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MACROECONOMIC IMPLICATIONS OF EMU AT THE REGIONAL LEVEL

ABSTRACT:

With no doubt, the main cost of joining a currency area is the loss of monetary policy instruments at a national level (e.g. the exchange rate) as stabilisation mechanisms against macroeconomic disturbances that only affect one country of the area or affect them in different manners. As this kind of macroeconomic disturbances, known as "asymmetric shocks", cannot be dealt by a common monetary policy, alternative adjustment mechanisms are needed to achieve macroeconomic stabilisation. However, the evidence for Europe has shown that European countries have a lower response capacity than other currency areas.

For this reason, several studies have examined to what extent asymmetric shocks have been relevant in Europe in the past, mainly at a national level. However, the regional dimension is relevant for this analysis. Not all the regions are equally affected by the problem of asymmetric shocks. The consideration of the fact that European regions did not have sovereignty to apply their own autonomous policy implies that, inside every national state, there could have been regions adversely affected by the national single monetary policy in presence of asymmetric shocks. In this sense, the consideration of the effects of taking part in the Economic and Monetary Union necessarily involves to consider the relative situation of every region inside their own country. If the relationships between every region and the European aggregates are as intense as the relationships with the previous national aggregate, the relative position of the region in this new macroeconomic framework will be similar to the previous one. In this paper, we analyse macroeconomic effects of EMU at a regional level using the Eurostat Regio database. The results show that there are big differences among regions: there will be winners and losers.

MACROECONOMIC IMPLICATIONS OF EMU AT THE REGIONAL LEVEL

1 Introduction

Most economic analysis of Monetary Integration processes take as a starting point the Theory of Optimum Currency Areas. This theory has its origins in the work of Mundell (1961), followed by McKinnon (1963) and Kenen (1969). These works were placed in the intense debate during the sixties and mid-seventies about fixed *versus* flexible exchange rates. Their objective was to identify the criteria that determine whether a country should join a currency area or not. The strategy consisted in identifying the main benefits and costs that an individual country would experience joining a currency area. If for every participant, benefits overweight costs, then the currency area is said to be optimal.

The intensification of the European Monetary Integration process has brought up to date the main ideas of these contributions to analyse the potential benefits and risks of the Economic and Monetary Union. In this sense, while there exists a certain consensus on EMU positive economic effects -specially at a microeconomic level (De Grauwe, 1997)- which can be summarised as direct and indirect benefits of transaction costs reduction, less uncertainty and more transparency in price determination mechanisms, there is no agreement on potential costs. The main potential cost of joining a currency area is the loss of monetary policy instruments at a national level (e.g. the exchange rate) as stabilisation mechanisms against macroeconomic disturbances that only affect one country of the area or affect them in different manners. As this kind of macroeconomic disturbances, known as “asymmetric shocks”, cannot be dealt by a common monetary policy, alternative adjustment mechanisms are needed to achieve macroeconomic stabilisation. In this sense, there is an agreement that European countries have a lower response capacity in front of adverse asymmetric shocks than other currency areas using alternative adjustment mechanisms such as factor mobility (Kenen, 1989; Eichengreen, 1992; Begg, 1995), fiscal redistribution (Boadway and Flatters, 1982; Sachs and Sala-i-Martí, 1991; Bayoumi and Masson, 1995) and flexibility of wages and prices (Layard *et al.*, 1991; Heylen *et al.*, 1995; Viñals and

Jimeno, 1996). If alternative adjustment mechanisms are limited, the only chance of success is that asymmetric shocks tend to be small or even disappear.

For this reason, several studies have examined to what extent asymmetric shocks have been relevant in Europe in the past, mainly at a national level. However, the regional dimension is relevant for this analysis. Not all the regions are equally affected by the problem of asymmetric shocks. The consideration of the fact that European regions did not have sovereignty to apply their own autonomous policy implies that, inside every national state, there could have been regions adversely affected by the national single monetary policy in presence of asymmetric shocks. In this sense, the consideration of the effects of taking part in the Economic and Monetary Union necessarily involves to consider the relative situation of every region inside their own country. If the relationships between every region and the European aggregates are as intense as the relationships with the previous national aggregate, the relative position of the region in this new macroeconomic framework will be similar to the previous one.

For this reason, the objective of this paper consists in analysing the macroeconomic effects of EMU at a regional level. The paper is organized as follows: first, previous works assessing the role of asymmetric shocks are briefly summarised; second, the applied methodology, the available statistical information and the obtained empirical evidence are described; and, last, the paper ends summarising the main conclusions and the future lines of research.

2. Assessing the role of asymmetric shocks: A brief summary of previous works

In this section, previous results by other authors focusing in the empirical relevance of asymmetric shocks for European countries and regions are briefly summarised. First, results of the works that have considered this question at the national level are summarised and next previous results at the regional level are presented.

2.1. Evidence at a national level

In the literature studying the asymmetry of shocks, early contributions examined the correlation coefficients for output movements across countries and argued that countries

whose GDP tended to move together experienced relatively symmetrical disturbances. Cohen and Wyplosz (1989) were the first to evaluate empirically the nature of shocks experienced by France and Germany using quarterly data of output, prices and current account deficit for the period 1965/I-1987/IV. The results obtained from this comparison show that shocks experienced by France and Germany during this period were mainly symmetric.

From this work, other authors extended similar analysis to wider sets of countries and longest time periods. But the most influential work in this line of research was Bayoumi and Eichengreen (1992). These authors applied the methodology proposed by Blanchard and Quah (1989) as a way to distinguish between demand and supply shocks. The distinction between demand and supply shocks permits to relate the degree of symmetry among two economies to the factors causing the shocks. To evaluate the degree of symmetry between countries, they calculate the correlation coefficients among the series of shocks. If the values of these coefficients are high, it would be expected that the countries under study have experienced relatively symmetrical disturbances. Using data for the period 1960-1988 for the 12 countries belonging to the European Union (EU) in that moment, they find a clear distinction between core and pheripherical countries. The values of the correlation coefficients between European countries were also clearly lower than those among the American States. From their analysis, it seems that a monetary union involving all EU member countries will be a bad idea.

However, in a more recent work, Bayoumi and Eichengreen (1996) replicated the previous analysis using more recent data (1960-1993). Two facts should be highlighted from their results: first, the German reunification seems to have altered substantially the macroeconomic relationships between Germany and the other European countries; and second, the distinction between core and peripherical countries is not so clear. Shocks experienced by European countries have been more symmetric in recent years.

These optimistic results have been also confirmed by other works such as Artis and Zhang (1996, 1997) who also find evidence of positive and significant correlation between the cyclical component of European economies. Both authors point out the role of the European Monetary System as a possible explanatory factor of this higher cyclical synchronity during the most recent years.

Rubin and Thygesen (1996) also find evidence of this higher cyclical synchronity using industrial output data for the period 1983-1994 for nine European countries (Germany, Austria, Belgium, Finland, France, Netherlands, Italy and the United Kingdom). Their results are relevant because they show that the symmetry for the manufacturing sector is higher than for the whole economy.

Ramos et al. (1999) also offer empirical evidence about the relative size and the degree of symmetry of shocks between European countries using manufacturing data from 1975 to 1996. Their results, applying time varying coefficient models to take into account the dinamicity of the process of European Integration, show that demand and supply shocks, but specially the first, have been more symmetric during the most recent years.

Summarising, previous works that have analysed the degree of symmetry between European countries at a national level show that there has been a reduction of asymmetric shocks during the most recent years and also that asymmetric shocks are more important for the whole economy than for the manufacturing sector.

2.2. Evidence at a regional level

The consideration of the regional dimension introduces two additional factors in the analysis of the relevance of asymmetric shocks for European countries and regions. First, the analysis of asymmetric shocks at a regional level is related with the degree of concentration of economic activity. And, second, it is important to take into account that, before the adoption of the single currency, European regions were part of other currency unions: the national states and, regions did not have sovereignty to apply their own autonomous monetary policy. For this reason, to analyse the regional effects of EMU, it will be necessary to compare the previous situation with the existing one.

In relation to the first factor, the relationship between asymmetric shocks and the degree of concentration, this idea was first introduced by Kenen (1969). He noted that when a region (or a country) has a sectorally-diversified productive structure, it tends to experience less asymmetric shocks. The idea, then, is that if economic activity is very

specialised at the regional level, it will experience more asymmetric shocks. So, if as a consequence of EMU, regions become more specialised, asymmetric shocks would increase.

According to Krugman, the interaction of increasing returns, transportation costs and demand is the main driving force behind geographic concentration of production. Following this literature, known as economic geography or "new trade" theories, the complete removal of barriers to trade and the improvement of the functioning of the Single Market as a result of EMU, will lead to regional concentration of industrial activity. The basic argument is that when barriers to trade decline, two opposite forces appear: agglomeration forces, which in the presence of scale economies will tend to concentrate production in a single location with large local demand (core), and disagglomeration forces, which due to the improved access to peripherical markets will permit these countries to gain locational attractiveness. The graphical illustration of the two forces is the well known U-shaped curve that relates the level of integration and the relative wage of the periphery (Krugman and Venables, 1990). The fact that trade may lead to regional concentration (agglomeration forces prevail) has been illustrated by comparing the regional distribution of production in the United States and Europe. Production in the United States is more regionally concentrated than in the EU's countries and, following Krugman (1991), the reason is that the US market is more highly integrated than EU's. This evidence suggests that European countries will expect similar levels of regional concentration in a near future, and as a result, more asymmetric shocks at the regional level.

However, a different, most optimistic view, has been defended by the European Commission in the report "One Money, One Market" (1990). This study predicts that asymmetric shocks in the future will decrease as a consequence of the increase in intra-industry trade, and, if this kind of trade predominates, productive structures will be more similar. As De Grauwe (1997) remarks, trade based on scale economies and product differentiation would lead to a situation where most demand shocks will affect participating countries in a similar way. So, demand shocks will tend to be more symmetric. If this view is correct, the loss of national sovereignty over the exchange rate will have no repercussion in terms of macroeconomic adjustment capacity.

Empirical works analysing this question have not arrived to conclusive results. Using regional data for EU15 for employment in 17 branches (including services) for the period 1950-1990, Molle (1996) finds a general trend for less concentration and less specialisation of EU regions and Brülhart (1997) shows that manufacturing had a lower centrality in the 1980s than in the 1970s. However, Hallet (2000) using regional data for a most recent period shows that the specialisation index has an increasingly similar pattern for most regions which reflects the general structural change from manufacturing into services. The analysis of concentration also shows a high degree of stability during time. Both results are "rather good news in that it reduces the probability of region-specific shocks and does not confirm the expectations of increased probability following European integration" (Hallet, 2000, p. 14).

In relation to the second aspect, the consideration of the fact that European regions did not have sovereignty to apply their own autonomous policy implies that inside every national state there could have been regions adversely affected by the national single monetary policy in presence of asymmetric shocks. In this sense, the consideration of the effects of taking part in the Economic and Monetary Union necessarily involves to consider the relative situation of every region inside their own country.

However, previous studies using regional data such as Abraham (1996), De Nardis *et al.* (1996), Forni and Reichlin (1997) or Funke *et al.* (1999) have not explicitely considered this question. Only De Grauwe and Vanhaverbeke (1991) and Funke (1997) have taken into account the previous line of reasoning. On one hand, the results obtained by the first authors show that the long run divergences in national growth rates are substantially lower than the long run divergences 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. From these results, one could think that the move towards EMU will not change the adverse relative position of some regions. On the other hand, the results obtained by Funke (1997) shows that the correlations of shocks between 16 European countries are much lower than the correlations within West German Landers. His results also show that there are big differences between these regions: while regions such as North Rhine-Westphalia, Hesse, Saarland and Rhineland-Palant have very high correlations, other regions such as Baden-Württemberg and Bavaria have medium values and other such as Schleswig-Holstein and Hamburg have values close to zero.

These results mean that a German national monetary policy would be appropriated for the first and second set of regions but not for the third as, in general, shocks among these regions are not completely symmetric. In the next section, this fact will be taken into account for the case of a more detailed data set for European regions.

3. Macroeconomic effects of EMU: Empirical evidence

3.1. Introduction

The methodology used in this section consists in comparing the value of the correlation coefficients between the growth rate of the same variable for three different territories: the considered region, its respective country and Europe. Two different definitions of European aggregates are considered in the paper: the Economic and Monetary Union aggregate (11 countries) and the aggregate for the 15 countries that nowadays belong to the European Union. The consideration of both aggregates permits to assess the effects of the possible incorporation of Denmark, Sweden and the United Kingdom to the Eurozone for every considered region.

As it has been previously exposed, the comparison of these values permits to assess the disadvantages (the macroeconomic cost) for every region of taking part in the Economic and Monetary Union. If the relationships between every region and Europe are as intense as the relationships between the region and its respective country, the relative position of the region in this new macroeconomic framework will be similar to the previous one. There will be no additional macroeconomic cost.

However, one disadvantage of the comparison of the values of the correlation coefficients is that in small samples there exists the danger of accepting as true, false correlations. For this reason, we have applied the criterium to distinguish between significant and not significant correlations proposed by Brandner and Neuser (1992). These authors suggest to take as the critical values for detrended series (as the ones considered in this paper) at a 5% significance level, the values obtained from the expression $2/\sqrt{n}$, where *n* is the number of observations of the considered series. The values of this test for the different considered time periods can be found in table 1.

The rest of the section is organised as follows: first, the considered variables and the statistical sources used in the paper are clearly described and second, the obtained results at a national and at a regional level are shown.

3.2. Definition of the considered variables and description of the available statistical information

To assess the degree of symmetry of shocks experienced by European regions and countries, the analysis will focused on the evolution of gross domestic product and prices. The reason to choose these two variables instead of other macroeconomic variables is that the objectives of the monetary policy are closely related to them.

In this sense, we will analyse the relationships among the growth rates of the gross domestic product at market prices in terms of the population of every considered territory (i.e. the growth rates of the GDP per capita). Information at the European and national levels have been obtained from Eurostat "National Accounts" and "Main Demographic indicators" (as collected in electronic format in the International Statistical Yearbook ed. 2000). Data are available from 1961 to 1998.

Data at the regional level have been taken from Eurostat's REGIO database which is the only source providing comparable EU-wide regional data based on a standardised classification of regions ("NUTS"). Considering the NUTS II classification level, we have obtained information for GDP and population for the period 1982-1996 for most regions. In particular and due to data restrictions, we have included in the analysis the eleven "provinces" of Belgium; thirty of the forty "regierungsbezirke" of Germany (East Germany regions have been excluded); the Spanish seventeen "comunidades autónomas" (Ceuta and Melilla have been excluded); the twenty-two "régions" of France; the Italian twenty "regioni"; the twelve Dutch "provincies" and the five "comissaoes de coerdenaçao regional" and the two "regioes autonomas" of Portugal. Austria and Finland have not been included in the analysis as statistical information for these variables was very scarce. Uniregional countries in the Euro zone such as Luxembourg and Ireland (with only 2 regions) at the NUTSII level have not been

included in the analysis. Greece has not been considered as when we started the paper, it did not take part in the euro zone.

In respect to prices, information at the European and national levels have been obtained from the same sources. At the regional level, however no information of prices evolution is available. For these reasons, we have calculated the growth rate of the ratio "compensation of employees" / "number of employees" for every region using information from the Eurostat "regio". We have also calculated this ratio at the European and National level. Although one can think this variable can provide a good aproximation to prices evolution, data restrictions only made possible to calculate this ratio for the Dutch, Italian and Spanish regions and for the period 1980-1995.

3.3 Empirical evidence

In this section, the results of applying the proposed methodology using the statistical data described in the previous section are presented.

However, and before commenting the results at a regional level, we have also analised the relationships between European countries at a national level for the period 1962-1998 and for the three considered variables: GPD, prices and wages. The values of the correlation coefficients among the growth rates of the national variables and of European aggregates are shown in table 2. From the results in this table, we can conclude that:

- The values of the correlation coefficients are very high for the three considered variables for every country. Only the correlation coefficient among wages growth rates for Greece and for the European Union is not significant using the Brandner and Neuser (1992) test. In fact, the evolution of wages is the less similar among countries of the three considered variables.

- However, and although correlations are significant and high, there are important differences among countries in the line of those found by previous authors: there is evidence of a core-periphery pattern.

- The differences in terms of correlations between a currency area including only the Euro Zone countries or the fifteen countries of the European Union are scarce. In fact, only one country would be better in a wide currency area: the United Kingdom.

- It is also important to remark that the relationships between countries in terms of prices are very similar to the relationships in terms of wages. This result is relevant as, when looking at regions, no information of prices is available and, so, prices evolution will be approximated by wages evolution.

In tables 3 to 9, the results for the different regions of every considered country are shown. In these tables, the values of the correlation coefficients among the growth rates of GDP and wages (when possible) of the considered regions and its respective country are shown first and next, the evolution of every region is compared with the evolution of the two considered European aggregates: the Euro Zone and the European Union. From these tables, we can conclude that:

- There are regional differences inside every considered country.

- There are also differences in terms of the relevance of these differences. For example, and in terms of GDP, the average value of the regional correlation coefficient with the country aggregates is near 0.9 for France and Italy; it is near 0.7 for Spain and Belgium and for Germany, Netherlands and Portugal it is 0.6.

- However, it is important to remark that the average correlations with the respective country is always higher than average correlations with the European agreggates, but correlations with EMU aggregates are usually higher than correlations with the EU aggergates. In general terms, the standard deviation of the correlation coefficients also increases when considering the European aggregates.

- In general, most regions keep the same relative status inside their own country when comparing the previous situation with the actual one, but others experience important changes:

    - Regions with low correlations with their respective country will have still lower correlations with European aggregates (for example, some Italian regions such as Basilicata or Calabria or some portuguese regions such as Norte, Centro or Lisboa e Vale do Tejo) but there are a few exceptions (for example, in the Netherlands: Flevoland, Utrecht and Zeeland).

    - There are also regions with high correlations with their respective countries that show quite low values when related with European aggregates. For example, the Spanish regions of Andalucía, Navarra and País Vasco, the French region of Bretagne, in Netherlands, the regions of Drenthe and Noord-Holland and the region of Algarve in Portugal.

    - There are some regions that show a significant correlation (following Brandner and Neuser criteria) with its own country, but they do not show this significant correlation with the European aggregates (see table 10). This means that these regions will be potential losers in the integration process. There are also some regions that have an important correlation with their respective country and have increased it with the aggregates (see table 11).

Summarising, the results show that national monetary policies in the European countries were not appropriated for every of the regions belonging to the country. In this sense, the adoption of the single currency and a common monetary policy will change the relative situation of these regions. These changes will not be equal for every region: there will be winners and losers and it is important that these changes are taken into account.

4 Conclusions

In this paper, we have considered the macroeconomic effects of the Economic and Monetary Union (EMU) at a regional level.

The methodological approach, based in the Theory of Optimum Currency Areas, has consisted in comparing the values of the correlation coefficients for different economic variables among every region, country and euro aggregates. The obtained results show that macroeconomic costs for every region of taking part into EMU will be different*:* there will be winners and losers.

However, it is important to remark that these conclusions should be taken with care for two reasons: First, as Wyplosz (1997) remarks, studies based on the Theory of Optimum Currency Areas are not able to consider all the effects of the European monetary integration process. In this sense, Krugman (1992) also affirms that the analysis of Optimum Currency Areas is far from giving an operative guide to take political decisions, but at least, it permits to be conscious of what we know and what we do not know. Second, a most important criticism is the applicability of the Lucas (1976) critique. Are the inferences based on historical data valid? Without doubt, the EMU implies a new economic framework for European economies. In fact, it will surely represent a structural break, a change that we cannot predict. So, although the results of the work are optimistic or pessimistic depending on the considered region, the attitude of citizens, firms and public institutions towards the euro will be determinant to take profit of the advantages derived of the single currency.

Further research will focus on two aspects: the consequences of these regional differences for the sustainability of EMU and the identification of the causes of this situation.

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7. Figures and tables

Table 1

Critical values of the Brandner and Neuser (1992) test for the different considered time periods		
Time period	*Observations*	$2/\sqrt{n}$
1962-1998	37	0.33
1982-1996	15	0.52
1981-1995	15	0.52
1983-1996	14	0.53
1987-1996	10	0.63
1987-1995	9	0.67
1989-1996	8	0.71

Table 2

Correlation coefficients among growth rates						
1962-1998	**GDP/POP**		**PRICES**		**WAGES**	
	EMU	**EU**	**EMU**	**EU**	**EMU**	**EU**
EMU		0.99		0.99		0.98
Austria	0.92	0.92	0.86	0.85	0.84	0.81
Belgium	0.94	0.93	0.88	0.88	0.87	0.87
Denmark	0.75	0.76	0.87	0.85	0.82	0.80
Finland	0.71	0.72	0.87	0.88	0.79	0.84
France	0.98	0.97	0.96	0.95	0.94	0.94
Germany	0.87	0.88	0.75	0.74	0.70	0.62
Greece	0.65	0.67	0.57	0.59	*0.33*	0.41
Ireland	0.55	0.54	0.91	0.91	0.85	0.90
Italy	0.94	0.93	0.97	0.96	0.89	0.89
Luxemburg	0.53	0.52	0.89	0.89	0.79	0.80
Netherland	0.92	0.92	0.71	0.71	0.74	0.68
Portugal	0.72	0.71	0.78	0.78	0.65	0.74
Spain	0.83	0.82	0.90	0.90	0.88	0.85
Sweden	0.87	0.88	0.83	0.85	0.69	0.74
United Kingdom	0.80	0.86	0.86	0.91	0.75	0.86
Average	0.80	0.80	0.84	0.84	0.78	0.77
Std. deviation	0.14	0.14	0.10	0.10	0.13	0.14

Correlations in italics are not significant according to critical values of the Brandner and Neuser (1992) test.

Table 3

Correlation coefficients among growth rates of GDP/POP			
1982-1996	**Belgium**	**EMU**	**EU**
Belgium		0.84	0.83
Région Bruxelles-capitale	0.77	0.54	0.55
Antwerpen	0.91	0.68	0.74
Limburg	*0.42*	*0.09*	*0.44*
Oost-Vlaanderen	0.90	0.80	0.92
Vlaams Brabant	0.76	0.68	*0.44*
West-Vlaanderen	0.91	0.80	0.80
Brabant Wallon	0.60	0.70	*0.36*
Hainaut	0.79	0.70	0.69
Liège	0.84	0.90	0.70
Luxembourg (B)	0.88	0.77	0.64
Namur	*0.35*	*0.21*	*0.17*
Average	0.74	0.64	0.61
Std. deviation	0.20	0.25	0.22

Correlations in italics are not significant according to critical values of the Brandner and Neuser (1992) test.

Table 4

Correlation coefficients among growth rates of GDP/POP			
1983-1996	**France**	**EMU**	**EU**
France		0.89	0.88
Ille de France	0.93	0.78	0.79
Champagne-Ardenne	0.82	0.87	0.83
Picardie	0.93	0.85	0.80
Haute-Normandie	0.66	*0.44*	*0.47*
Centre	0.96	0.82	0.82
Basse-Normandie	0.77	0.75	0.72
Bourgogne	0.93	0.78	0.78
Nord - Pas-de-Calais	0.91	0.75	0.73
Lorraine	0.91	0.84	0.84
Alsace	0.82	0.70	0.68
Franche-Comté	0.88	0.92	0.90
Pays de la Loire	0.88	0.87	0.87
Bretagne	0.90	0.69	0.70
Poitou-Charentes	0.86	0.74	0.73
Aquitaine	0.87	0.84	0.83
Midi-Pyrénées	0.90	0.86	0.84
Limousin	0.78	0.72	0.68
Rhône-Alpes	0.96	0.84	0.83
Auvergne	0.79	0.69	0.69
Languedoc-Roussillon	0.78	0.70	0.65
Provence-Alpes-Côte d`Azur	0.94	0.83	0.85
Average	0.87	0.77	0.76
Std. deviation	0.08	0.11	0.11

Correlations in italics are not significant according to critical values of the Brandner and Neuser (1992) test.

Table 5

Correlation coefficients among growth rates of GDP/POP							
1982-1996	**Germany**	**EMU**	**EU**	*1982-1996*	**Germany**	**EMU**	**EU**
Germany		0.86	0.85	Braunschweig	0.69	0.59	0.53
Stuttgart	0.72	0.61	0.55	Hannover	0.67	0.58	*0.52*
Karlsruhe	0.70	0.59	*0.52*	Lüneburg	0.66	0.59	*0.52*
Freiburg	0.70	0.60	0.53	Weser-Ems	0.66	0.58	*0.51*
Tübingen	0.70	0.61	0.54	Düsseldorf	0.69	0.58	*0.51*
Oberbayern	0.66	0.57	*0.50*	Köln	0.67	0.55	*0.48*
Niederbayern	0.69	0.59	*0.52*	Münster	0.67	0.56	*0.49*
Oberpfalz	0.69	0.59	*0.52*	Detmold	0.68	0.58	*0.51*
Oberfranken	0.70	0.59	*0.52*	Arnsberg	0.69	0.59	*0.52*
Mittelfranken	0.70	0.59	*0.52*	Koblenz	0.70	0.62	0.55
Unterfranken	0.68	0.58	*0.50*	Trier	0.71	0.63	0.55
Schwaben	0.69	0.58	*0.51*	Rheinhessen-Pfalz	0.71	0.62	0.56
Bremen	0.64	0.55	*0.48*	Saarland	0.70	0.60	*0.52*
Hamburg	0.67	0.55	*0.47*	Schleswig-Holstein	0.63	0.54	*0.46*
Darmstadt	0.67	0.58	*0.51*	Average	0.69	0.60	0.53
Gießen	0.65	0.56	*0.49*	Std. deviation	0.05	0.06	0.07
Kassel	0.66	0.57	*0.50*				

Correlations in italics are not significant according to critical values of the Brandner and Neuser (1992) test.

Table 6

Correlation coefficients among growth rates						
1982-1996 (GDP/POP)	**GDP/POP**			**WAGES/EMP**		
1981-1995 (W/EMP)	**Italy**	**EMU**	**EU**	**Italy**	**EMU**	**EU**
Italy		0.85	0.86		0.92	0.95
Piemonte	0.89	0.74	0.76	0.99	0.93	0.95
Valle d`Aosta	0.91	0.75	0.77	0.93	0.86	0.89
Liguria	0.91	0.74	0.72	0.99	0.91	0.95
Lombardia	0.93	0.78	0.81	0.99	0.92	0.94
Trentino-Alto Adige	0.86	0.79	0.79	0.98	0.88	0.93
Veneto	0.92	0.77	0.79	0.99	0.92	0.95
Friuli-Venezia Giulia	0.84	0.69	0.68	0.97	0.95	0.97
Emilia-Romagna	0.88	0.72	0.73	1.00	0.92	0.94
Toscana	0.90	0.67	0.68	0.99	0.91	0.94
Umbria	0.91	0.80	0.80	0.99	0.89	0.93
Marche	0.87	0.68	0.70	0.99	0.91	0.94
Lazio	0.87	0.76	0.78	0.98	0.87	0.93
Abruzzo	0.96	0.85	0.82	0.98	0.94	0.95
Molise	0.86	0.66	0.70	0.94	0.91	0.93
Campania	0.87	0.89	0.89	0.99	0.89	0.93
Puglia	0.83	0.67	0.70	0.98	0.90	0.92
Basilicata	*0.44*	*0.45*	*0.43*	0.94	0.85	0.89
Calabria	*0.39*	*0.12*	*0.14*	0.94	0.89	0.90
Sicilia	0.67	0.59	0.57	0.98	0.88	0.92
Sardegna	0.77	0.67	0.66	0.98	0.91	0.93
Average	0.82	0.70	0.70	0.98	0.90	0.93
Std. deviation	0.15	0.16	0.16	0.02	0.02	0.02

Correlations in italics are not significant according to critical values of the Brandner and Neuser (1992) test.

Table 7

Correlation coefficients among growth rates						
1982-1996 (GDP/POP)	**GDP/POP**			**WAGES/EMP**		
1981-1995 (W/EMP)	**Netherlands**	**EMU**	**EU**	**Netherlands**	**EMU**	**EU**
Netherlands		0.74	0.70		*0.51*	*0.44*
Groningen	*0.49*	*0.05*	*0.02*	0.97	0.57	*0.50*
Friesland	0.61	*0.49*	*0.46*	0.79	*0.44*	*0.35*
Drenthe	0.81	*0.50*	*0.44*	0.85	0.55	*0.47*
Overijssel*	0.87	0.87	0.82	0.99	*0.54*	*0.34*
Gelderland*	0.77	0.75	0.67	0.98	*0.52*	*0.30*
Flevoland	*0.23*	0.53	*0.49*	0.77	*0.27*	*0.11*
Utrecht	*0.37*	0.56	*0.51*	0.94	*0.50*	*0.47*
Noord-Holland	0.94	0.68	0.66	0.95	0.65	0.59
Zuid-Holland	0.68	0.78	0.74	0.99	*0.50*	*0.44*
Zeeland	*0.51*	0.56	0.56	0.86	*0.33*	*0.26*
Noord-Brabant	0.84	0.70	0.68	0.90	*0.31*	*0.24*
Limburg	0.75	0.56	0.55	0.88	*0.41*	*0.36*
Average	0.66	0.60	0.56	0.91	0.47	0.37
Std. deviation	0.22	0.20	0.20	0.08	0.11	0.13

Correlations in italics are not significant according to critical values of the Brandner and Neuser (1992) test.

* 1987-1996 (GDP/POP) and 1987-1995 (WAGES/EMP).

Table 8

Correlation coefficients among growth rates of GDP/POP			
1982-1996	**Portugal**	**EMU**	**EU**
Portugal		*0.46*	*0.49*
Norte	*0.39*	*0.22*	*0.22*
Centro (P)	*0.36*	*0.17*	*0.19*
Lisboa e Vale do Tejo	*0.34*	*0.04*	*-0.01*
Alentejo	0.56	*0.34*	*0.42*
Algarve	0.69	*0.35*	*0.43*
Aores*	0.90	*0.67*	*0.69*
Madeira*	0.80	*0.32*	*0.29*
Average	0.58	0.32	0.34
Std. deviation	0.21	0.18	0.20

Correlations in italics are not significant according to critical values of the Brandner and Neuser (1992) test.
* 1989-1996.

Table 9

Correlation coefficients among growth rates						
1982-1996 (GDP/POP)	**GDP/POP**			**WAGES/EMP**		
1981-1995 (W/EMP)	**Spain**	**EMU**	**EU**	**Spain**	**EMU**	**EU**
Spain		0.71	0.76		0.91	0.88
Galicia	0.67	*0.43*	*0.46*	0.87	0.78	0.76
Asturias	0.72	*0.46*	*0.51*	0.97	0.89	0.87
Cantabria	0.74	0.58	0.62	0.87	0.81	0.77
Pais Vasco	0.78	*0.51*	0.54	0.94	0.85	0.80
Navarra	0.67	*0.39*	*0.42*	0.95	0.86	0.82
La Rioja	0.76	0.62	0.63	0.76	0.69	0.67
Aragón	0.91	0.62	0.69	0.93	0.87	0.85
Madrid	0.92	0.69	0.72	0.96	0.89	0.87
Castilla y León	0.59	*0.20*	*0.25*	0.97	0.89	0.87
Castilla-la Mancha	0.87	*0.49*	0.57	0.84	0.79	0.77
Extremadura	*0.49*	*0.30*	*0.34*	0.84	0.81	0.80
Cataluña	0.95	0.74	0.78	0.96	0.86	0.83
Comunidad Valenciana	0.86	0.65	0.69	0.96	0.87	0.84
Baleares	0.75	0.70	0.70	0.90	0.86	0.86
Andalucia	0.94	0.66	0.69	0.89	0.80	0.77
Murcia	0.71	0.62	0.65	0.88	0.73	0.72
Canarias	0.77	0.56	0.66	0.88	0.84	0.82
Average	0.77	0.55	0.59	0.90	0.83	0.81
Std. deviation	0.13	0.15	0.15	0.06	0.06	0.06

Correlations in italics are not significant correlations according to critical values of the Brandner and Neuser (1992) test.

Table 10

Country	Potential losers in terms of the macroeconomic cost of not having a national monetary policy*			
	EMU		EU	
Belgium	------		Vlaams Brabant	Brabant Wallon
France	Haute-Normandie		Haute-Normandie	
Germany	------		Karlsruhe Oberbayern Niederbayern Oberpfalz Oberfranken Mittelfranken Unterfranken Schwaben Bremen Hamburg Darmstadt Schleswig-Holstein	Gießen Kassel Hannover Lüneburg Weser-Ems Düsseldorf Köln Münster Detmold Arnsberg Saarland
Italy	------		------	
Netherlands	Friesland	Drenthe	Friesland	Drenthe
Portugal	Alentejo Algarve	Aores Madeira	Alentejo Algarve	Aores Madeira
Spain	Galicia Asturias Pais Vasco	Navarra Castilla y León Castilla-la Mancha	Galicia Asturias Pais Vasco	Navarra Castilla y León Castilla-la Mancha

*Regions with a significant correlation with its countries but not with the EMU or with the EU.

Table 11

Country	Potential winners in terms of the macroeconomic cost of not having a national monetary policy*	
	EMU	EU
Belgium	Brabant Wallon Liège	Oost-Vlaanderen
France	Champagne-Ardenne Franche-Comté	Franche-Comté
Germany	------	------
Italy	Campania	Campania
Netherlands	Flevoland** Utrecht** Zuid-Holland Zeeland**	Zuid-Holland Zeeland**
Portugal	------	------
Spain	------	------

*Regions with a higher correlation with the EMU or with the EU despite of that correlation were significant or not with its Country.

**Regions with no significant correlation with its country but significant with the EMU or EU.