International Review of Business Research Papers
Vol. 5 No. 4 June 2009 Pp. 335-353

Financial Structure And Bank Lending: Asymmetries Of A European Monetary Policy

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The implementation of the common monetary policy by the Euro-system seems a difficult task since it should cause important asymmetries of economic activity across regions. It is argued that part of the heterogeneous effects in the response on output reflects different transmission mechanisms. This triggers the question of how much the transmission of the common European monetary policy differs across the member states of EMU? This paper addresses this question in three steps. Firstly, I focus on the link between monetary policy and financial structure, the bank credit channel, because this channel is determined by imperfections in the financial markets and can capture the heterogeneous financial systems across countries. Secondly, I identify the most notable differences in financial structure, especially in the banking system, for a number of EMU members which are United Kingdom, Germany, France, Italy and Spain. I also rate these countries according to the strength of the monetary transmission mechanism. Finally, I demonstrate the existence of the bank credit channel across European countries and the role of this channel in explaining the asymmetries of a European monetary policy, using a Vector Autoregressive (VAR) model.

Keywords: Bank Credit Channel, Monetary Policy Transmission Mechanism, Financial Statistics.

Major Field of Research: Banking and Economics.

1.- INTRODUCTION

From the early 90´s the EU countries were preparing for the beginning to the European Economic and Monetary Union (EMU) which occurred in January 1999. During this period, the member countries co-ordinated their economic policies in order to maintain low inflation rates and promote the fiscal consolidation. The result of this harmonization has been a higher synchronization of business cycles in the EU countries (Mihov, 2001). However, the implementation of the common monetary policy by the ECB appears to be a difficult task since it could cause important asymmetries of economic activity across regions, mainly because of the economic structural differences that still remain. In particular, wage-price setting practices and financial structures differ across countries. Both features establish that a common monetary shock transmission may generate important distributional effects in the Euro zone.

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This paper focuses on the relationship between monetary policy and financial structure through the bank credit channel, which emphasizes the role of the banking system in the monetary policy transmission. Since banks are deposit taking institutions, and rarely fund themselves with non-reservable forms of finance, a monetary contraction that decreases reserves will lead banks to cut back on the loan supply. Those borrowers that rely on bank lending – because they do not have access to public bond markets – will be led to cut back on investment, and ultimately, on aggregate economic activity. As I argue below, this channel might influence the potency of monetary policy. If a financial system is well-developed, banks are healthy, and the bank concentration ratio is high, then bank credit will play no role in the transmission of monetary impulses and output responses will coincide with those that predict the interest rate channel or money view. In the opposite sense, the lending channel is to be stronger and aggregate money channel effect will be amplified.

Following on form (Kashyap and Stein, 1997a) and (Cecchetti, 1999), who focus on the importance of the banking system in explaining the distributional effects of monetary policy changes, the goal of this paper is twofold. Firstly, to identify the most notable differences in financial structure for a number of EMU countries – Germany, Spain, France, Italy and United Kingdom –, and then, to demonstrate the existence of a heterogeneous impact of monetary policy on output – size and timing - across such countries, highlighting the role that the bank credit channel plays in explaining these asymmetries of European monetary policy.

The remainder of this paper is divided as follows. In section 2, I analyse the causes of the asymmetric effects of the monetary shocks, and I provide a brief survey of the empirical evidence of these asymmetries, focusing on the differences in the monetary transmission. Section 3 establishes the importance of financial structure in the monetary policy mechanism trough the role of the bank credit channel. Section 4 identifies the most notable differences in financial systems across countries, and reports estimates of the differential impact of an interest rates increase on output and bank loans, consistent with the bank credit view, and finally, section 5 presents the conclusions drawn from this.

2. Asymmetric Effects Of Monetary Policy: Causes And Empirical Evidence.

Can we consider the EMU as an optimal currency area[1] (Mundell, 1961), in which a common monetary policy operates in a similar way across all the countries in the Union? A growing body of empirical literature addresses this issue and there is consensus on the asymmetric effects of monetary shocks, but not on what causes such differences.

Why do the effects of monetary shocks on economic activity differ, in magnitude and in timing, across countries? According to the body of empirical literature there are at least three justifications. Firstly, ***wage-price structure*** determines that wages (prices) rigidity leads to a great reduction of output after monetary contraction because the aggregate demand decreases more than if the wages (prices) setting is flexible – (Guiso *et al.,* 1999) –.

Secondly, Central Banks' ***reaction functions*** vary considerably across countries, because the official interest rates responses to different shocks depend on the authorities' preferences with respect to inflation and output targeting – (Clements *et al.*, 2001) –[2].

And thirdly, ***transmission mechanism of monetary policy*** can differ across European countries[3]. Monetary transmission channels can be divided mainly into three different channels[4]. The *interest rate* (or *money*) *channel* which is based on the monetary authorities modifying the official interest rates, which determine the interest rates on the monetary market. Given a restrictive monetary policy, the real interest rates increase, affecting the aggregate spending – (Mihov, 2001), (Guiso *et al.,* 1999), (Dedola and Lippi, 2000), (Clements *et al.,* 2001), and (Carlino and DeFina, 1998) –.

The *exchange rate channel* determines that a monetary contraction will raise domestic interest rates relative to foreign rates and, consequently, domestic currency will be appreciated, reducing net exports and then aggregate output. The magnitude of this channel depends on the country's openness – (Dornbusch *et al.,* 1998) –.

And lastly, the *credit channel* that focuses on financial market imperfections as an important factor of propagation and amplification of the money channel effects. It operates in two ways: a) the *balance sheet channel* points up how the problems of informational asymmetries between lenders and borrowers determine a cost spread between the external finance and self-financing – called the external finance premium –, which increases after a monetary contraction, reducing access to credit markets for firms (specially medium and small sized firms) and households – (Bernanke, Gertler and Gilchrist, 1994), (Bernanke and Gertler, 1995), and (Hubbard, 1994) –; b) the *bank credit channel* emphasizes the role of banking sector in the transmission of monetary policy. Since banks are deposit taking institutions and rarely fund themselves with non-reservable forms of finance, a monetary tightening that decreases reserves will lead banks to cut back on loan supply and those borrowers that rely on bank lending – because they do not have access to public bond markets – will be led to cut back on

investment, and ultimately, on aggregate economic activity – (Bernanke and Blinder, 1988, 1992), (Romer and Romer, 1990), and (Kashyap and Stein, 1994, 1997) –.

The advantage of this last sub-channel is that it identifies as a principal cause of the asymmetric effects of a common monetary shock the cross-country differences in financial structure. If financial system is well-developed, banks are healthy, and the bank concentration ratio is high, then bank credit will play no role in the transmission of monetary impulses and output responses will be in line with those that predict the interest rate channel or money view; in the opposite sense, the lending channel is to be stronger and aggregate money channel effect will be amplified.

The empirical evidence on the impact on output and prices of monetary policy across the countries in the union adopt the VAR methodology, which presents some advantages: it estimates the dynamic economic effects of monetary policy and permits to adopt different schemes identifying monetary shocks according to the monetary authorities' reaction functions. However, this approach has been criticised at least in two ways: a) the estimated parameters can not capture the economic structure in each country and then the model does not indicate what economic structures cause the differences across countries; b) since the VAR model focuses on the effects of monetary shocks – when monetary decisions deviate form their normal reaction function – it does not give any information about the consequences of a systematic monetary policy.

The results of some studies which adopt this methodology are reporting as follows. The baseline model of the VAR includes output, prices, short-term interest rates – (Gerlach and Smets, 1995), (Ramaswamy and Sloek, 1997), and (Kieler and Saarenheimo, 1998) –, and exchange rate, which extends to monetary aggregate – (Barran *et al.*, 1995), (Dedola and Lippi, 2000), and (Clements *et al*., 2001) –, bank credit – (Barran *et al*., 1995) and (Clements *et al.,* 2001)) –, and specific variables of each country: an information variable about the central bank's behaviour (Ehrmann, 1998), oil prices and German interest rates (Mihov, 2001), and US' output and interest rates for Germany and German interest rates for France, Italy and Spain (Mojon and Peersman, 2001).

Regarding to the identification scheme of monetary policy, the most studies rely on Cholesky Decomposition that is, monetary policy effects output and prices with a lag of one period and reacts contemporaneously to macroeconomic variables imposing the following order in variables: output, prices, short-term interest rates, monetary aggregate, exchange rate, and the rest of specific variables – except (Barran *et al.,* 1995) in which short-term interest rates changes affect contemporaneously to macroeconomic variables –. On the other hand, (Kieler and Saarenheimo, 1998) adopt different identification for each country and avoid the *price puzzle* problem but do not find any significant differences across countries. Following on this line, (Sala, 2001), through a Dynamic Factor Model, identifies a common monetary shock, which coincides with German monetary shock, and obtains cross-country differences in output, more persistent in France and Spain.

The rest of studies show differential impact across economies but differ in magnitude and in duration. It can stand out the higher response in the UK in short and long run

when the interest rate channel is only taking into account (Gerlach and Smets, 1995), joins to German output response in (Ramaswamy and Sloek, 1997). However, when exchange rate is including the impact of monetary policy is weaker in UK and the heterogeneous response across countries decreases, except in (Mihov, 2001) in which German output contraction is almost twice as much as than the other countries after two years. Finally, (Clements *et al.,* 2001) compare the differences in output responses of monetary policy during the pre-EMU and under EMU periods, and conclude that a common monetary policy generates stronger effects in all countries, and the adoption of fixed intra-EMU exchange rate imposes higher costs to adjust to monetary policy changes.

Summing up the evidence reviewed, the assumption of different priors and different methodology imply that the results are often not comparable across countries and not even across studies. Therefore, this empirical evidence is not quite valid to asses neither the power of monetary policy nor the ranking of differences of a single monetary policy on the Euro area countries.

3. The Bank Credit Channel And Financial Structure.

As (Bernanke y Blinder, 1988) have shown, in order for the bank credit channel to work and have a real effect due solely to a modification in bond interest rates, ***two conditions are necessary***: 1) that the agents who depend on the banks to finance them cannot obtain other sources of finance; 2) that the banks do not have another source to attract funds that is a perfect substitute for reserve deposits.

Just how well both hypotheses can be fulfilled depends on the workings and development of the financial system. The ***first condition*** is much more likely to be fulfilled even though a tendency exists nowadays towards financing through the securities market instead of using banking intermediaries; however, on an aggregate level, the banking system still plays a crucial role in financing businesses, especially small and medium sized ones.

As far as the ***second condition*** is concerned, the following question would have to be answered in the affirmative: Can the monetary authority affect the bank credit supply by manipulating the amount of reserves available for the banking sector? At least four factors exist that weaken or can break the relationship between reserves and the credit supply:

i) *the importance of the non-banking intermediaries*: if the volume of credit provided by the agents were considerable, and these institutions did not need to finance themselves via deposits subject to reserve requirements, then the relationship between the Central Bank and the aggregate credit supply would be very weak;

ii) *the maintenance of bonds as a buffer against reserves shocks*: what would be the reaction of a bank in the case of a reduction in its deposits after a monetary

contraction? The bank would have at least three alternatives: reduce its offer of credit, sell some bonds to obtain liquidity or, increase alternative sources of finance (Certificates of deposit (CDs), shares, short and long term bonds,...). In order to complete the second condition some type of adjustment in the credit supply would be necessary. This would require (with regard to the second alternative since the third one will be analysed in the next factor) that the proportion of bonds to total assets low in relation to the proportion of credit;

iii) *the bank's ability to use non-reservable forms of finance*: Using the size, the concentration and bank health as proxy variables for the ability of the banks to access other forms of finance which are not subject to reserve requirements, it can be shown that where there are healthy banking systems with a high concentration of only a few banks in the marketplace, problems of asymmetric information between investors and the banks issuing new instruments to capture funds can be reduced, it being easier to get them and, thus, compensating for a reduction in deposits without changing the credit supply;

iv) *the impact of capital requirements*: if the banks must maintain an amount of capital as a percentage of its risk assets, and if the issue of new shares is costly for a bank (due to the information problems that accompany the issue of new shares), then the banks will prefer to hold more bonds that are not subject to these requirements rather than invest in new credits (risk assets). Under these circumstances, the higher the regulation on the volume of capital, the lower will be the impact of monetary policy on output due the bank credit channel not being able to fully operate.

4. Measuring The Role Of Bank Lending In The Monetary Policy Transmission Mechanism.

4.1.- Characteristics of financial structures and their implications for the importance of bank credit in the transmission of monetary impulses.

This section will present data concerning those characteristics of the financial systems of the countries included in this study which are relevant in order to determine how much of the 2 necessary conditions need be fulfilled for the bank credit channel to exist.

First condition: *Can the economic agents who are bank-dependent access to other forms of finance?*

Looking at **Table 1** one can appreciate the high degree of dependency that households have on bank financing, being growing except in Italy and United Kingdom. For non-financial enterprises is lower but increasing – except in United Kingdom where there has been a slight decrease –.

Does this fact point to the development of new, outside, non-banking means of finance? **Table 2** shows other financial instruments such as shares, securities and trade credit. It is worth noting that firms substitute bank financing by these new means of finance in Spain, Italy, and United Kingdom. This supposes that the impact of monetary policy could be reduced, as enterprises would substitute bank credit for these other financing forms following a monetary contraction.

Table 1. Bank financing for households (HH) and non-financial enterprises (NFE), 1983-2007.

Share of liabilities with banks:	D		E		F		I		UK	
	HH	NFE	HH	NFE	HH	NFE	HH	NFE	HH	NFE
1983	99.2	-	90.8	-	77.3	-	-	-	93.3	77.6
1993	100.0	14.9	88.3	-	82.2	-	94.6	-	97.5	49.4
2000	99.1	8.2	85.2	28.4	77.0	36.3	85.1	23.2	74.6	41.8
2007	99.4	14.7	94.1	34.7	82.5	35.8	72.2	25.1	64.4	36.9

Source: 1983-1993: (BIS, 1995); 2000-2007: *National Financial Accounts* of Bundesbank, Banco de España, Banque de France, Banca d´Italia; Bank of England.

Table 2. Non-financial enterprises sector balance sheet, 1983-2007.

Country	Period	Equity/GDP	Securities/GDP	Trade credit granted/GDP	Trade credit received/GDP
Germany	1983	20	37.6	7.5	4.6
	1993	30	55.9	5.7	3.5
	2000	9.4	0.5	1.3	7.9
	2007	1,1	0.6	0.2	0.2
Spain	1983	20	6.8	40.1	30.6
	1993	35	4.5	32.1	20.8
	2000	141.7	57.5	61.4	57.6
	2007	221.2	123.1	71.8	69
France	1983	50	34.9	42.4	40.2
	1993	215	41.8	49.3	39.4
	2000	8.5	0.2	1.9	3.8
	2006	5.7	0.6	1.2	0.6
Italy	1983	-	16.9	-	2.5
	1993	50	20.2	-	2.3
	2000	93.1	1.5	23	21.4
	2007	116.3	4.2	25.1	23.5
United Kingdom	1983	50	1.6	19.4	20.3
	1993	120	21.4	14.7	15.5
	2003	0.4	13.7	3.0	3.0
	2007	1.0	38.9	7.3	6.9

Source: 1983-1993: (BIS, 1995); 2000-2007: *National Financial Accounts* of Bundesbank, Banco de España, Banque de France, Banca d´Italia; Bank of England.

One can conclude, although the data provided is not exhaustive concerning access to other sources of finance, these sources are greater in Spain and Italy, followed by the United Kingdom and in last place would be France and Germany.

Second condition: *Can the monetary authority affect the bank credit supply?*

The importance of the non-banking intermediaries.

The percentage of credit available by Other Financial Institutions (OFIs) – **Table 3** – is very low in all cases – except in United Kingdom –, which would make one expect that following a reduction in reserves, ceteris paribus, one could expect a contraction in credit availability at the aggregate level.

Table 3. Banks loans and other financial intermediaries, 1983-2007.

	Percentage of total loans							
	1983		1993		2000		2007	
	Banks	OFIs	Banks	OFIs	Banks	OFIs	Banks	OFIs
Germany	84	16	89	11	96	4	94	6
Spain	98	2	91	9	94	6	96	4
France	88	12	85	15	78	22	95	5
Italy	89	11	89	11	90	10	91	9
United Kingdom	-	-	36	64	70	30	56	44

Source: (BIS, 1995); *National Financial Accounts* of Bundesbank, Banco de España, Banque de France, Banca d´Italia; Bank of England.

Holdings of bonds as a buffer against reserves shocks.

The proportion of liquid assets to total is decreasing in relation to the proportion of loans in Spain and Italy. This composition of the asset portfolio supposes that banks in these countries find it more difficult to compensate for a reduction in reserves through the sale of liquid assets, being obliged to reduce their credit supply; whilst French, German and British banks can react to a negative monetary shock without altering their credit.

Table 4. Banking structure, 1998-2005.

	Germany		Spain		France		Italy		UK	
	1998	**2005**	**1998**	**2005**	**1998**	**2005**	**1998**	**2005**	**1998**	**2005**
Number of Banks	3207	1665	243	215	332	393	759	959	-	202
Liquid assets/Total assets	0.17	0.54	0.41	0.31	0.40	0.61	0.40	0.38	0.16	0.48
Loans/Total assets	0.56	0.38	0.46	0.62	0.40	0.30	0.39	0.54	0.84	0.46
Capital and Reserves/Total assets	0.06	0.05	0.13	0.10	0.09	0.06	0.11	0.11	0.07	0.07

Source: 1998: (*Ehrmann et al.,* 2001) and Bank of England, *Monetary and Financial Statistics,* for UK; 2005: *Bankscope.*

The ability of banks to use alternative forms of finance rather than deposits.

Looking at **Table 5**, we see that France has the most highly concentrated banking system, followed by the United Kingdom and Spain. Germany – with a large number of small banks – is where the credit channel can play a major role, followed by Italy. Looking at the data pertaining to the health of the banking system – **Table 6** –, the United Kingdom shows itself to be the healthiest system, followed by Spain, Germany,

France and Italy. Therefore, one can suppose that the British banks will find it easiest to obtain other types of funds, as opposed to the Italian banks where the possibility of finding them will be very difficult, and, therefore, the credit offer will play an important role in the transmission of monetary impulses. Spain, Germany, and France will have an intermediary position.

Table 5. Size and bank concentration, 1995-2005.

	Germany		Spain		France		Italy		UK	
	1995	**2005**	**1995**	**2005**	**1995**	**2005**	**1995**	**2005**	**1995**	**2005**
Number of Banks	3500	1588	318	196	1453	281	269	379	40	159
Percentage of assets in 5 largest banks	17	34	49	45	47	55	29	34	57	45
Percentage of assets in 10 largest banks	28	44	62	54	63	78	45	40	78	63

Source: 1995: (BIS, 1995); 2005: *Bankscope.*

Table 6. Bank health, 1993-2005.

	Germany		Spain		France		Italy		UK	
	1993	**2005**	**1993**	**2005**	**1993**	**2005**	**1993**	**2005**	**1993**	**2005**
Number of Banks	3627	1665	317	215	1569	393	296	959	38	202
ROA	0.22	0.37	0.20	0.81	0.15	0.52	-0.01	0.78	1.84	0.53
Profit before tax/Total assets	0.26	0.41	0.45	0.96	0.00	0.58	0.11	1.00	0.67	0.65
Loan losses/Total loans	0.17	1.19	4.09	0.50	2.56	1.32	7.47	4.72	1.21	0.62
Risk Ratings [(a) (b)]	B/C	BBB	B/C	BBB	B/C	BBB	C	BBB	B	AAA

Source: 1993: (Kashyap and Stein, 1997a); 2005: *Bankscope.*
[(a)] For 1993 Thomson Ratings (from most to least health): A > A/B > B > B/C > C > C/D > D > D/E > E.
[(b)] For 2005 Fitch Ratings (from most to least health): AAA>AA>A>BBB>BB>B>CCC>CC>RD>D.

Capital requirements

In Spain and Italy we can see that banks have the highest level of capitalisation – **Table 4** –, then in these countries the bank credit reaction will not be as great as in Germany and the United Kingdom that have lower ratios.

Conclusion

To conclude, it is possible to order countries in terms of the magnitude of their output reaction following a monetary shock, taking into account how far the 2 conditions necessary for the bank credit channel to be operative are met. Thus, establishing a scale from least to most fulfilling (1 to 3) of every determining factor – **Table 7** –, shows that Germany's output will have the biggest reaction, followed by France. Italy and Spain, and in last place will be the United Kingdom where the impact of monetary policy will be less important[6].

Table 7. Summary of determinants of bank credit channel and effectiveness of monetary policy.

Country	1st Condition	2nd Condition				Effectiveness of Monetary Policy [(a)]
	Availability of Non Bank Financing	Importance of Non-Bank Intermediaries	Importance of Bonds	Availability of Alternative Finance	Capital Ratio	
Germany	3	3	1,5	2	3	**2.5**
Spain	2	3	3	1,5	1	**2.1**
France	3	3	1	2	3	**2.4**
Italy	2	2,5	2.5	3	1	**2.2**
UK	2	1	2	1	3	**1.8**

[(a)] Average of five previous columns.

4.2.- Measuring the impact of monetary policy on output and bank credit.

Using the VAR methodology, I estimate the impact on output and bank credit following a monetary contraction. The model used is the following:

$$Y_t = \sum_{i=1}^{k} A_i Y_{t-i} + \sum_{i=0}^{k} B_i X_{t-i} + C\varepsilon_t$$

Where vector Y represents the main macroeconomics variables – production, inflation y interest rate –, while vector X encompasses a monetary aggregate, the exchange rate and bank credit. Adopting the Cholesky's triangular decomposition in matrix C, the order introducing the variables in VAR is: production, prices, interest rates, monetary aggregate, exchange rate and bank credit, so the last three will be affected simultaneously by a monetary impulse. A more detailed description of the data can be found in Appendix.

Figure 1 shows the reactions of output, prices and bank credit, following a 100 basic point increase in interest rates. The first result worthy of note is the increase in prices following a monetary contraction in every case – the *price puzzle* –, which is, the monetary authorities anticipate inflationary pressures due to offer shocks and decide to reduce money supply in order to reduce these stresses.

In **Table 8** one can see the differences in the reduction in output, in both magnitude and duration, amongst the countries. The United Kingdom stands out in first place in both the short term and after 2 years, followed by Germany, Italy, Spain and France; however, whilst recuperation begins after the first year in the United Kingdom, it occurs after the second year in Germany, Italy, Spain and France. Moreover, looking at the effect on bank credit, this is reduced immediately following an increase in interest rates in Germany, the United Kingdom, and France, whilst in Spain and Italy this does not happen until more than a year later.

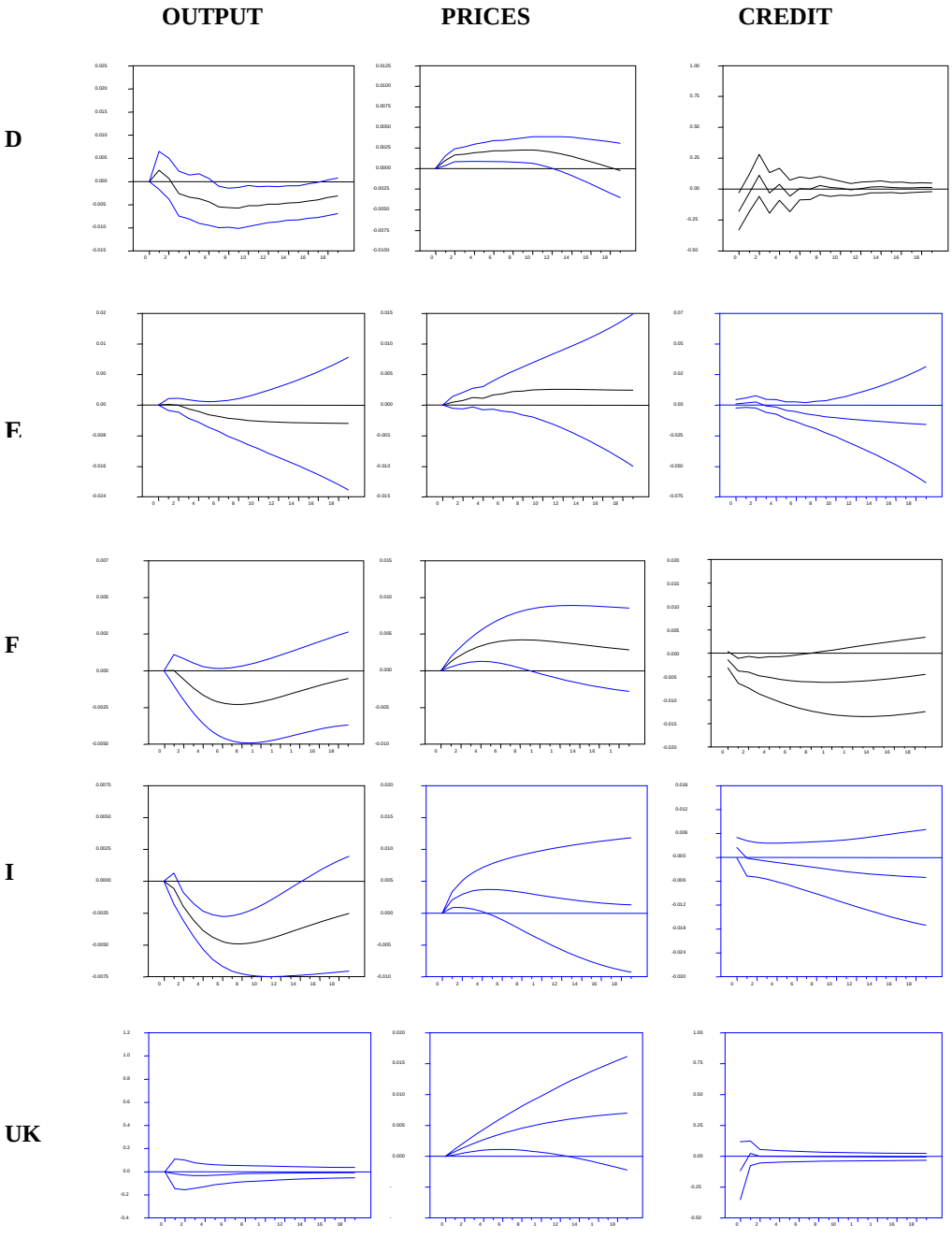
Table 8. Impact of interest rates shock on output and bank credit.

	OUTPUT		CREDIT	
	First year	**Second year**	**First quarter**	**First year**
Germany	-0.33	-0.56	-18.65	-1.47
Spain	-0.17	-0.36	0.12	-0.04
France	-0.15	-0.20	-0.14	-0.45
Italy	-0.37	-0.46	0.23	-0.09
UK	-2.8	-1.4	-9.54	-0.15

Note: Data are in percentage points.

Although these results disagree with those in **Table 7**, where Germany followed by France and Italy, were the countries where it was predicted that monetary policy would have a greater effect, and the effect would be felt less in Spain and the United Kingdom, this evidence confirms the different role that the bank credit channel analysed in the last section has.

Figure 1. Responses on output, prices, and bank credit to monetary shocks.



5.Conclusions.

In the presence of the new challenge that the ECB is facing concerning the differential impact that its single monetary policy could have amongst the member states of the EMU, this paper has focused on the importance of the different financial structures in the transmission of monetary impulses – through the different level of effectiveness of bank credit channel – as a possible justification for these asymmetries, since if this transmission route exists then effects on output will be greater than those only due to changes in interest rates.

The characteristics of the financial systems, that are relevant in order to determine the fulfilment of the two conditions necessary for the bank credit channel to exist have been analysed: 1) the economic agents who depend on the banks for financing can not access other sources of finance, and 2) the banks do not have another source to attract funds that are a perfect substitute for deposits. The characteristics looked at were the composition of the debts of non-financial enterprises and households, the importance of non-banking intermediaries, the structure of the banks' balance sheet, the size and bank concentration, and the banks' solvency. The conclusion that has been drawn, along with the evidence that different financial structure exist between countries, is the different grade of effectiveness of credit channel and, therefore, the strength of monetary policy; Germany is the country where a monetary shock could have the biggest effect on output, followed by France, Italy, Spain and the United Kingdom.

To corroborate these conclusions an estimation has been made of the reaction of output, prices and bank credit in the face of an increase in official interest rates using the VAR methodology and it has been found that the differential response of production between countries agrees with that which the grade of performance of the bank credit channel predicts.

However, this last result is not very convincing due to the specification problems of the VAR system that have brought about the price puzzle phenomenon, so a solution would be to include a variable belonging to the reaction function of each Central Bank, and to collect information concerning future inflation. Although this alternative would allow a more precise estimate of the impact on production, it wouldn't be able to precisely explain what the reduction in bank credit was due to, if it was due to a contraction in demand or to a reduction in the banks' credit supply. Determining the cause is important because only in the second case would it imply the existence of the bank credit channel, so the effects of monetary policy would be amplified. A way to avoid this ambiguity is by using disaggregate data from the banking system of each country. Future investigation in order to determine the role of banks in the transmission of monetary policy, and therefore be a source of the generation of asymmetries should take this aspect into account.

Notes

[1] There are at least three conditions that accompany to an optimal currency area: first, agreement on the ultimate goals to be achieved through monetary policy; second, business cycles alignment, and third, similar monetary policy transmission mechanism across countries.

[2] For an extensive analysis about the reaction functions see (Dornbusch *et al.,* 1998) for Germany, France, Italy, Spain, Sweden, and the UK; and (Mihov, 2001) for Germany, France, and Italy.

[3] See (Britton and Whitley, 1997), (Kieler and Saarenheimo, 1998), and (Guiso *et al.*, 1999) for a survey of the empirical evidence on the five major European countries monetary transmission mechanisms.

[4] See (Mishkin, 1995), (Meltzer, 1995), and (De Bondt, 1997) for a survey of the different transmission channels of the monetary shocks.

[5] The empirical evidence is based on historical pre-EMU data; past forecasts of economic variables may no longer be relevant after January 1999. However, it is to be expected that EMU has not brought a sharp structural break because agents adjust their behaviour gradually and furthermore, the reaction function of the ECB imitates the behaviour of central banks in the past regime. Taking this into account, a study based on past experience would be informative about across-country differences in the transmission mechanism of a common monetary policy.

[6] (Kashyap and Stein, 1997a) found the United Kingdom to be the country least sensitive to the bank credit channel; Spain and Germany were in an intermediary position, next France and finally Italy which was the most sensitive to monetary policy. On the other hand, (Cecchetti, 1999) using 3 indicators – the importance of small banks, bank health and the ability of financing from alternative non banking sources – found the following order from the least to the most reaction: the United Kingdom, Spain, Germany and France and, finally, Italy.

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APPENDIX

VAR MODEL ESTIMATION

Database: *Main Indicators,* OECD. *Annual Report,* BIS 1996. *Monetary and Financial Statistic*s, Bank of England.

Samples and Lags:

Country	Sample	Lags[(1)]
Germany	1974:1 – 1998:4	4
Spain	1980:1 – 1998:4	3
France	1978:1 – 1998: 2	2
Italy	1975:1 – 1998:4	2
United Kingdom	1986:4 – 2002:2	1

[(1)]According to Likelihood Ratio Test, except in the UK where I adopt one lag because the sample is very short.

Variables: GDP in real terms or the Industrial Production Index for Germany (output), Consumer Price Index, CPI (prices), the Central Bank official bank interest rates (short term interest rates), M3 for Germany, Spain and France; and M2 for Italy and the United Kingdom (monetary aggregate), the exchange rate of the German mark against the dollar for Germany, and the British pound against the dollar for the United Kingdom, and bank credit to private sector. In Germany, Spain, France, and Italy the variables are in billion euros; in the UK in million pounds sterling.

Estimation of VAR Model: The series of GDP, monetary aggregate and bank credit are transformed in real terms. It applies logarithms to GDP, monetary aggregate, bank credit, prices and exchange rate. Each equation includes dummies seasonal variables.