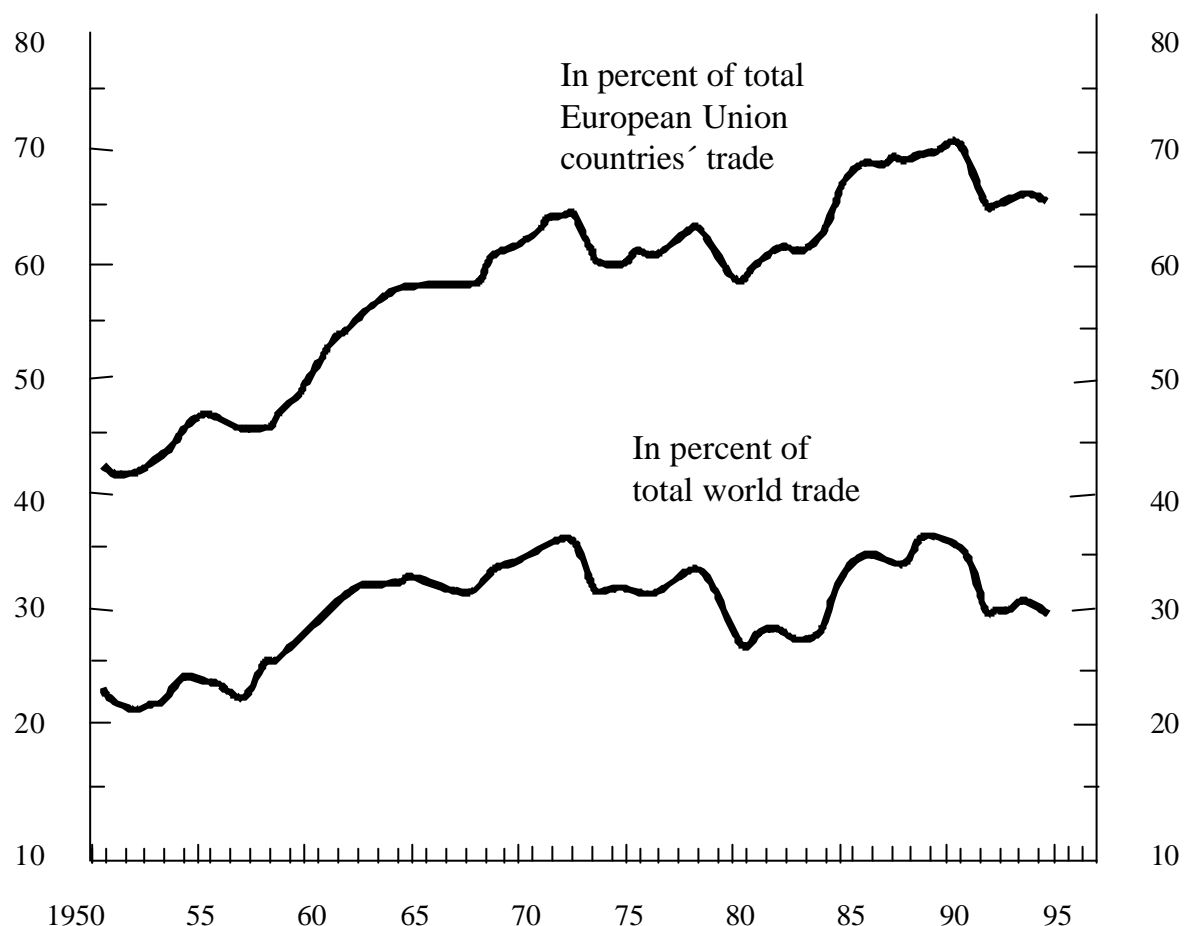
Fig. VII: Intra EU-Trade[9]

Even within European countries labor mobility appears limited, partly because of government regulations. For example, the requirement in some countries that workers establish residence before receiving unemployment benefits makes it harder for unemployed workers to seek jobs in regions that are far away from their current home. Furthermore, all data shows, that not only Americans but also the Japanese were significantly more mobile than Europeans in one typical year. Moreover, real

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[8] See Bayouni and Eichengreen (1993) and Eichengreen (1993)
[9] Source: International Monetary Fund (1997)

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wage flexibility in the EU has been estimated at about one-half of real wage flexibility in the US.

That means that in the case of long-lasting asymmetric developments, no employment adjustments can take place in Europe, because of the lack of labor mobility and the rigidity of the wage-system. In the past, exchange rate changes, including those within the ERM, have provided an important tool for EU countries in such circumstances, by facilitating adjustment in the face of such rigidity. It is to be hoped that de-regulations of the labor market in the future will help avoid misalignment of costs and prices in EMU. Of course, with the possibility of exchange rate changes among countries in the Euro area no longer existing, adjustments in wages and labor mobility will play a larger role in this area. Given Europe's high level of unemployment this adds to the need, for the EU to reform labor markets in ways that would reduce rigidity and increasing wage flexibility. While cultural and linguistic differences will inevitably continue to limit migration, it is important in this context to examine the scope for reducing further the barriers to labor mobility across national boundaries.

III. Conclusions

To sum up this paper two points seem crucial:

First, the theoretical question:

The theory of optimum currency areas implies that countries will wish to join fixed exchange rate areas closely linked to their own economies through trade and factor mobility.

A country's decision to join an exchange rate area is determined by the differences between the monetary efficiency benefit from joining and the economic stability cost of joining. The BB-CC diagram relates both of these factors to the degree of economic integration between the member country and the larger fixed exchange rate zone. Only when economic integration passes the critical level is it beneficial to join.

Secondly, the empirical question:

In the past, asymmetric and idiosyncratic demand and supply shocks within the EMU countries were only relevant for the Southern European countries and Ireland. This was because of the different production structure, particularly, the much larger agricultural sector in these countries compared to the other EMU states. Intra-EU-trade, however, indicates that the EU is an optimum currency area. Since the early post war period, the trade among all EU countries has risen constantly. At the same time the low factor mobility and the low flexibility of real wages continues to go in the other direction. Perhaps the EMU is a tool, however, to increase labor mobility and the flexibility of wages.

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