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ABSTRACT

Is Europe an Optimum Currency Area? Evidence from Regional Data*

In this paper we contrast regional and national data on real exchange rate movements, the growth rates of output and employment, labour mobility and unemployment. We find that asymmetric shocks tend to be more prevalent at the regional than at the national level in Europe. The presumption of the optimum currency area literature holds relatively well, i.e. the adjustment mechanism at the national level involves very little mobility of labour and substantially more real exchange rate variability. At the regional level the opposite holds, although we find some role for real exchange rate adjustments. Finally, we identify two models of regional integration, a 'Northern' and a 'Southern' one. Implications for monetary union in Europe are drawn.

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NON-TECHNICAL SUMMARY

The traditional theory of optimum currency areas, as developed by Mundell, has identified the conditions under which a monetary union between regions or countries will work smoothly. When regions or countries are hit by different disturbances (asymmetric shocks), the adjustment process will require either that real exchange rates adjust or that factors of production move, or a combination of both. In the absence of real exchange rate flexibility and factor mobility, regional or national concentrations of unemployment will be inevitable.

The theory of optimum currency areas has also established a presumption that in a monetary union the adjustment mechanism will rely more on factor mobility than on real exchange rate flexibility. The opposite holds for countries with separate currencies, where more of the adjustment to asymmetric shocks will take the form of real exchange rate changes than of labour mobility.

This paper presents descriptive statistics on regions and countries in Europe. This statistical analysis sheds some light on the question of whether Europe is an optimal currency area. We reach three main conclusions.

First, we find that the presumption of the optimum currency theory holds for Europe subject to certain minor qualifications. At the level of regions of the same country (monetary union) labour mobility plays a role in the adjustment process. Although the degree of real exchange rate flexibility between regions is limited, it does appear to play some role in their adjustment process. At the national level, there is almost no labour mobility but significantly more real exchange rate variability. As the EMS moves towards monetary union, the question arises whether and how far labour mobility can compensate for the reduced reliance on real exchange rate flexibility.

Second, there is no evidence that fewer asymmetric shocks occur at the regional than at the national level. The opposite seems to be the case. We find larger and more sustained divergences of the growth rates of output and employment at the regional than at the national level.

This evidence can lead to two interpretations about the prospects of a future EMU in Europe. The optimistic view, which can also be found in the recent *One Market, One Money* report of the EC Commission, is that the low occurrence of asymmetric shocks at the national level (which we find in our paper) makes it possible to move ahead with monetary union without the fear of major adjustment problems in the future. In this view, as economic integration moves forward, the occurrence of asymmetric shocks will even decline in the future, reducing the adjustment costs.

There is also, however, a pessimistic interpretation of our results. Regions of the same country today are certainly more economically integrated with each other than countries in the Community. The large occurrence of asymmetric shocks at the regional level observed today suggests that economic integration does not make the occurrence of asymmetric shocks less likely. The opposite seems to be the case. Thus, a future EMU in Europe may be confronted with the same kind of divergences in national output and employment trends as the ones observed today at the regional level. This may lead to major changes in the adjustment process between countries, forcing labour mobility to play a greater role than it does today.

This more pessimistic view of the integration process stresses that the latter typically leads to regional concentration and agglomeration effects. As a result, shocks that affect one particular industry also tend to have concentrated effects on particular regions. The experience of the US tends to confirm this view. The economic integration in the US is certainly more advanced than the integration achieved in the Community. At the same time the regional concentration of industrial production is much more pronounced in the US than in Europe. As a result, sectoral shocks (say in the automobile industry, or in the textile industry) have pronounced regional effects and require major regional adjustment efforts.

Third, there are clearly two models of regional development in Europe. One is 'Northern' as typified by West Germany; the other is 'Southern'. The Northern model of regional development is balanced. It involves a relatively large regional mobility of labour and low divergences in output and employment. As a result, regional unemployment rates are relatively uniform. The Southern model is one where labour is relatively immobile, divergences in output and employment are relatively pronounced and large regional concentrations of unemployment exist.

The major issue is to what model the monetary union in Europe will tend to converge. Neither will be without costs for individual countries. The Northern model appears most attractive but involves a sizeable amount of regional labour mobility. Thus, if this is the model to which Europe converges, relatively large movements of labour between countries will be necessary. The Southern model does not require so much mobility of labour. It does, however, lead to large regional divergences in unemployment rates.

It is difficult to predict which of the two models of monetary union will prevail in Europe. If the mobility of labour between countries cannot be increased sufficiently, the Southern model of monetary union may prevail. In that case not all regions and countries in Europe will profit from monetary union.

1. INTRODUCTION

The traditional theory of optimum currency areas, as developed by Mundell(1962), has identified the conditions under which a monetary union between regions or countries will work smoothly¹. In a nutshell this theory says that when regions or countries are subjected to different disturbances (asymmetric shocks) the adjustment process will require either real exchange rates to adjust, or factors of production to move, or a combination of these two. In the absence of real exchange rate flexibility and factor mobility, regional or national concentrations of unemployment will be inevitable.

The theory of optimum currency areas has also established a presumption that in a monetary union the adjustment mechanism will rely more on factor mobility than on real exchange rate flexibility. Of course, in a monetary union the real exchange rates of regions can change, because of divergent regional movements of prices². However, it is likely that the regional adjustment process following asymmetric shocks will rely less on these relative price changes than on mobility of labour. Exactly the opposite holds for countries with separate currencies. The presumption here is that more of the adjustment to asymmetric shocks will take the form of real exchange rate changes than of labour mobility. The reason is that countries can change their nominal exchange rates.

The purpose of this paper is twofold. First it aims at contrasting the nature of the adjustment mechanism between regions of the same country, and between countries in Europe. Is this presumption as described by the theory of optimum currency areas correct ?

Second, we want to find out whether the occurrence of asymmetric shocks is different as between regions of the same country and nations in Europe. Recently the European Commission(1990) has forcefully argued that further economic integration of Europe will reduce the likelihood of asymmetric shocks in European countries. If this is so, it may not matter much whether there is sufficient real exchange rate flexibility and labour mobility. European countries may form a monetary union without fear that they will face large adjustment costs, because they will typically face the same shocks with similar effects in all countries. In this paper we provide some evidence that can shed light on this

¹ See also McKinnon (1963), Kenen (1969).

² A recent paper by Poloz (1990) provides evidence that these regional exchange rates in Canada are substantial.

issue. More particularly, we systematically compare the divergent movements of regional and national output and employment trends. We will ask the question of whether output and employment changes tend to be more asymmetric between countries than between regions of the same country. This issue of the asymmetry of shocks has recently been analyzed by several researchers, (see Cohen and Wyplosz (1989), Weber (1990), EC-Commission (1990), Eichengreen (1990)). The value added of the present paper is that it contrasts the experience of regions with those of countries in Europe.

In sections 2 and 3 we focus the attention on the nature of the regional and national adjustment processes by presenting data on real exchange rate flexibility (section 2) and labour mobility (section 3). In section 4 we study the occurrence of asymmetric shocks by analyzing the degree of regional and national dispersion of output and employment trends. Finally in section 5 the implications for economic and monetary union in Europe are drawn.

2. REAL EXCHANGE RATE VARIABILITY - REGIONAL AND NATIONAL

In this section we compare systematically the degree of real exchange rate variability of regions (within countries) and of countries.

2.1. Definitions and data

We concentrate our attention on the real exchange rates using **unit labour costs** as the price variable. We chose this definition because of data availability : Using unit labour costs allowed us to cover a wider group of countries and regions than if we had used other price variables. In addition the unit labour cost is the most comprehensive measure of competitiveness.

For each country we define the real (effective) exchange rate as follows :

$$R_{it} = \sum_j \alpha_{ij} (S_{ijt} \cdot P_{jt} / P_{it}) \quad (1)$$

where R_{it} is the real effective exchange rate of country i in period t ; S_{ijt} is the nominal exchange rate of currency i with respect to currency j in period t expressed as an index; P_{jt} and P_{it} are the unit labour costs of country j and i respectively; α_{ij} is the weight of currency j in the effective exchange rate of country i , as measured by the share of trade of country j in country i 's total trade.

In a similar way we define a real effective exchange rate of a region k in a particular country as follows :

$$R_{kt} = \sum_m \alpha_{km} (P_{mt} / P_{kt}) \quad (2)$$

Note that since the currency is the same in that country, the nominal exchange rate is irrevocably fixed and drops out of the formula. Note also that α_{km} is defined here as the weight of region m in the effective exchange rate of region k . In this case of regional exchange rates we used the shares of region m in the total GDP of the country³.

The regional data come from Eurostat, *Banque de données régionales*. We used regional data of Germany, France, Spain, the UK and the Netherlands. For the regions of the other countries we lacked the necessary data on unit labour costs. This yielded data of 50 regions during the sample period 1977-85. (As a result of the limitations of regional data, this is the longest sample period that could be constructed). The complete list of these regions is given in appendix.

The data source of the national data is OECD, Economic Outlook. We used data of the following countries : Belgium, Denmark, France, Germany, Greece, Italy, Japan, the Netherlands, Portugal, Spain, the United Kingdom, and the United States.

2.2. Measures of exchange rate variability

We computed different measures of real exchange rate variability. A first one aims at capturing the long- run variations of the real exchange rates. This measure should give us an idea of whether these real effective exchange rates of countries and regions have a

³ This implies that in equation (2) $\alpha_{km} = \alpha_m$ for all k .

tendency to move in a trend-like fashion or whether they return to some constant value⁴. We define this variability concept (LVR) as follows :

$$\text{LVR} = \frac{1}{n} \frac{(R_{i,t_n} - R_{i,t_0})}{R_{i,t_0}}$$

where n is the length of the period expressed in years and R_{i,t_0} and R_{i,t_n} are the real exchange rates in the beginning and at the end of the period (respectively).

Two other measures of variability concentrate on the short-term movements of the real exchange rates. The first one is the mean of the absolute yearly changes of the real exchange rate (MAYC). The second one is defined as the standard deviation of the yearly changes of the real exchange rate (SDYC).

2.3. Empirical Results

In table 1 we present the results of computing the average variability of the real exchange rates during 1977-85.

We observe that the variability of the real exchange rates of nations is about twice as large as the one observed at the regional level⁵. In order to test for the significance of these differences we computed t-ratios testing for differences in the mean. The results are presented in table 2.

4 It would have been more appropriate to use unit root tests. However, the limited number of (yearly) observations precluded such an approach.

5 We also observe that the degree of variability of the regional exchange rates in West-Germany is substantially lower than the one observed in other countries. We return to the differences between German regions and the other regions in Europe in a later section.

Table 1 : Real exchange rate variability
(in yearly percentage change)

Countries	whole sample (1977-88)	EMS (1977-85)
Long run variability	4.4	3.3
Short run variability		
MAYC	2.0	2.0
SDYC	2.4	1.8

Regions in :	W.Germany (77-88)	Spain (80-85)	Netherlands (77-88)	UK (80-85)
Long run variability	0.8	1.8	2.2	1.6
Short run variability				
MAYC	0.4	1.0	0.7	0.7
SDYC	0.5	1.2	0.9	0.9

Note : MAYC is the mean absolute yearly change
SDYC is the standard deviation of yearly changes

Source : The national data are from OECD, Economic Outlook;
The regional data are from Eurostat, Banque de données régionales

Table 2 : Real exchange rate variability
Tests of significance of differences in the mean

Variability measures	Mean value		t-ratio
	Regions	Countries	
Long run variability	0.75	2.01	-3.0
Short run variability			
MAYC	1.76	4.70	-4.4
SDYC	1.70	4.84	-6.7

Note : See table 1

Source : See table 1

The results of table 2 confirm that the differences in the mean between regions and countries are significant. All the t-ratios indicate that these differences are significant at the 1 % level. Thus, during the sample period 1977-85 the long run variability of the real exchange rates between regions of the same monetary union tended to be less than half as large as the one observed between sovereign nations. The same holds for the short-run variability measures.

Since the group of countries in the sample involve both EMS- and non-EMS countries we also wanted to find out whether this significant difference between regional and national exchange rate variability may not be affected by the fact that the real exchange rate variability in the non-EMS countries was very high. We therefore computed the same average variability measures restricting ourselves to the EMS-countries and the regions in EMS-countries. The results are given in table 3.

**Table 3 : Real exchange rate variability
Tests of significance of differences in the mean**

Variability measures	Mean value		t-ratio
	EMS-Regions	EMS-Countries	
Long run variability	0.55	1.99	-3.4
Short run variability			
MAYC	1.58	2.82	-1.9
SDYC	1.24	3.09	-3.8

Note : See table 1

Source : See table 1

As expected, we observe from table 3 that the variability of the real exchange rates is lower in the EMS than in the non-EMS countries. However, the difference between regional and national variability measures remains and is of a similar order of magnitude as in the previous table.

3. REGIONAL AND NATIONAL LABOUR MOBILITY

The degree of labour mobility is an important factor in determining the nature of the adjustment when asymmetric shocks occur in regions or in countries. In this section we contrast the evidence about labour mobility between regions of the same country and between countries.

Our measure of labour mobility between regions will be the flow of migrants in one region from and to the other regions expressed as a percent of the population of the former region. Thus this measure is the sum of the immigrant and emigrant **flows** of a particular region (as a percent of the population of that region). Table 4 presents these measures of regional mobility for a number of European countries.

Table 4 : Average flows of immigrants plus emigrants of regions to and from the rest of the country
(as a percent of population of the region)

	1975	1980	1987	1975-87 (yearly average)
Belgium	0.92	0.89	0.84	0.87
Denmark	1.29	1.12	1.17	1.17
W.Germany	1.32	1.33	1.07	1.21
	(1.06)*	(1.06)*	(0.85)*	(0.98)*
Spain	N.A.	0.40	0.46	0.36
France	1.24	1.15	N.A.	1.20
Italy	0.78	0.68	0.53	0.66
Netherlands	2.02	1.63	1.66	1.68
UK	N.A.	1.51	1.81	1.54

Note : N.A. = not available

* = these numbers exclude the German "city-states" Bremen, Hamburg and West-Berlin

Source : Eurostat, Banque de données régionales.

Table 4 allows to note some striking differences in interregional mobility of European countries. The two Southern countries, Spain and Italy, have a much lower degree of interregional mobility than Northern countries such as Germany, the UK and France.

These differences are not due to aggregation bias, i.e. the size of the regions in these countries is approximately the same. This cannot be said of the smaller countries in the sample, whose regions are typically much smaller than regions in the larger countries. The smaller size of regions in small countries helps to explain the larger degree of interregional labour mobility observed in these countries. For West Germany we have also computed the same measures of interregional mobility after excluding the three "city-states" of the Federal Republic (Bremen, Hamburg, and West-Berlin). These cities experience a much higher degree of mobility. The results are presented between brackets.

The differences in the intensity of interregional mobility of labour between the South and the North of Europe is surprising. It is surprising because the regional differences in per capita income tend to be higher in the South than in the North⁶. These differences would tend to produce larger migratory flows in the South than in the North of Europe. The perception of a high interregional mobility in the South and a low one in the North does not correspond to the facts.

We next compare the interregional mobility measures of table 4 to similar **inter-country** mobility measures in Europe. We could not find yearly **flow** data of inter-country mobility, however. Instead we had to rely on **stock** figures in a given year. These stock figures express the total number of migrants of a given country to and from the rest of the Community (as a percent of the population of the former country). Thus, these numbers have to be interpreted as the **cumulative flows** of all the preceding years. The results are given in table 5. Due to data limitations we could only construct data for the original EC-countries.

Comparing table 5 with table 4 leads to the following conclusion. The migratory flows between regions of the same country are low and of a different order of magnitude than those between countries of the Community. This can be seen from the fact that the stock data of table 5 are smaller (on average) than the yearly flow data of table 4. If the average length of stay of migrants in EC-countries is, say, 10 years, this would imply that the yearly flows of migrants between the EC-countries is less than one tenth of the yearly flow of migrants between regions.

⁶ See e.g. EC-Commission (1990) for evidence of regional disparities of income per capita.

Table 5 : Stock of a country's immigrants plus emigrants from and to the rest of the EC, in 1984
(as a percent of population of the country)

Belgium	1.59
W. Germany	0.57
France	0.41
Italy	0.72
Netherlands	0.70
EC-6 average	0.64

Source : Calculations based on Staubhaar(1988).

The results presented so far can be summarized as follows. Adjustment mechanisms that can be relied upon to absorb shocks in regions and countries in Europe differ significantly. European countries experience a significantly higher degree of real exchange rate variability than European regions. Conversely, regions experience a degree of labour mobility that is much higher than the one observed between countries in Europe. It is fair to say that the latter is almost absent as an adjustment mechanism⁷. These results confirm the presumption of the traditional optimum currency theory.

We have also observed that the degree of interregional mobility of labour is higher in the North than in the South of Europe (Spain and Italy). We will take up this point when we consider the implications for the European monetary unification.

4. ASYMMETRIC SHOCKS IN REGIONS AND IN COUNTRIES

The theory of optimum currency areas stresses that when asymmetric shocks occur, regions of an "optimal" monetary union are likely to adjust mainly by migration of the labour force, whereas countries that are not part of an "optimal" monetary union will rely more on real exchange rate changes to adjust to those shocks. The empirical evidence discussed in the previous sections seems to confirm this traditional view.

⁷ These results confirm the recent empirical studies of Eichengreen. See Eichengreen (1990b).

Much of the recent discussion of the issue whether the EMS-countries should form a monetary union has focused on the question whether large asymmetric shocks are likely to occur in a future European monetary union. If these are unlikely to happen, the lack of labour mobility between EMS-countries may not matter much.

The recent European Commission's report "One Market, One Money" has taken a strong stand on this issue. It argues that the continuing economic integration in the Community will make the EC-countries more alike, so that asymmetric shocks will become less important. The existing instruments of policy will be able to deal with these disturbances. (See EC-Commission (1990), p. 136).

A major difficulty in identifying asymmetric shocks is that we only observe its effects on some endogenous variable, (e.g. output and employment). These variables, however, are also influenced by economic policies. As a result, divergent movements in these variables can be evidence both of exogenous asymmetric shocks and of different national economic policies.

In this section we present some data on regional output and employment growth and compare these with the corresponding national data.

4.1. Regional and national output growth

Table 6 presents some evidence about divergencies in the growth rates of output between regions and between countries. We compute measures of short-term and of long-term variability. As our measure of short-term regional divergencies of output growth, we take the average of the yearly standard deviations of the regional growth rates of output. We do the same for the short-term divergencies of national output growth.

As our measure of the long-term divergencies we compute the standard deviation of the average growth rate of regional output. We use a similar measure of long-term divergencies in growth rates of countries. Thus, this measure gives us insight into the question of whether long-term growth rates tend to diverge more between countries than between regions.

The results of table 6 lead to some surprising conclusions. It appears that the long run divergencies in **national** growth rates are substantially lower than the long run divergencies in **regional** growth rates. Thus, regions belonging to the same countries in Europe tend to have a more unequal development of their output than nations.

As far as the short-term divergencies in growth rates is concerned, we find that there are fewer differences between regions and countries. The short-term deviations of the regional and the national growth rates are of comparable orders of magnitude.

We also note the special position of West Germany, where the regional dispersion of growth rates (both long run and short run) is small in comparison of what one observes in other countries.

Table 6 : Short-term and long-term divergencies in regional and national growth rates of output
(in yearly percentage change)

Countries (76-90)	Long run divergence	Short run divergence
Whole sample	0.48	1.66
EMS	0.48	

Regions in	Long run divergence	Short run divergence
France (76-86)	0.78	2.04
W. Germany (76-86)	0.51	1.09
Netherlands (76-86)	0.71	3.85
Spain (81-86)	1.45	3.59
UK (76-88)	0.72	1.40

Note : The long run divergence of regions is defined as the standard deviation of the average regional growth rates over the relevant periods. For nations we have the same definition. The short run divergence is defined as the average of the yearly standard deviations of the regional (resp. the national) growth rates.

Source : The national data are from OECD, Economic Outlook;
The regional data are from Eurostat, Banque de données régionales.

4.2. Regional and national employment growth

In this section we present data on the regional and national dispersion of the growth rates of employment. We use the same measures of dispersion as in the previous section. The results are presented in table 7. Note that the sample of countries is not the same as in table 6. This has to do with the the different availability of regional employment data.

Table 7 : Short-term and long-term divergencies in regional and national growth rates of employment
(in yearly percentage change)

Countries (1976-90)	Long run divergence	Short run divergence
Whole sample	0.30	1.13
EMS	0.44	0.82

Regions in	Long run divergence	Short run divergence
W. Germany (76-87)	0.38	0.63
Italy (84-87)	0.89	2.18
Spain (81-86)	2.00	2.88
UK (82-86)	0.96	1.11

Note : The long run divergence of regions is defined as the standard deviation of the average regional growth rates over the relevant periods. For nations we have the same definition. The short run divergence is defined as the average of the yearly standard deviations of the regional (resp. the national) growth rates.

The conclusions that can be drawn from table 7 are almost identical as the ones derived from table 6. The long-run dispersion of employment growth between regions of the same country is substantially larger than the dispersion of these growth rates between countries. For the short-term measures of dispersion we do not find the same pronounced difference between regions and countries.

Note again the special position of West Germany, which experiences a much more balanced regional development of employment than most other countries. Noteworthy is

also the fact that the regional dispersion of employment growth is particularly pronounced in the Southern European countries (Spain and Italy). Earlier we noted that the regional labour mobility is relatively low in these Southern countries. These two features (unbalanced regional growth in employment and low mobility of labour) helps to explain the relatively large regional concentration of unemployment in these Southern European countries. We show some evidence in table 8. The differences between the North and the South of Europe are striking. The regional dispersion of unemployment appears to be much more substantial in Spain and especially in Italy as compared to Germany and Great Britain.

Table 8 : Regional unemployment rates in 1989
(in percent)

	Standard Deviation	Maximum	Minimum	Difference
France	2.4	14.7	6.7	8.0
W. Germany	2.3	10.9	3.2	7.7
Great Britain*	2.3	10.5	4.0	6.5
Italy	6.4	21.8	4.1	17.7
Spain	4.5	26.5	13.7	12.8

Note : Contrary to the data on the United Kingdom in the previous tables, the data in this table exclude Northern Ireland

Source : Eurostat, Banque de données régionales.

5. REAL EXCHANGE RATE FLEXIBILITY AND ASYMMETRIC SHOCKS

In a previous section we observed that the degree of real exchange rate flexibility between regions of the same country is (on average) smaller than between countries. This, however, does not imply that real exchange rate movements have no role to play in the regional adjustment process. In this section we provide some additional empirical evidence highlighting the role of real exchange rate changes. We computed the correlations between variability measures of real output and of real exchange rates, for both regions and countries. We did the same exercise with employment. The results are shown in tables 9 and 10.

We observe that the regional variability of output is relatively well correlated with the regional variability of the real exchange rates. The surprising thing is that this correlation is stronger and more significant at the regional than at the national level⁸. This suggests that, although the regional variability of real exchange rates is relatively small, it nevertheless plays a significant role in regional adjustment.

The correlations between the variability of real exchange rates and employment is much weaker. In addition, no strong differences are observed between the regional and the national correlations.

On the whole the evidence of tables 9 and 10 suggests that real exchange rates do play some role in the adjustment process at the regional level. Regions experiencing large disturbances in real output tend to have relatively large movements in their real exchange rates. This is consistent with the hypothesis that asymmetric regional disturbances are absorbed by regional changes in the real exchange rates. And since nominal exchange rates are fixed between regions, this can also be seen as evidence that relative prices play a role in the adjustment process. It is clear, however, that this evidence can only be called suggestive. Correlation coefficients do not tell us anything about the direction of the causality. These correlations can also be interpreted to mean that relative price shocks cause variability in output and employment.

The evidence of this section adds some nuance to the presumption of the traditional optimum currency theory. It suggests that real exchange rate changes continue to play a role in the adjustment process of regions. This has also been found by researchers in the context of other regions (see Poloz(1990) for the Canadian provinces).

In this connection it is important to stress that there is evidence (which is not revealed by our correlation analysis) that real exchange rate changes have also been quite important in the adjustment process of individual EMS-countries, that have chosen to limit the changes in their nominal exchange rates. Countries like Belgium and the Netherlands, for example, allowed significant real depreciations of their currencies of 20 to 30 % to occur during the early part of the eighties. These real depreciations were instrumental in

⁸ The EC-Commission (1990) also found no evidence of a significant relationship between real exchange rate changes and national growth rates of output. See EC-Commission (1990), p. 147.

the adjustment process of these countries following asymmetric shocks to which these countries were subjected at the start of the eighties⁹.

It is fair to conclude from this empirical evidence that real exchange rate changes (relative price changes) will continue to play a role in regional adjustment in the future.

Table 9 : Correlations between measures of dispersion in real exchange rates and growth rates of output

	short-term	long run
All countries and regions	0.27**	0.23*
All countries	-0.03	-0.16
All regions	0.73***	0.28*
Regions in		
Germany	0.60**	0.07
Spain	0.79***	0.47**
Netherlands	0.95***	-0.2
UK	-0.41	0.18

Note : *** = significant at 1 % level;
 ** = significant at 5 % level;
 * = significant at 10 % level.

Source : Eurostat, Banque de données régionales.

⁹ See De Grauwe and Vanhaverbeke (1990) for case studies of Belgium and the Netherlands.

Table 10 : Correlations between measures of dispersion in real exchange rates and growth rates of employment

	short-term	long run
All countries and regions	0.22 [*]	0.06
All countries	0.53 [*]	0.10
All regions	0.50 ^{***}	0.17
Regions in		
Germany	0.03	0.04
Spain	0.53 ^{**}	-0.07
Netherlands	0.20	0.44
UK	-0.38	0.27

Note : *** = significant at 1 % level;
 ** = significant at 5 % level;
 * = significant at 10 % level.

Source : Eurostat, Banque de données régionales.

6. CONCLUSION : IMPLICATIONS FOR EMU

In this paper we have presented descriptive statistics about regions and countries in Europe. This statistical analysis helps us to shed some light on the question of whether Europe is an optimal currency area. Our main findings are the following.

First, we have found that the presumption of the optimum currency theory holds for Europe provided some nuances are made. At the level of regions of the same country (monetary union) labour mobility plays a role in the adjustment process. Although the degree of real exchange rate flexibility between regions is limited, it does appear to play some role in the adjustment process of regions. At the national level, there is almost no labour mobility but significantly more exchange rate variability. As the EMS moves towards monetary union the question arises whether and to what extent the smaller reliance on real exchange rate flexibility can be compensated for by more labour mobility.

Second, there is no evidence that asymmetric shocks occur less at the regional than at the national level. The opposite seems to be the case. We found larger and more

sustained divergencies of the growth rates of output and employment at the regional level than at the national level. Thus, national growth rates of output and employment tend to diverge less than the same growth rates at the level of regions of the same countries.

This evidence can lead to two interpretations about the prospects of a future EMU in Europe. One is optimistic, the other is pessimistic. The optimistic view, which can also be found in the recent "One Market, One Money" report of the EC-Commission, is that the low occurrence of asymmetric shocks at the national level (which we find in our paper) makes it possible to move ahead with monetary union without one having to fear that major adjustment problems will arise in the future. In this view, as economic integration moves forward, the occurrence of asymmetric shocks will even decline in the future, reducing the adjustment costs.

There is, however, also a pessimistic interpretation of our results. Regions of the same country today are certainly more economically integrated with each other than countries in the Community. The large occurrence of asymmetric shocks at the regional level observed today suggests that economic integration does not make the occurrence of asymmetric shocks less likely. The opposite seems to be the case. Thus, a future EMU in Europe may be confronted with the same kind of divergencies in national output and employment trends as the one observed today at the regional level. This may lead to major changes in the adjustment process between countries, and may force labour mobility to play a greater role than it does today.

This more pessimistic view of the integration process stresses that the latter typically leads to regional concentration and agglomeration effects¹⁰. As a result, shocks that affect one particular industry also tend to have concentrated effects on particular regions. The experience of the US tends to confirm this view. The economic integration in the US is certainly more advanced than the integration achieved in the Community. At the same time one observes that the regional concentration of industrial production is much more pronounced in the US than in Europe (see Krugman (1990) for evidence). As a result, sectoral shocks (say in the automobile industry, or in the textile industry) have pronounced regional effects, and require major regional adjustment efforts.

The interesting aspect of this phenomenon is that one finds evidence of relatively strong divergence of economic developments of highly integrated regions both at a relatively

¹⁰ For a recent formalization of this view see Krugman (1989). There are of course older writers who have stressed these effects of integration. See Giersch (1949), Myrdal (1957), and Scitovsky (1958).

disaggregated level (i.e. regions within existing European countries) and at a more aggregated level (regions in the US of the size of existing European countries). This suggests that if European countries integrate further, they are likely to move towards a model in which asymmetric shocks become more rather than less important.

Third, there are clearly two models of regional development in Europe. One is Northern as typified by West Germany, the other is Southern. The Northern model of regional development is balanced. It involves a relatively large regional mobility of labour and low divergencies in output and employment. As a result, regional unemployment rates are relatively uniform. The Southern model is one where labour is relatively immobile, divergencies in output and employment are relatively pronounced, and large regional concentrations of unemployment exist.

The major issue is to what model the monetary union in Europe will tend to converge. None of the two models will be without costs for individual countries. The Northern model appears most attractive. One should bear in mind, however, that this model involves a sizable amount of regional labour mobility. Thus, if this is the model to which Europe converges, relatively large movements of labour between countries will be necessary. The Southern model does not require so much mobility of labour. It does lead to large regional divergencies in unemployment rates.

Which of the two models of monetary union will prevail in Europe is difficult to predict. If the mobility of labour between countries cannot be increased sufficiently, the Southern model of monetary union may prevail. In that case not all regions and countries in Europe will profit from monetary union.

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APPENDIX : LIST OF REGIONS**BR DEUTSCHLAND**

R11	Schleswig-Holstein
R12	Hamburg
R13	Niedersachsen
R14	Bremen
R15	Nordrhein-Westfalen
R16	Hessen
R17	Rheinland-Pfalz
R18	Baden-Württemberg
R19	Bayern
R1A	Saarland
R1B	Berlin (West)

FRANCE

R21	Ile de France
R22	Bassin Parisien
R23	Nord - Pas-de-Calais
R24	Est
R25	Ouest
R26	Sud-Ouest
R27	Centre-Est
R28	Méditerranée
R29	Departements d'Outre-Mer

ITALIA

R31	Nord Ovest
R32	Lombardia
R33	Nord Est
R34	Emilia-Romagna

R35	Centro
R36	Lazio
R37	Campania
R38	Abruzzi-Molise
R39	Sud
R3A	Sicilia
R3B	Sardegna

NEDERLAND

R41	Noord-Nederland
R42	Oost-Nederland
R47	West-Nederland
R45	Zuid-Nederland

UNITED KINGDOM

R71	North
R72	Yorkshire and Humberside
R73	East Midlands
R74	East Anglia
R75	South East
R76	South West
R77	West Midlands
R78	North West
R79	Wales
R7A	Scotland
R7B	Northern Ireland

ESPAÑA

RB11	Galicia
RB12	Asturias
RB13	Cantabria
RB21	País Vasco
RB22	Navarra
RB23	Rioja
RB24	Aragón
RB41	Castilla-León
RB42	Castilla - La Mancha
RB43	Extremadura
RB51	Cataluña
RB52	Comunidad Valenciana
RB53	Baleares
RB61	Andalucía
RB62	Murcia
RB63	Ceuta Y Melilla