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EMU: some unanswered questions

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**39th Congress of the European Regional Science Association
23-27 August 1999, Dublin**

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EMU: SOME UNANSWERED QUESTIONS

(Preliminary version)

ABSTRACT: Following the Optimum Currency Areas approach, recent theoretical and empirical studies have concluded that asymmetric shocks play a fundamental role to assess the success of EMU. In a previous study, we found strong evidence supporting a reduction of asymmetric shocks at a national level in the most recent years. Taking into account these results, one should expect that benefits of EMU would overweight costs. However, there are some other questions that should be considered. In this paper, we analyse the possible consequences of the reduction of asymmetric shocks on regional convergence, putting special attention to differences in the transmission of the single monetary policy and the implications of the Stability Pact at a regional level.

Keywords: EMU, Optimum currency areas, Asymmetric shocks, Convergence, Monetary transmission mechanisms, Stability Pact.

EMU: SOME UNANSWERED QUESTIONS

1. Introduction

Most studies that have analysed the possible effects of the European Monetary Unification process following the Optimum Currency Area approach have concluded that the success of EMU is related to the degree of flexibility and cyclical symmetry of the European economies.

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, a high degree of flexibility is needed to achieve macroeconomic stabilisation. However, there is a wide consensus that European countries have a lower response capacity in front of adverse asymmetric shocks than other currency areas, so the role of asymmetric shocks is a key question. In this sense, the most optimistic view about the risks associated to asymmetric shocks (specific shocks that cannot be dealt by a common monetary policy) is given by the European Commission (1990) in the report “One Market, One Money”. In this study, the Commission predicts that asymmetric shocks will tend to reduce as a result of the greatest co-ordination among European countries, the increase of intra-industry trade and the similarities of European economic structures. The alternative view, defended among others by Krugman, suggests that the complete removal of barriers to trade and the improvement of functioning of the Single Market as a result of the Monetary Unification will increase the productive specialisation of European regions. As a result, shocks will tend to be more asymmetric.

The debate about the relevance of asymmetric shocks as a key element to assess the net benefits of EMU is not closed yet. Some recent studies, such as Frankel and Rose (1997) or Ramos *et al.* (1999), indicate that shocks experienced by European countries have tended to be more symmetric. However, one of the main shortages of this kind of analysis is that the possible asymmetries derived from differences in the transmission of monetary policy between the countries taking part in the currency area have not been considered. As Kieler and Saarenheimo (1998, p. 1) affirm: “Important differences in the impact of the single

monetary policy would be a potential source of cyclical divergence and could impose significant adjustment demands on other economic policies”. However, and in spite of its relevance, this fact has not been explicitly analysed since recent years.

The objective of this paper is to analyse the implications of the existence of different responses to common monetary shocks at a regional level in a well-established currency area as a way to evaluate the potential asymmetric effects of the Single Monetary Policy on the Euro Zone countries and regions. In particular, we analyse the different impact of monetary policy on output and prices evolution in the Spanish regions. The structure of the paper is as follows: First, the main mechanisms of monetary policy transmission are analysed from a theoretical perspective; second, the available empirical evidence about different responses to monetary shocks and its determinants is reviewed; and next, the main results about asymmetries in output and prices response to monetary shocks in the Spanish regions are shown; and, last, the paper finishes summarising the main implications of these results in relation to EMU.

2. The mechanisms of monetary transmission

As it is well known, monetary policy can be a very useful tool to correct macroeconomic disequilibria. However, sometimes the implementation of a particular monetary policy can have unexpected or unwanted consequences related not also to the existence of lags between the adoption of the measure and its effects but also to the magnitude of these effects. These adverse consequences are usually related to the characteristics of the mechanisms through which monetary policy influences real economy. These mechanisms are known as “transmission mechanisms or channels”. In the literature, four different mechanisms have been identified: The interest rate channel, the exchange rate channel, the asset prices channel and the credit channel.

From a very simple point of view, interactions between financial variables and non-financial activity can be reduced and simplified to interactions between interest rates and non-financial activity. In this sense, the underlying presumption of this literature is that monetary authority exercises power over economic behaviour of private-sector agents by influencing the financial (opportunity) cost relevant to the spending decisions of these agents and the main implication of this view is that variations in the interest rate operating through changes in the cost of

capital are extremely important in the monetary transmission mechanism (Taylor, 1995). This is called the interest rate channel. In Taylor's model, contractionary monetary policy raises the short-term nominal interest rate and then, through a combination of sticky prices and rational expectations, the real long-term interest rate rises as well, at least for a time. These higher real interest rates lead to a decline in business fixed investment, residential housing investment, consumer durable expenditure and inventory investment, which produces the desired decline in aggregate output. This mechanism is based, then, on the well-known IS-LM keynesian model. Following this view, the main features of the transmission of the monetary policy are related to the extent that the central bank interest rate is being used in the economy and to the other factors such as the "life" of financial contracts (if the interest rate is fixed for a long period of time, the effect of monetary policy will be lower).

Another factor through which changes in monetary policy instruments influence non-financial activity operates through the exchange rate (Menon, 1995). The interpretation of the exchange rate channel is related with the impact on non-financial activity of monetary policy decisions through movements in the balance of payments. Under flexible exchange rates, a change in the domestic instrument variable *ceteris paribus* elicits movements in the exchange rate. This channel also involves interest rates effects, because when domestic real interest rates rise, domestic national currency deposits become more attractive relative to deposits denominated in foreign currencies leading to a rise in the value of national currency deposits relative to other currency, which causes a appreciation of the national currency. The higher value of the domestic currency makes domestic goods more expensive than foreign goods, thereby causing a fall in net exports and hence in aggregate output (altering the relative prices of national and foreign goods).

As Meltzer (1995) emphasises, a key objection to the keynesian paradigm for analysing monetary policy effects on the economy (present in the two previously presented "channels"), is that it only focuses on one relative asset prices, the interest rate (and the exchange rate but in relation to it). The description of the Japanese experience during the 80s and 90s in Meltzer (1995) shows how monetary policy can have a relevant impact on non-financial activity through its effect on land and property values. This channel, known as asset prices channel, relative prices channel or stock market channels, assumes that monetary policy has influence on the prices (and composition) of agent's assets portfolios through changes in the opportunity cost and, as a result, when agents try to bring into balance their portfolios (having

effects on their consumption decisions), the investment decisions of firms that are quoted at the stock market are also affected. Following this theory, the main source of differences in monetary transmission will be related to the extent to which the agents hold financial assets whose prices may vary in reaction to unexpected changes in monetary policy.

However, these channels of monetary transmission (or at least the most traditional: interest rate and exchange rate) have recently received considerable criticism as it is assumed that credit markets tend to come back to equilibrium. In fact, the main criticism to the previous approaches is related to the assumption of perfect information and the lack of consideration of incentive problems. In this alternative view, financial prices do not clear the credit market (Bernanke and Gertler, 1995). This approach to the transmission process is known as the credit channel. In this case, the efficient functioning of the market credit is hindered by asymmetries in information between borrowers and lenders, resulting in principal-agent problems. These problems lead to endogenous and varying credit conditions with help to shape the transmission of monetary policy decisions to economy. This uncertainty generates a potential important role for financial intermediaries who specialise in gathering and distilling agent-specific information. The implication is that financial intermediaries, usually banks, play a unique role in the monetary transmission process, acting as an interface between the policy decisions of the central bank and non-financial activity.

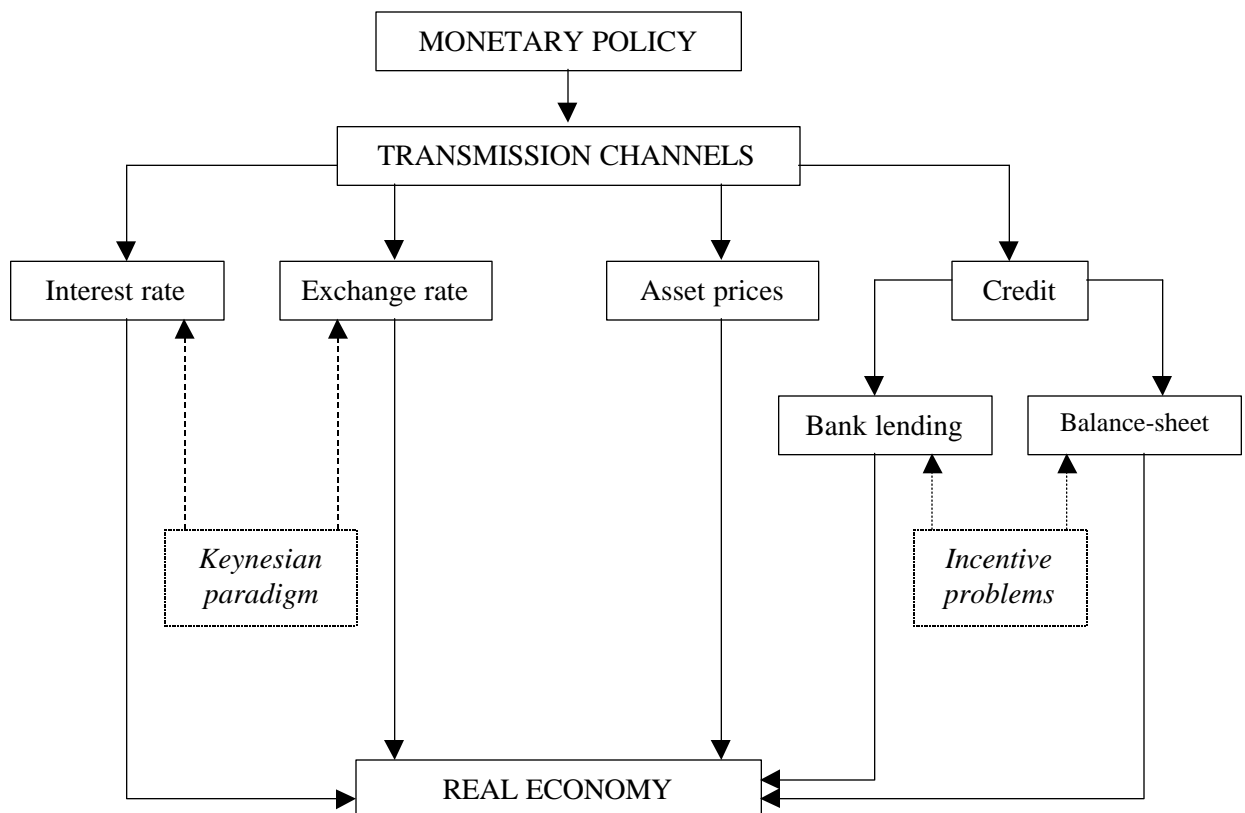
Bernanke and Gertler (1995) emphasise how asymmetric information and costly enforcement of contracts creates agency problems in financial markets. Two basic channels of monetary transmission arise as a result of agency problems in credit markets: the bank lending channel and the balance-sheet channel.

The bank lending channel is based on the view that banks play a special role in the financial system because they are specially well suited to deal with certain types of borrowers, especially small firms where the problems of asymmetric information can be very pronounced. In this context, the relationships between small firms and banks play a strategic role in the transmission of monetary policy. The way this channel works is the following: assuming that the total available quantity of credit is limited, a restriction of bank credit will restrict the investment possibilities of small firms (but not for large firms as they can access to credit through stock markets), translating the restrictive effects, through multiplier-effects, to the rest of the non-financial sector.

The balance-sheet channel operates through the net worth of business firms and this is related with the ability of firms to borrow. In this literature, the borrower's financial position is influenced by the monetary policy and the business cycle. Under a restrictive monetary policy, the firm's asset prices are lower reducing the net worth of the firm while the cost of external financing is higher making investment much more difficult. As Schmidt (1999) remarks, for firms with problems to access external credit markets, there is an "external finance premium cost" which is a positive function of the interest rate: the cost moves in the same direction as a consequence of the own situation of the firm.

Summarising, although there is not a complete agreement (and probably not a full understanding on the way the monetary policy works), both real economy and financial factors play a fundamental role in the transmission of monetary policy and in the possible asymmetries that generates. In the next section, a brief summary on the available empirical evidence on asymmetries on the transmission of monetary policy and its determinants is done.

Figure 1. Monetary policy transmission channels



3. Empirical evidence on asymmetries on the transmission of monetary policy and its determinants

There is a broad empirical evidence on the existence of asymmetries on the transmission of monetary policy. In this sense, it is possible to identify three different and well-defined research lines: First, some authors use different econometric techniques to identify and quantify the existence of asymmetries in the effect of monetary policy on output; second, other authors justify the lack of agreement of the previous group remarking that the effects of monetary policy are asymmetric between countries as they are in different stages of the business cycle; and, last, the third group are interested in obtaining empirical evidence about the determinants of the asymmetries considering the two previous lines of research.

In reference to the first research line, probably the one with the widest diffusion, there are significant differences among countries in terms of output response to monetary shocks. However, there is no agreement about the classification of countries in term of these differences. As Kieler and Saarenheimo (1998, p. 32) affirm: “the results have generally varied a great deal and, as a result, no consensus regarding the likely extent of nature of these differences has arisen”. In this sense, the analysis of different time periods, different assumptions about the exchange rate system in the considered countries and the use of different econometric techniques (large scale macroeconomic models, single equation models or structural VAR models, among others, see Britton and Whitley, 1997) would explain this lack of agreement.

The second research line previously mentioned justifies the previous results assuming that the effects of monetary policy are asymmetric over the business cycle and, as a result, countries in different stages of the cycle would experience different responses to a common monetary shock. The empirical evidence obtained by Kakes (1998) for Germany, Belgium, the United Kingdom and the United States and María (1997) for Spain show that monetary policy is much more effective during expansions than during recessions. However, differences among countries in output responses to monetary shocks are not completely explained by this hypothesis.

For this reason, the third considered research line focuses on identifying using empirical evidence, but taking as a starting point the previously explained framework of monetary

policy transmission channels, the possible determinants of different responses to a common monetary shock. The main features of this approach are the following: First, measures of the long-run response of output to a monetary shock are obtained (using one of the different econometric techniques proposed in the literature, for example, VAR models); and, second, using the obtained measures as endogenous variables, a multiple regression analysis is carried out using as explanatory those related to differences in the monetary policy transmission channels. The most important references in this research line are Carlino and DeFina (1998, 1999) who have analysed the case of the American States and of countries participating in EMU. De Lucio and Izquierdo (1998) have also applied this methodology for the case of Spanish regions.

Carlino and DeFina (1998) consider that asymmetries of monetary policy should be analysed in the presence of a common monetary policy but usually the fact that every country has been subjected to its own monetary shocks during the considered period is not taken into account being this one of the main deficiencies of the first group of authors. In this sense, the analysis of differences in monetary policy output response between European countries would be especially difficult, as there is no available historical data. To solve this problem, Carlino and DeFina (1998) extrapolate the evidence obtained for the American States (which have been exposed to a common monetary policy for a long period and where important differences were detected) to analyse the case of European countries. In particular, in a first step, they identify the possible determinants of asymmetries for the American case using the previously exposed methodology and the influence of these determinants on the long-run response of output to a common monetary shock. In a second step, they combine the estimates of the influence of these determinants with European data. The determinants of the differences in output responses are related to the economic and financial structure of the considered territories, which can be summarised as follows:

- i. *The industry-mix of the territory:* The existence of different elasticities of the domestic demand to changes in the interest rates can explain different responses of output to a common monetary shock. For example, residential investment does not react to changes in monetary policy in the same way as capital goods investment. This variable is related to differences in the effectiveness of the interest rate channel in every territory;

- ii. *The size of the firms in the territory:* As relationships between financial intermediaries and small firms are very different to relationships between banks and big companies. As a result, a greater concentration of small firms in a given territory will explain part of the different responses to monetary policy. This variable reflects, partially, the different peculiarities in the asset prices and credit transmission channels; and,
- iii. *The financial structure of the territory:* This variable can be measured as the percentage of loans given by local banks, the relative weight of the 3 first banks or other similar ratios. This variable is related with the bank channel.

The consideration of these characteristics for European countries show that countries as Spain, Finland and Ireland have a greater response than France, Netherlands or Italy to a common monetary shock while Germany, Austria, Belgium, Luxembourg and Portugal have a very similar response and near to the average. In this sense, the results of Carlino and DeFina (1998) show evidence in favour of the possibility that differences in monetary policy responses could generate asymmetries in output evolution and, as a result, higher potential costs derived from EMU.

A possible critique for these results is related with the dangers of extrapolating the results for the American states to the European regions. To solve this problem, other possibility consists in analysing the relevance of differences in monetary policy response in a well-established currency area. In this sense, the analysis of European countries at a regional level offers this possibility. De Lucio and Izquierdo (1998) analyse the case of the Spanish regions using the long-run response of employment to a common monetary shock as an endogenous variable to identify the possible determinants of asymmetries. The explanatory variables of the different response are very similar to the ones found by Carlino and DeFina (1998, 1999).

Summarising, the literature reviewed in this section, there is a clear evidence about the existence of national/regional asymmetries in responses to a common monetary policy and its possible determinants. However, there is little research done on evaluating the existence of asymmetries using direct information about these determinants and, which is more important, in relating these differences with a lower cyclical symmetry on output evolution at a regional level. In the next section a methodology is proposed to obtain a direct indicator of the relative response of Spanish regions to a common monetary shock using data about its determinants

and, next, we analyse the implications of the existence of these asymmetries on regional output evolution. The implications for EMU are clear and straightforward.

4. Implications for the European Regions: The Spanish case

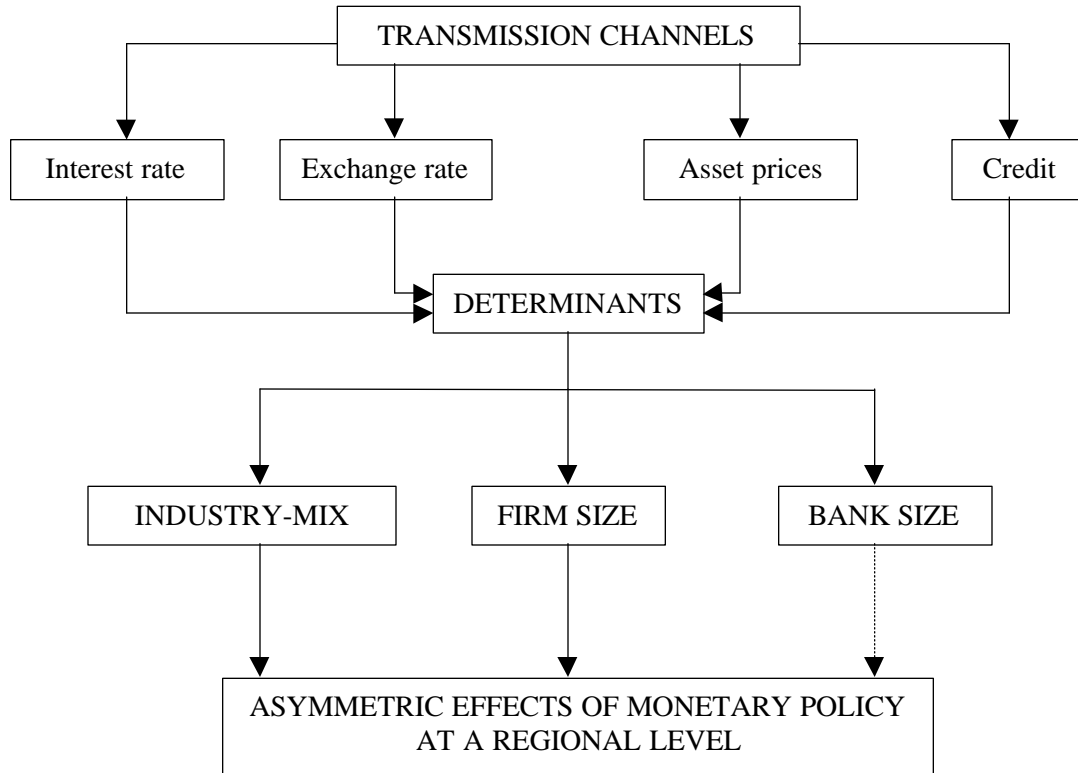
As it has been previously exposed, the existence of different responses to a common monetary policy can increase the degree of asymmetry among countries or regions taking part in a currency area. The objective of this section consists in analysing the relevance of the different impacts of monetary policy as a determinant of different output and prices evolution at a regional level. First, a methodology to obtain a measure of the regional relative response to a common monetary shock is proposed and second, the relationships between this indicator and the output and prices evolution are considered.

4.1. Methodology and data

The results obtained by previous authors summarised in the previous sections remark the relevance of differences in economic and financial structures as determinants of the regional response to monetary policy (see figure 2).

In reference to the first aspect, as it has been stated in the introduction, from a theoretical perspective it is possible that regional differences in economic activity will increase under EMU. If this happens, the regional response of output to monetary policy will be more different increasing the asymmetry and making more difficult macroeconomic adjustment in participating countries. Although the available empirical evidence does not reflect any important change in the most recent years in terms of an increase of specialisation, nowadays there are important differences in the regional industry-mix, which allow the existence of different responses. In this sense, together with the differences in the size of firms located in the territory, these are the factors that must be taken into account to evaluate the existence of different regional responses to a common monetary shock

Figure 2. Theoretical and empirical determinants of the asymmetric effects of the monetary policy



In respect to the second aspect, as Rodriguez-Fuentes (1997, p. 217) affirms for the Spanish case that: “... we could assume that the degree of (financial) development is homogeneous in a given country as the financial system is not subjected to any kind of segmentation at a regional level from an institutional point of view...” However, as the same author remarks (p. 219): “the fact that regulations do not promote a regional market segmentation does not imply that there is no segmentation”. In this sense, the most important factor that can act as a differentiating is the existence of region-specific financial agents. However, the effects of regional banking on responses to monetary policy are not clear. In fact, they could be ambiguous: on one hand, regions with a bigger number of region-specific banks could be less affected by national monetary policy than the rest; but, on the other hand, it is possible that if there is a great competition between regional and not-regional banks the response could be greater. Moreover, it seems plausible that after the introduction of the Euro, the single currency could act as “a catalyser, increasing the competition and accelerating structural changes in the financial sector, promoting a real single market of financial services” (ECB, 1999). Taking into account this fact, it is possible that regional differences on financial

structures will tend to vanish. In table 1, it can be seen that the degree of bank concentration in European countries is converging to similar values. Other relevant factor, is the reduction of the need of having a vast and extensive network of bank offices in the territories where the financial agents wants to operate. Thanks to new information technologies and to the increase of competition between regional and non-regional financial institutions, there is a clear incentive to operate in the greatest number of territories as marginal costs are continuously decreasing.

Table 1. Bank concentration at a national level: Deposits of the five most important financial entities as a percentage of total financial deposits

	1985	1990	1995	1997
Belgium	48,0	48,0	54,0	57,0
Denmark		13,9	16,7	16,7
Spain	38,1	34,9	45,6	43,6
France	46,0	42,5	41,3	40,3
Ireland	47,5	44,2	44,4	40,7
Italy	20,9	19,1	26,1	24,6
Luxembourg			21,2	22,4
Netherlands	69,3	73,4	76,1	79,4
Austria	35,9	34,6	39,2	48,3
Portugal	61,0	58,0	74,0	76,0
Finland	51,7	53,5	68,6	77,8

Source: ECB (1999)

Taking into account the previous exposition, if we want to evaluate the existence of differences in regional responses to monetary policy, we should consider information about three different aspects: the industry-mix, the firm size and the financial structure. However, the most important are the two first as it seems quite plausible that regional differences in financial structures will tend to disappear (or at least reduce) in a near future. For this reason, the methodology that we propose to analyse the different impact of monetary policy will only consider the two first determinants.

In particular, the industry-mix of the territory is approximated by two different variables: the relative weights of the manufacturing and the building sectors on the total Gross Added Value (GAV) of the region. In this sense, as the manufacturing and the building sectors are much more sensitive to monetary policy decisions than other sectors (keynesian transmission mechanisms), in regions where these sectors are more important, the response to monetary shocks will be higher than in the rest.

In respect to the size of regional firms, the firm size has been approximated by the average number of workers per establishment in every region. Firms with a higher number of workers (a bigger size) have more possibilities to access capital markets or to have more capacity for self-financing. So, if firms located in a given region are bigger than firms in the other, monetary policy would be less effective there than in the others.

In this sense, the regional response of a given region to a monetary shock in relation to the rest of regions in the country will be determined by the values of these three variables: it will be higher than in the rest if the manufacturing and the building are more relevant in the considered regions, and it will be lower, if the average firm size is higher than in the rest. So, if we are interested in identifying those regions in a country with a higher or lower relative response to monetary policy, it is possible to elaborate a regional indicator combining the values of these variables for every region in deviations from the national average. Thus, the value of the indicator for the Spanish region j will be given by the following expression:

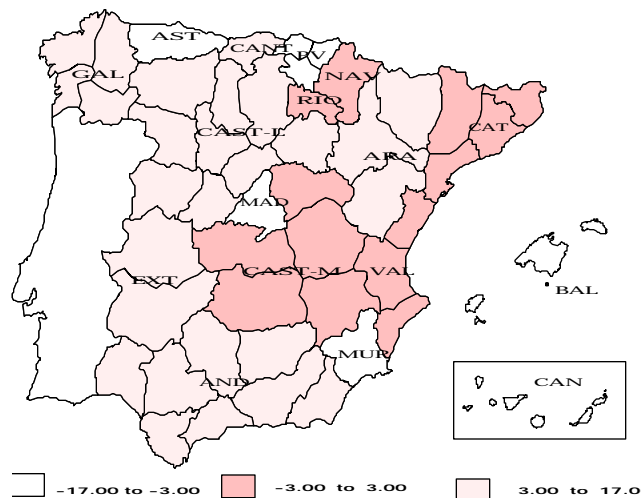
$$IND^j = (X_1^j - X_1^{esp}) + (X_2^j - X_2^{esp}) - (X_3^j - X_3^{esp})$$

where X_1^j is the relative weight of manufacturing sector in region j , X_1^{esp} is the relative weight of the manufacturing sector in Spain, X_2^j is the relative weight of the building sector in region j , X_2^{esp} is the relative weight of the building sector in Spain, X_3^j is the average size of firms located in region j , and X_3^{esp} is the average size of firms located in Spain. As it has been previously stated, the influence of the first two variables on the indicator (the regional response) would be positive, while the third would be negative. So, if the indicator takes positive values, the regional response to a common monetary shock would be higher to the response at a national level, and, if it takes negative values it would be lower.

Data for the three variables are the average value for the period 1985-1992. The analysis of this period for the Spanish economy is specially relevant as it includes both an expansive phase of the business cycle and a contractive one and also different monetary policy measures (see annex 3). Averaging the data for explanatory variables is also appropriate, as we are interested in analysing the average behaviour during the sample period. Averaging also minimises the possibility that the results are affected by business-cycle dynamics (although the average period is relatively short due to data availability). The data source for the relative weights of manufacturing and building is Eurostat-Regio and data for the average firm size come from DAISIE Annual industrial survey (New cronos). Both data are shown in annex 1.

The obtained values of the indicator of the regional relative response to a common monetary shock for the Spanish regions are also shown in annex 1 and are represented in figure 3. As it can be seen regions with the highest response are the Mediterranean regions joint with Castilla-La Mancha, Rioja and Navarra, while regions with the lowest response are Madrid, Murcia and Cantabric regions. In general terms, the obtained classification is similar to the one obtained by De Lucio and Izquierdo (1998). The proposed indicator has also been calculated for different countries at a national level and the obtained results have been compared with the ones by Carlino and DeFina (1998). As it can be seen in annex 2, both results show that Ireland and Spain have greater responses to a common monetary shocks that France, Italy and Netherlands.

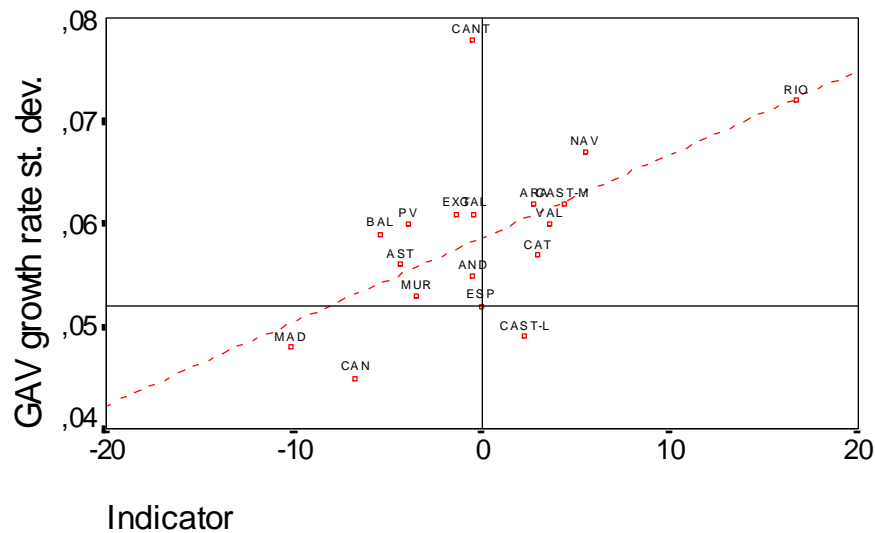
Figure 3. Regional indicator of monetary policy relative responses



4.2. Implications of the empirical results

But, which are the implications of the existence of these differences? From a theoretical perspective, if some regions response with higher intensity to a common monetary shock than the national average, when the shock is positive (expansive monetary policy), the regional output growth rate will be higher than the national average, and, when the shock is negative (contractionary monetary policy), the regional growth will be lower. If this is true, the regional cyclical component of output evolution will be higher than the national component in regions with higher responses to monetary policy. In other words, the variance of output in these regions will be higher than the variance of national output. Figure 4 represents the relationship between the standard deviation of the regional GAV growth rate and the indicator of the regional relative response to monetary policy. As it can be seen, there is an empirical positive relationship between both variables. These results reinforce, then, the idea that different responses to a common monetary policy can increase the degree of cyclical synchrony of regional economies and, as a result, it can increase the costs of taking part in a currency union.

Figure 4. Relationship between the GAV growth rate standard deviation and the indicator of monetary policy relative responses

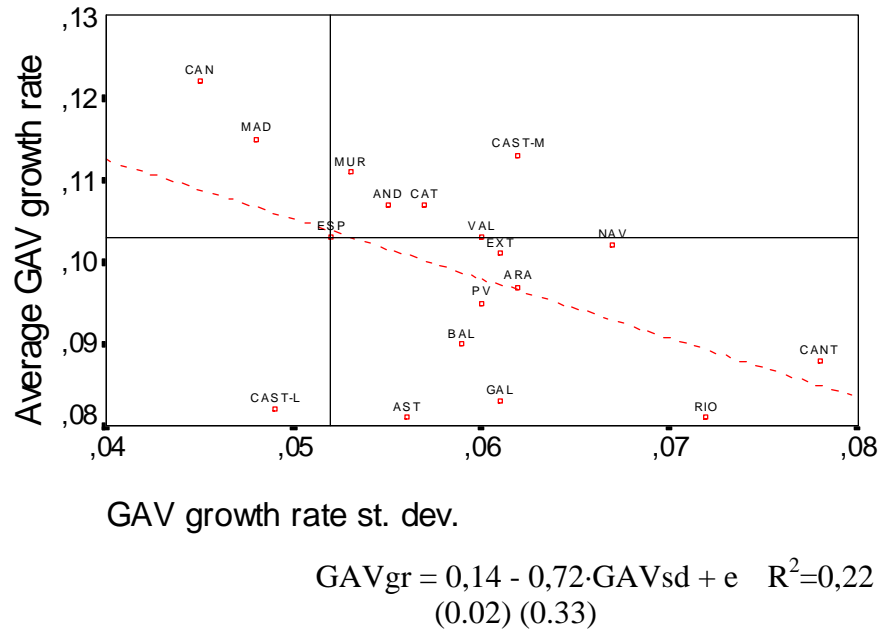


$$\text{GAVsd} = 0,58 + 0,8 \cdot 10^{-3} \cdot \text{IND} + e \quad R^2 = 0,34$$

(0.002) (0.3 · 10⁻³)

Moreover, other fact, which would be even more worrying, is that those regions with a higher variance of output have also experienced a lower output growth rate than the average (see figure 5). This fact would imply that regions with a higher variance of output (higher response to a monetary shock) grow less than the average. This result is consistent with the empirical evidence obtained by Laxton *et al.* (1995) for G-7 countries. However, the relationship between both facts is not probably as simple as it has been stated, so future research should be done to clarify this point.

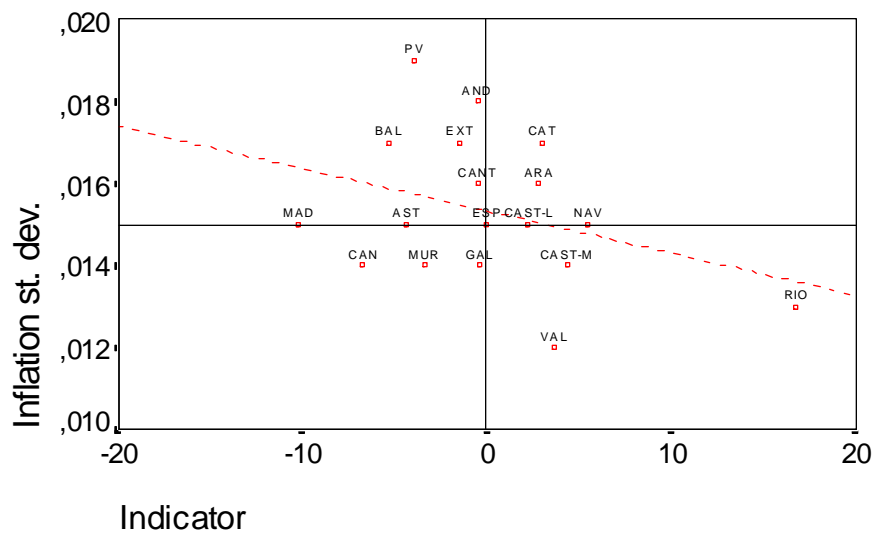
Figure 5. Relationship between the average GAV growth rate and the GAV growth rate standard deviation



Other relevant aspect that has to be considered is what has happened to prices in regions with a higher relative response. In this case, there is not a clear agreement on what happens with regional inflation where the response to monetary shocks is higher than the rest. Following classical theories, the response of prices to a monetary shock will be instantaneous. In fact, the movements of prices in regions with a higher response to monetary shocks should be higher than in the rest (in a similar way to output variations). So, if this view were true, one would expect that the variance of inflation in regions with higher response would be higher than in the rest. However, following (neo) keynesians theories, the existence of rigidities and different responses of prices will make unclear the previous prediction. Other factor that should be taken into account is the possibility that prices react more quickly to expansive

monetary policies than to contractionary ones (see Tinsley and Krueger, 1997). Under this last assumption, if prices are not fully flexible, the existence of different regional responses will not always imply a higher value of the variance of regional inflation than the national one. In figure 6 the relationship between the standard deviation of regional inflation and the regional indicator of relative responses to monetary shocks is represented. As it can be seen, the sign of the relationship is negative, the opposite of the sign predicted by classical theories. However, no strong conclusion can be extracted from this. Something similar happens when the relationship between the average regional inflation and the indicator of relative response to monetary policy is considered (see figure 7).

Figure 6. Relationship between the inflation standard deviation and the indicator of monetary policy relative responses



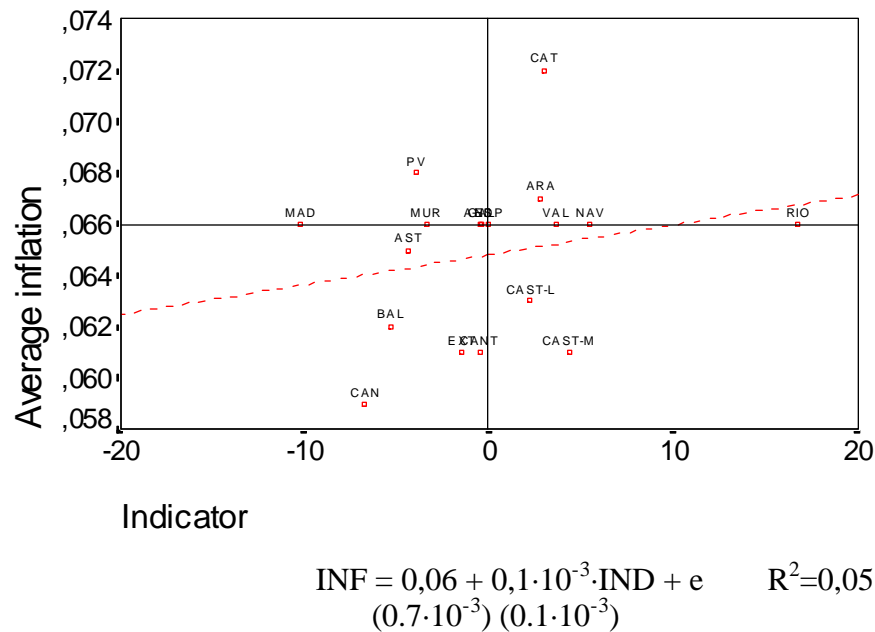
$$\text{INFsd} = 0,02 - 0,1 \cdot 10^{-3} \cdot \text{IND} + e \quad R^2 = 0,05$$

$$(0,4 \cdot 10^{-3}) \quad (0,07 \cdot 10^{-3})$$

So, which are the implications of the obtained results for EMU? In spite of the simplicity of the analysis and the possible deficiencies of the proposed indicator, some facts can be remarked: First, the theoretical and empirical literature reviewed in the paper suggests the existence of important differences between regions in terms of responses to common monetary shocks. Second, after elaborating a regional indicator of relative responses to common monetary shocks using direct data of the determinants of asymmetries related to the different transmission mechanism of monetary policy, a clear relationship exists between a higher response to monetary policy and a higher variance of output for the Spanish case. Also,

there seems to be a negative relationship between the variance of regional output and the regional output average growth rate, while no conclusion can be extracted from the existing relationships between responses to monetary policy and inflation. In this sense, the obtained results suggest that the potential risk of increasing asymmetries as a result of differences in the transmission of a common monetary policy at a European level can be real. As under a higher real asymmetry, macroeconomic adjustment would be more difficult under EMU, it seems clear that any reform addressed to increase the efficiency of financial and monetary markets could help to reduce the adverse effects of a single monetary policy (see European Commission, 1997 and Costas and Bel, 1998). The main objective of these economic policies would be to reduce the risk of “policy-induced” asymmetric shocks.

Figure 7. Relationship between the average inflation and the indicator of monetary policy relative responses



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ANNEX 1

Table A.1.1. Data for Spanish regions (average value 1985-1992)

	Regions	% Manufacturing	% Building	Average firm size	Reg. indicator
<i>ESP</i>	<i>Spain</i>	<i>21,30</i>	<i>7,81</i>	<i>13,8</i>	<i>0</i>
GAL	Galicia	16,61	8,87	11,3	-0,33
AST	Asturias	20,13	8,68	18,8	-4,31
CANT	Cantabria	25,32	6,62	18,6	-0,48
PV	País Vasco	31,30	5,24	27,0	-3,88
NAV	Navarra	33,97	6,42	20,5	5,54
RIO	Rioja	38,70	5,31	13,0	16,80
ARA	Aragón	23,37	7,02	12,9	2,87
MAD	Madrid	17,41	7,19	20,4	-10,17
CAST-L	Castilla-León	19,67	8,06	10,9	2,32
CAST-M	Castilla-La Mancha	17,41	9,42	7,3	4,39
EXT	Extremadura	6,79	11,37	4,8	-1,38
CAT	Cataluña	27,75	6,69	17,4	3,07
VAL	Comunidad Valenciana	23,23	7,03	11,9	3,68
BAL	Baleares	7,64	8,00	6,7	-5,32
AND	Andalucía	14,56	9,52	10,2	-0,46
MUR	Murcia	14,45	8,22	11,6	-3,41
CAN	Canarias	6,91	9,23	8,0	-6,72

Source: Eurostat-Regio (1st and 2nd column) and DAISIE Annual industrial survey (NEW CRONOS) (3rd column)

Table A.1.2. Data for Spanish regions (averages and standard deviations 1985-1992)

	Regions	GAV av.	GAV s.d.	CPI av.	CPI s.d.
<i>ESP</i>	<i>Spain</i>	0,103	0,052	0,066	0,015
GAL	Galicia	0,083	0,061	0,066	0,014
AST	Asturias	0,081	0,056	0,065	0,015
CANT	Cantabria	0,088	0,078	0,061	0,016
PV	País Vasco	0,095	0,060	0,068	0,019
NAV	Navarra	0,102	0,067	0,066	0,015
RIO	Rioja	0,081	0,072	0,066	0,013
ARA	Aragón	0,097	0,062	0,067	0,016
MAD	Madrid	0,115	0,048	0,066	0,015
CAST-L	Castilla-León	0,082	0,049	0,063	0,015
CAST-M	Castilla-La Mancha	0,113	0,062	0,061	0,014
EXT	Extremadura	0,101	0,061	0,061	0,017
CAT	Cataluña	0,107	0,057	0,072	0,017
VAL	Comunidad Valenciana	0,103	0,060	0,066	0,012
BAL	Baleares	0,090	0,059	0,062	0,017
AND	Andalucía	0,107	0,055	0,066	0,018
MUR	Murcia	0,111	0,053	0,066	0,014
CAN	Canarias	0,122	0,045	0,059	0,014

Source: Own elaboration from Eurostat-Regio (1st and 2nd columns) and INE (3rd and 4th columns).

ANNEX 2

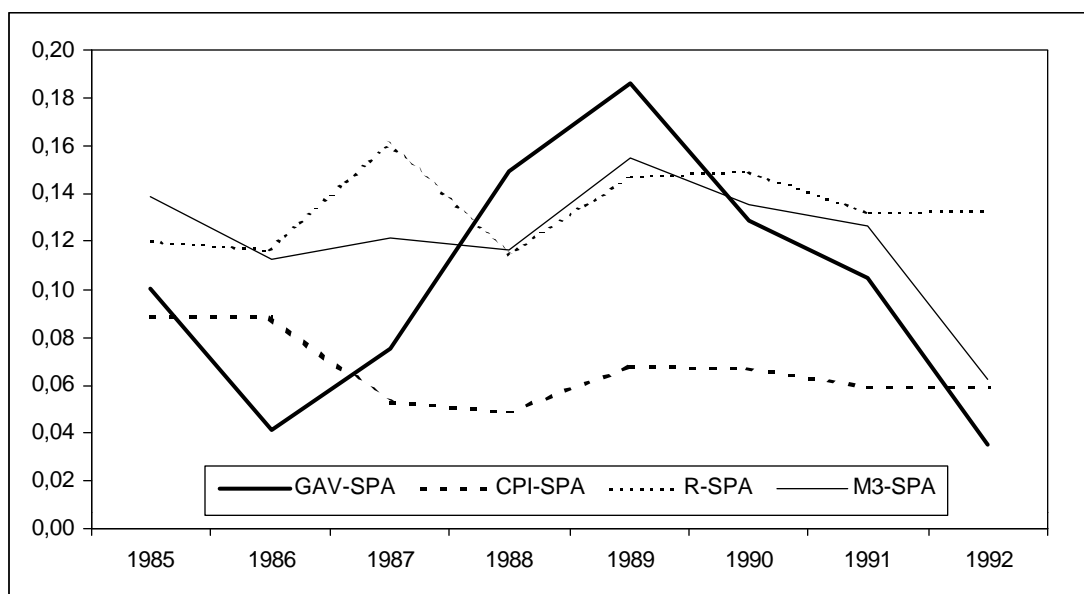
Table A.2.1. Comparison at a national level between the proposed indicator and the long-run response of output in front of a monetary shock obtained by Carlino and DeFina (1998)

	% Manufacturing	% Building	Average firm size	Indicator	Carlino-DeFina
Spain	20,80	7,84	13,79	47,57	2,05
France	20,92	5,47	72,72	-13,60	1,42
Netherlands	18,55	5,48	94,16	-37,41	1,42
Ireland	29,88	5,52	44,71	23,41	2,20
Italy	23,98	5,97	82,64	-19,97	1,43

Source: Own elaboration from Eurostat-Regio (1st and 2nd column); DAISIE Annual industrial survey (NEW CRONOS) (3rd column) and Carlino and DeFina (1998).

ANNEX 3

Figure A.3.1. Evolution of main macroeconomic variables in Spain from 1985 to 1992 (annual growth rates, except for interest rates –R–)



Source: Eurostat (GAV) and INE (Consumer Prices Index, Interest Rates and M3).