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Working Paper **6369**

NBER WORKING PAPER SERIES

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Working Paper 6369
http://www.nber.org/papers/w6369

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
January 1998

Prepared for the Twenty-Sixth Economic Policy Panel Meeting, Bonn, 17/18 October, 1997. We thank Luca Cazzulani for his help as a research assistant. Carlo Favero worked on this paper during a visit at the economics department of the University of California at San Diego. We are indebted to David Begg, Claudio Borio, Hans Genberg, Andrew K. Rose, Guido Tabellini and Robert Waldmann for their insightful suggestions. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

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NBER Working Paper No. 6369
January 1998
JEL Nos. E44, E58

ABSTRACT

This paper discusses a number of issues that the newly constituted Board of the ECB will face early on. We show how conducting a European monetary policy is very different from living under the protective umbrella of the Bundesbank. We discuss voting on the ECB Board, and argue that the ability to communicate to the public will be a critical factor for the success of the new institution. We also ask how a single monetary policy -- a common change in the interest rate controlled by the ECB -- is transmitted to the economy of the member countries. We show that the monetary process differs significantly inside EMU: initially, at least, the cost of a disinflation episode could thus fall very unequally on a few member countries because they have a combination of financial structure that spreads a monetary contraction widely, and a wage-price structure that is relatively inflexible. This process, moreover, is sure to evolve, in part as a result of the financial industry restructuring that is already underway and will be accentuated by the common money. Furthermore, as the Lucas principle suggests, the wage-price process itself will adapt to the changing focus of European monetary policy.

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1 Introduction

After a formal dinner hosted by Dr. Tietmeyer on January 3rd 1999, the board of the newly constituted European Central Bank meets in the morning of the 4th to formally assume its duties. In the chair is Jean Claude Trichet to welcome the members of the board to their important responsibilities. He underlines the historic occasion, and reminds them that Europe and the world are watching, including importantly the bond market: «You can make a first impression only once», the saying goes. He notes the importance of continuity in policy, after a decade of successful and often difficult convergence. But he also emphasizes the task of creating a *European* monetary policy, not a policy that just fits Germany. That does not mean a departure from the central criterion of price stability, but it does mean that Europe is now the focus. Needless to say, the chair is nervous and there is tension among the group. This is not the occasion for the chair to open up a discussion. He will have rigged the game way ahead, and the less reliable members of the board understand that a deal has already been struck behind their back. They might as well go along; this day belongs to the hard money crowd.

The critical agenda item is monetary policy, understood as setting the short-term interest rate, *i.e.* the ECB Funds rate. The Beige Book (in analogy with Federal Reserve practice) will have set out the economic conditions in the various member countries, and the summary statistics will be available for decision making: current and prospective inflation as well as the output gap. It won't occur to anyone to look at unemployment since that is understood to be substantially if not overwhelmingly structural. But the output gap does help summarize the cyclical situation and its prospective impact on inflation.

Using current (November 1997) estimates, the ECB board will face an environment in which the European output gap in 1998 will have declined significantly, with a further important reduction projected for 1999. In fact, by 1999, the output gap (ex-UK) will be only half of what it was in 1996-97 and full utilization of productive capacity almost around the corner (see Table 1.1 and Figure 1). Moreover, projections for growth in 1999-2000 run wells above 2 percent so that no slowdown will have appeared on the horizon. Inflation, after the trough of 1997, will have been on the rise with a further acceleration anticipated for 1999. With inflation above 2 percent, any restraint that has not happened under Buba auspices in 1998 is overdue.

Table 1.1 The EU Output Gap

	Total	ex-UK
1994	1.61	1.63
1995	1.31	1.37
1996	1.74	1.89
1997	1.53	1.84
1998	1.05	1.28
1999	0.63	0.77

Source: OECD.

The ECB board recesses at noon and a brief statement is released to the effect that the ECB Funds rate is increased by 25 basis points to forestall an overheating of the European economy. The market reaction was prompt: the Euro rallied against the dollar and Euro long

bond yields, which had risen in late NY trading upon skeptical remarks by a former chairman of the US Council of Economic Advisers dropped a full 10 basis points.

At a press conference later in the afternoon, ECB President Trichet commented, in English, that monetary policy was overburdened by large budget deficits and long overdue deregulation. Observers noted that he used language identical to that employed by President Tietmeyer on the occasion of the 50th anniversary of the Buba just 6 months earlier. But staffers clarified that this was thinking and language that had become the common stock of European monetary policy makers. The press received the first move of the ECB in a broadly favourable way. But there was dissonance: French former prime minister Rocard was quoted as deeply disappointed that the ECB did not repudiate the Buba heritage vigorously and unambiguously; he said that a short work-week had its logical counterpart in lower interest rates. A quite different reaction came from the *Deutscher Sparverein* who deplored that the ECB had failed to endorse a monetary aggregate target at this propitious opportunity, and expressed the view that the rate hike fell far short of what was needed to inspire confidence on inflation.

Conducting monetary policy in the boardroom of the ECB will be a very new game. The board will have to convince financial markets that the ECB is a serious institution. It will have to establish its political legitimacy convincing the political community, that it is a European-minded institution and the message needs to be effectively communicated to the European public. The board will also have to convince itself to look at EU-wide averages: learning about how the EU economy--a previously non-existent entity—works will be an immediate priority. This will take time, as the way in which monetary policy affects prices and output will change as a result of the introduction of the Euro, and of the transition to a single central bank. von Hagen (1997) has developed the full range of issues facing the EU monetary authority in a broad and definitive way. Our paper narrows the focus to several of the specific issues of monetary policy

In preparing for EMU, a large number of studies have been written which ask the time-honoured question: Is the EU an optimal currency area? (See for instance Maurice Obstfeld and Giovanni Peri in this issue). These papers follow Mundell's (1961) traditional approach: they assume that the countries which join to form the currency union have similar economic structures, and ask how can they cope with asymmetric shocks once they loose the ability to set monetary policy independently. For example, a question that is often asked (see for instance Antonio Fatàs in this issue) is whether the low degree of labour mobility inside Europe implies that some form of fiscal federalism among EMU members will be required to cope with the consequences of asymmetric shocks.

The focus of this paper is different. The question we ask is how a *single* monetary policy—a common change in the interest rate controlled by the ECB—is transmitted to the economy of the member countries. What if it turned out that most of the cost of a disinflation episode fell very unequally on a few countries because they have a combination of a financial structure that spreads a contractionary policy widely, and a wage-price structure that is relatively inflexible? Just on the principle of *Schadenfreude* that might be all right if it is Germany with its predilection for low inflation. But that outcome would not be as easy to

accept if it were some other country, say France, that is relatively less concerned with inflation as opposed to unemployment.

2 There is something new coming

So far, European monetary policy was run by a board of German central bankers. The new team will instead be made up of the central bankers of the participating countries, who are veterans of the campaign against inflation in the past decade, plus six newcomers appointed by the EU Heads of State--most likely chosen among the staff of the current central banks. An easy answer, and not even an absurd one, is to pretend that nothing has changed and thus pursue a German stability-oriented policy as in the past. Of course, that is not going to happen because the ECB has Europe written all over it and hence must learn to operate in that dimension. The issues range from the question of what to target--inflation or aggregates--to the question of intermediate targets, presumably short rates, to the all important question of the objectives. How these will be measured--presumably as European averages-- and how they are linked to policy instruments is uncertain at present, and is bound to be a major issue of controversy in the actual operation of policy.

The model of the past decade was straightforward: Germany set its own monetary policy on the basis of German inflation and unemployment rates. There is some question whether monetary targeting was actually taken seriously or whether some Taylor-style targeting was used, but the basic frame of reference was *German*.[2] The connection to the rest of Europe was provided by the EMS. The various partner countries within the context of the EMS had to translate German monetary policy moves into domestic monetary measures so as to be compatible with maintenance of the exchange rate margins. Over time that relation was not totally tight because increasing convergence provided some room for additional rate reductions on the soft periphery, and the presence of margins yielded extra room too. But within the limits of these special factors, Germany made its own policy and the rest scrambled along. By and large, in building a German reaction function, European (ex-Germany) conditions would have no significance. By contrast, say in France, German variables would do better in explaining monetary policy than French conditions. In other words, Europe was on the Buba standard.

In an EMU setting, joint decision making with an eye on European targets changes the process dramatically. The only plausible methodology is to look at European-wide averages built, using GDP weights. For inflation the building of this variable is underway. For a cyclical variable it is obvious that unemployment rates, even on a standardized basis, are useless. It is accepted that the large structural component makes them an unreliable cyclical indicator. Spain's rate, in the 20+ percentage range, even scaled down by Spain's relatively smaller size, would impart an implausible expansionist bias to the numbers. More plausibly then, weighted output gaps will be used (see Figure 1.) Those data are already available from the OECD (1997), though seemingly not from Brussels.

Table 1.2 makes it clear that even in looking at European averages, Germany still remains the dominant player. But the game will definitely be different in that the three large Latin countries combined carry far more weight than Germany.

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[2] Among others Clarida and Gertler (1997) most recently make the point that Bundesbank policy is well explained by a Taylor rule rather than modelled as a monetary targetting experience.

Table 1.2 Weights in Euro-GDP (%)

	EMU-11	EMU-15
Germany	34.3	27.6
France	22.3	18.0
Italy	17.5	14.1
Spain	8.5	6.8
Netherland	5.7	4.6
Be-Lux	4.0	3.3
Austria	3.3	2.7
Finland	1.8	1.4
Portugal	1.5	1.2
Ireland	1.0	1.0
UK	-	13.2
Sweden	-	2.9
Denmark	-	2.0
Greece	-	1.4

Source: European Economy, No. 63, 1997.

Now consider what the members of the central bank board, looking at the same data on growth and inflation forecasts, and a cyclical indicator by country and Europe-averaged will have to think about. Surely, the intermediate variable will be the ECB Funds rate and the question will be: should it be changed and if so, in what direction and by how much? The answer to this question will bring in the preferences of the individual board members in respect to inflation versus slack, judgements about the model--the monetary mechanism in this new universe which is characterised by very different financial structures, and also different wage-price processes--and regional considerations over and beyond their representation in the European averages.

There can be no denying that something very new is coming. Interest rates will simply no longer be set by German authorities with German objectives in mind, and with the rest of Europe following. The change can be illustrated using a simple model of the interaction between interest rates and macroeconomic variables. Consider an EMU made of only two countries: 11, or 15, instead of 2 would not change the argument. We also limit our example to the simple case in which the ECB cares about a single macroeconomic objective, but again the argument can be easily extended. We characterize the ECB as attempting to minimise the following loss function:

$$L = \left(wy_1 + (1-w)y_2\right)^2 \tag{1}$$

where the y are deviations of country i's objective from its desired level, and w is the weight used to aggregate local macroeconomic variables to form EMU-wide averages: the GDP weights in Table 1.2 The Central Bank uses the ECB Funds Rate, R, as its instrument, and the relation between instruments and objectives in the two countries is:

$$y_1 = -\gamma_1 R + \varepsilon_1 \qquad y_2 = -\gamma_2 R + \varepsilon_2 \tag{2}$$

where ε_1 and ε_2 are country-specific shocks, γ_1 and γ_2 describe the country-specific transmission mechanism, and R is the deviation of the instrument from its equilibrium level, zero. The rule which minimises the central bank loss is:

$$R = \frac{w\varepsilon_1 + (1-w)\varepsilon_2}{w\gamma_1 + (1-w)\gamma_2} \quad . \tag{3}$$

This rule implies that the optimal ECB response to a local shock in country 1 is:

$$\frac{\partial R}{\partial \varepsilon_1} = \frac{w}{w\gamma_1 + (1-w)\gamma_2} :$$

the change in the Euro-money market rate depends on the GDP weight of country 1, and on the impact of monetary policy in both countries, as described by the weighted average of the parameters that characterise the transmission mechanism in each country $w\gamma_1 + (1-w)\gamma_2$. The smaller the impact of interest rates the larger the required change in interest rates for any given shock.

It is instructive to use this simple result to compare the EMS and the EMU regimes. Consider the effects of a German fiscal shock that raises demand in Germany and assume, for instance, that the Bundesbank cares about German output stability. In the EMS the Bundesbank would set interest rates having in mind just the domestic objective, and would achieve full output stabilisation by responding to a German shock ε_1 raising interest rates by ε_1/γ_1. The cost for country 2 of pegging to the DM after a German-specific shock has occurred, is a fall in output equal to $\gamma_2\varepsilon_1/\gamma_1$.

Consider instead the EMU regime. If the ECB uses equation (3) as its reaction function, the ECB Funds rate goes up by $\frac{w\varepsilon_1}{w\gamma_1 + (1-w)\gamma_2}$: as a result German output remains above equilibrium by an amount equal to $\varepsilon_1\left(1 - \frac{w}{w + (1-w)\gamma_2/\gamma_1}\right)$, and output in country 2 falls less than in the EMS regime, precisely $\frac{\gamma_2\varepsilon_1}{\gamma_1}\left(1 - \frac{w}{w + (1-w)\gamma_2/\gamma_1}\right)$ less. Note that for $\gamma_2 = \gamma_1$ country 2 is better off inside EMU by $(1-w)$, its weight relative to Germany. But for given weights, country 2 gains less from membership in EMU the smaller is γ_1 relative to γ_2, that is the smaller is the effect of a change in interest rates on real activity in Germany, relative to country 2. In the limiting case of $\gamma_1 << \gamma_2$ the difference between the two regimes vanishes for both countries.

There are two lessons to be learned from this simple example. First, it shows that in order to set the ECB Funds rate, the bank needs to be aware of the characteristics of the transmission mechanism in member countries. But the example also confirms that Germany will lose the central role it has so far played in setting European interest rates. The extent to which this will affect the distribution of output losses across Europe will depend on the origin

of the shocks, on the relative share of the German economy and on the relative speed at which an interest rate change affects output.

A dramatic way of illustrating this point is to ask just how a German fiscal expansion looks under the old regime--EMS with Europe following Germany--and EMU where Europe-wide data underlie policy making. The Federal Reserve has simulated just this exercise in its FRB/Global model.[3] Figures 2 and 3 show the impact of a German fiscal expansion of 1 percent of GDP, starting in 2000:I, on real GDP in Germany and France, respectively. Monetary policy is described by an active rule linking short term interest rates to deviations of output from potential and inflation from target. Under the EMS, Germany fights its own expansion with tight money, the output expansion is dampened by high interest rates and the rest of Europe is scrambling: the steep contraction imposed by the Buba causes a sharp decline of output in France.

In the EMU regime, the ECB uses an active monetary policy rule, in which the ECB Funds rate responds to the weighted average of output gaps and inflation deviations of member countries assuming symmetric effects of monetary policy (identical gamma's with reference to the example above). This rule highlight the contrast with the previous regime, in which short-term interest rates in all member countries are determined by the German output and inflation gaps. In the EMU regime the German expansion, while of course raising output and inflation, is scaled down in its Europe-wide effects. As a result, monetary policy responds less vigorously to offset the fiscal shock. In fact, in the Fed simulation, interest rates rise by only 70 basis points rather than 150. That leaves room for Germany to have more of an expansion, and for France to avoid much of the recession with favourable fiscal spillover mostly offsetting tight money. To put it another way, if German unification had occurred in an EMU regime, the rest of Europe would have paid a lesser price.

One is, of course, immediately interested in the different inflation outcome. Is the EMU far more inflationary than a German/EMS scenario? The EMS setting imposes on France a drop in inflation at the peak of a quarter of a percentage point, while EMU keeps the price level largely unchanged (see table 2.1). In Germany the EMS regime leaves the price level mostly unchanged while EMU involves somewhat more inflation--a half percentage point at the outset and gradually vanishing.

Table 2.1 A permanent German fiscal expansion: effects on inflation
Absolute deviation from baseline, averages over four years

	EMS-regime	EMU-regime
Germany	0.05	0.17
France	-0.15	0.03
EMU	-0.03	0.12

Source: authors calculations based on the Fed simulation.
EMU is assumed to consist of France and Germany only.

[3] See Levin, Rogers and Tryon (1997). We are indebted to the authors for graciously making their simulation data available.

We now have set the stage by identifying a number of different issues, which over time need to be resolved in order to shape a European monetary policy. We proceed now to elaborate on some of the pieces.

3 How will the Board vote?

A first set of issues revolves around the question whether the regional or political background of Board members has an influence on their preferences regarding monetary policy setting. This possibility arises in two respects. First, the selection process that puts them in place may be systematically biased so that they are «hawks» or «doves» because they were chosen to be just that. Second, regional economic conditions may diverge significantly from the average of the monetary zone, and this may lead a particular board member to respond in a differential way. On both of these issues there is ample evidence from a long history of voting on the US Federal Reserve Open Market Committee (FOMC). Before going to the US evidence, however, it is worth noting the conceptual framework useful for this question. The issue of centralized or regionalized decision making on the ECB board is the focus of a paper by von Hagen and Supel (1994). They spell out a conceptual framework based on incomplete information. Centralized decision making, in a Barro-Gordon setting with principals and agents averse to inflation and employment variability, leads to offsetting of demand shocks and partial offsetting of supplies shocks. In centralized decision making regional shocks (with aggregate mean zero) are washed out. But when decision making falls to regional representatives who do not observe the regional shocks, their parochial concerns, including Brainard-style policy uncertainty, come to affect policy reactions and lead to underperformance in terms of welfare. Of course, this is not the only set up about uncertainties and shocks, but it moves to center stage the proposition that there is an issue here.[4]

The US FOMC is composed of 12 voting members, 7 of these are members of the Board of Governors and 5, on a rotating basis, are presidents of the Federal Reserve District Banks. Among these 5, the NY Fed has a permanent seat, and the Chicago and Cleveland Fed alternate. Faust (1996, p.269), provides a quote that summarises the issue of divergent political interests controlled by the mixed influences getting together on the FOMC:

«The Fed was born in controversy. Farmers and small businessmen wanted a decentralised organisation under strong governmental control to counterbalance the power of eastern bankers. The financial community, on the other hand, feared that political control of the system would bring inflation.» Replacing «eastern banks» with «Buba» brings the quote into the context of control over the ECB.

A first point to note is the powerful influence of the chairman of the Federal Reserve. Much of the mystique surrounding Federal Reserve policy involves the uniquely powerful role of the chairman, their influence in shaping consensus, their never having been on the wrong side of the vote. Not all Fed chairmen have been as successful as the myth will have it, and

[4] In passing it is interesting to note that in the US case the board members represent the stable part, and the Reserve Bank presidents the flukes; by contrast, in the ECB the central bank presidents are the known quantities, hardened by a decade of convergence, while the new appointees, equivalent to board members in the US system, are the jokers in the deck.

they will be simply forgotten. But where policy matters decisively, as at some stages of the Volcker and Greenspan years, their role in setting and communicating policy cannot be exaggerated. That central role has, of course, also contributed to the political debate on the Fed as an institution and the appropriate congressional control. If anything, that debate has strengthened the hand of the chairman and weakened adventurism or plain undisciplined talk on the part of Board members. Moreover, as time passes, the chairman and his style and beliefs become a central institution of the capital market and as such they become almost indispensable: their replacement is virtually the most delicate task a President may face. Given the scrutiny with which the replacement will be viewed, a bending over toward the traditional and conservative is inevitable. Thus the cycle is closed.[5]

Consider next the members of the Board of Governors of the Fed who are all political appointees. While they invariably have some credentials and often are highly qualified for the appointment (one was a lawn-mower manufacturer), they do clearly show the fingerprints of their patrons. Havrilesky and Gildea (1995) show in detail that both Board members and Reserve bank presidents reflect in their voting their political roots and that they are swayed by the prevailing winds. The evidence is based on exploring those frequent instances where there are split decisions to determine on which side of the split a particular member of the FOMC votes. Economists, uniquely, are «reliable» in that they vote a pattern rather than politics. But there are differences among governors and bank presidents. Specifically «bank presidents chosen under any Administration prefer less expansion than governors appointed by the same Administration.» (ibid, p.279)

In terms of the ECB there are a few lessons here. The issue is *not* that governors or bank presidents take or solicit direct instructions from their patrons. The point is whether they are cloned and then sent on their mission. When an issue of difference arises, a French appointee would vote in the style of France, and a German, as predictably, in the way of the Buba.

Going back to the Fed, the next issue is whether, in addition to national averages, regional conditions have an influence on the way bank presidents vote. The point here is that bank presidents are appointed by a local board (with a heavy hand supervision from the Board chairman) and are guided by their board, which includes predominantly local bankers and business people. It is therefore plausible to assume these bank presidents would respond to local conditions either in a direct partisan way or else because local conditions, beyond the numbers, shape their perception of the national situation. The evidence on this issue is not decisive. In a number of studies Havrilevsky and Gildea (1992, 1995) conclude that there is, indeed, a decisive regional effect at work. But Tootell (1991, 1997) using a different methodology finds that given national variables as predictors of voting, regional variables do not add to the prediction. He concludes (1997, p.15) «the evidence suggests that the District presidents pay attention to the macro, rather than the regional data.»

Even if the issue remains undecided, the overriding presumption is that regional and political influences enter what happens in the FOMC meeting. That perception is behind the various attempts to bring the FOMC under closer political control either in respect to the appointments process for District presidents, or in widening the board to include

[5] One is tempted to paraphrase James Carville's election year aphorism «It's the bond market, stupid !»

Administration officials. If the issue is relatively open in the FOMC context, it is obvious that it will be a major issue for the ECB.

4 Communicating to the public

In its commitment to price stability, the ECB is equipped with an unambiguous charter. The independence from national governments—not to seek nor take advice—further limits the scope for political dependence. Yet the discussion continues, particularly from France, to defuse somewhat this charter with proposals to create an offsetting political body to limit the independence and single mindedness the ECB is meant to enjoy. The issue of accountability is an inevitable one in a democratic society where money is removed from the immediate short sighted political process, yet some account must be rendered of what the proposed policy is and how well the targets have been met.

The ECB will need to do a lot of explaining. It will have to explain to all those who hoped that the transition from the Buba Zone to EMU meant a more relaxed monetary policy that this must not be, cannot be. It needs to establish the legitimacy of a serious monetary policy as a desirable European objective rather than a mindless continuation of Buba policy. But the ECB has to satisfy at the same time the demand of skeptics who want early and decisive assurance that the ECB is, in fact, a committed follower of Buba policy in its insistence on price stability without compromises. Most importantly, to be successful the ECB needs to create a constituency that understands and supports its policy conceptions.

It is immediately clear that there is a role model and precedent. Not surprisingly, it is the Buba. Week after week, in Germany and throughout Europe, the top layer of the Bundesbank shows up at public events of industrialists, savers, bankers, and every conceivable civic or commercial association to explain the importance of sound money, the immediate challenges ahead, the instruments used to achieve and sustain price stability, the risks to veer from the true path. Needless to say, over time the policy of direct communication with the public has paid off. The Buba is probably less questioned in Germany than any other institution from government to church or university. It has created broad support, most fervently from the die-hard savers, for price stability and policies to support just that.

The ECB leadership will have to do just the same in a very intensive fashion. If it succeeds in creating an understanding, acceptance and support for its policies, then it will become politically independent. If it relies on the narrow script of the Maastricht treaty, it will soon find that political pressures will come to be influential even if they are not directly represented at the table.

The idea of a political body that interacts with the ECB is shocking: Europe and the world have moved a healthy distance from short term political control of monetary policy. But there is obviously some gap that needs to be filled. Hearings before the European Parliament may be useful, but only to inform rather than being directed. Meetings with finance ministers may be useful for discussion (the Fed chairman has a regular breakfast with the Secretary of the Treasury). But none of these things amount to «control»—the little extra bit those unreconstructed expansionists would like to bring on the scene. There is a vacuum, which the ECB needs to fill from day one or else someone else will. Accountability comes down to

effective communication to the broad and concerned public: once that is in place and gains depth, the vacuum is filled and political meddling is fought off by a broad constituency.

The experience of the UK makes the point of how transparency and an effective communication strategy change altogether the scope for political meddling. The first step was the publication of the minutes of the monthly meeting between the Chancellor and the Governor of the Bank of England. After the Bank espoused the inflation targeting approach and started publishing an Inflation Report, the room for government to control monetary policy, while legally of course still present, became smaller and smaller. Independence suddenly became the logical next step. The success of a communication strategy has a lot to do with a simple message. Formal and explicit inflation targeting is, of course, a far better story than monetary aggregates, which are alien to the man in the street.

5 The monetary mechanism

Very soon, at ECB board meetings, questions such as these will be asked: "What do we know ? If we add 50 basis points to the ECB Funds Rate, how effective will the rise be at dampening EMU-wide demand ? And, more importantly, how different, both in terms of timing and magnitude, will the impact be across member states?"

5.1 Regional effects and initial conditions

The regional impact of a monetary tightening is rarely at the forefront of debate. Even in large countries that have regions with very different make-up of economic activity there is more discussion of the regional impact of an oil prices than of monetary tightening. Some studies have addressed the issue in the case of the US (see Carlino and deFina, 1996). The finding, not surprisingly, is that monetary policy has an above average effect on the Great Lakes States and a below average impact on the South West and Rocky Mountain States. Most other regions, accounting for about 70 percent of US income, respond like the country-wide average. Perhaps it is the good fortune of monetary policy makers that the discussion really never has gotten to that point and thus further complicated the acceptance of monetary policy decisions. Yet, one cannot assume that in the ECB, with countries still largely the frame of reference, this issue should not become live. In fact, it does not have to become live since it has been around for a decade in discussing the appropriateness of German monetary policy decisions for say France or Italy.

Suppose then that the ECB judges that on the basis of an EMU-average inflation outlook a tightening is required. What is the incidence? With interest rates and credit as one channel, those countries that have a relatively large share of GDP in construction, capital goods and consumer durables will be more exposed, other things equal. In a regional setting it is quite obvious that there will some regions that absorb most of the shock simply because by economic geography industrial activity may be clustered, or because a shifting of economic activity has opened up a new frontier where construction is in a boom. But do these differential *regional* effects translate in a significant effect across *countries*? Are there some where construction (taken to be nontraded) is running at a much higher pace than elsewhere, and are there some where capital goods and consumer durables are produced on a much higher scale than elsewhere? Clearly, Germany is a producer of capital goods and durables *par excellence*, Luxembourg is not. Of course, these are extremes and in between are most countries such as France, Italy or Spain. Reviewing the category "machinery and equipment"

as a share of GDP in the OECD *Historical Statistics* suggests that the differences are in fact insignificant among European economies. For the case of construction, the other credit sensitive component of spending, broadly the same conclusion applies. The difference in construction as a share of GDP across countries is a percentage or two--not enough to be a major issue.

Monetary policy shifts will also affect the Euro/$ rate and hence create the potential for differential effects across countries.[6] A rise in Euro-rates, other things equal, will lead to appreciation. Appreciation in turn leads to reduced prices of imports, including imported intermediate goods and materials, but also a loss of competitiveness for exporters and import-competing firms. Terms of trade improvements as a result of appreciation imply a gain in real income but the competitiveness effect may lead to a decline in output and employment. The magnitude of these effects obviously depends on the degree of openness of the member countries.

Openness across European countries differs significantly. Part of that differences involves intra-European trade and does not interest us here. But the part that involves extra-European trade is enough to be of interest (See Table 5.0). The UK and Ireland, and to some extent also Germany, are relatively more exposed to fluctuations in cross-Atlantic competitiveness Given these pronounced differences in extra-European openness, monetary policy will have a differential impact. Countries that are more open will experience more of the loss in competitiveness that comes with tight money, and more of the terms of trade improvement.

[6] For a discussion of the exchange rate policy of the Euro, see CEPR (1997).

Table 5.0 Openness of EMU Members

	Overall	Share of exports directed:				
		outside EMU-7	outside EMU-11	outside EMU-15	to North-America	to Cz,Hun,Pol
Austria	24,2	59,0	46,0	41,0	4,1	4,9
Bel-Lux	51,4	51,0	40,0	29,0	7,9	0,1
Denmark	26,5	-	-		4,1	2,0
Finland	27,5	-	43,0	39,0	7,6	1,8
France	18,2	68,0	49,0	38,0	7,5	0,5
Germany	19,7	69,0	57,0	44,0	8,1	4,5
Ireland	58,9	65,0	57,0	28,0	13,0	0,1
Greece	16,1	-	-	46,0	6,2	1,0
Italy	20,0	-	53,0	45,0	7,0	0,2
Netherlands	37,5	47,0	38,0	25,0	7,0	0,1
Portugal	27,6	-	36,0	20,0	4,3	0,1
Spain	18,4	-	38,0	29,0	5,9	1,1
Sweden	28,4	-	-	44,0	6,0	1,4
UK	22,7	-	-	47,0	13,2	0,9

Source: European Economy. Data refer to 1995.

To the extent that exchange rate and interest rate exposure overlap this works to concentrate the impact differentially on some countries. If, as is also plausible, the overlap is not tight, it just means that in its various effects monetary policy has a bit for everybody.

Even if there is not much of a story in differential impacts of monetary policy via credit and exchange rate effects, there is definitely the issue of initial conditions. Tight money hurts large debtors far more than it affects countries with moderate debt levels and good balance sheets. These differences in Europe are well documented. Belgium and Italy stand out with mega debts and hence very special vulnerability. This problem is compounded, at least in the case of Italy, by the below average quality of bank balance sheets (see section 8.1). The complication does not even stop there since increased interest rates and their impact on debt service come back to the budget and from there to the potential failure to comply with the Stability Pact and any resulting fines and deterioration of credit rating.

5.2. Is there anything to be learned form the pre-EMU experience?

Once the board has come to a consensus on EMU-wide inflation prospects, and on the appropriate response, the next step is to decide by how much interest rates should be changed. What this requires is a lot of experience on how the economy works, what the lags are, the extent to which spending responds to a change in interest rates, and wages to a change in demand. Even in the much studied US case all this continues to be surrounded by a lot of uncertainty. In fact, the ground is shifting faster than the answers come in.

The board will be reminded of the Lucas critique: if "Something Very New is Coming" there is little to be learned from past history. The ECB reaction function will be very different from that of the previous national central banks, and the way national economies respond to monetary policy will also change. Of course this is true, but telling the board that the only way to learn is experimenting, is not very helpful. The board needs to know how uneven the distribution of the sacrifice ratio could be . If we need an output gap of one percent to bring inflation down by half a percent, over, say two years (approximately the numbers for the US economy), it makes a great deal of difference how that output gap is distributed across the EMU. Uncertainty about the distribution of the sacrifice ratio, or awareness that it is very unevenly distributed, may bring the board to a standstill, as the coalition of losers protests the unfair distribution of the burden.[7]

Moving from the EMS to the EMU is a big change in regime, but this does not imply that the data from the EMS years are of no use. In this section we show that they contain information that will be valuable for the ECB. Consider the EMS regime. The model for a typical EMS member, country i, contains--as in equations (2) and (3) in Section 2--a reaction function, which describes how the central bank sets the short term rate, and an equation describing the impact of interest rates on a set of final objectives Y:

$$\begin{aligned} R_t^i &= \bar{R}^i + \beta_{1i}\left(E\left(\pi_{t+n}^i \middle| I_t\right) - \pi^{*i}\right) + \beta_{2i}\left(E\left(y_t^i \middle| I_t\right) - y^{*i}\right) + \beta_{3i}\left(E\left(e_{t+n}^i \middle| I_t\right) - e^*\right) \\ Y_t^i &= \Gamma_{1i} R_{t-k_i}^i + \Gamma_{2i}^{'} X_{it} + u_{it} \end{aligned} \tag{4}$$

$\bar{R}^i$ is the long-run equilibrium value of the short term rate, π_{t+n} is the rate of inflation between periods t and t+n, y is real output, e is the exchange rate, I_t is the information available at time t. Starred variables define the targets, and the β coefficients are weights attached to the different objectives. The vector Y contains real output, inflation and the exchange rate, and X is a set of variables outside the control of the central bank. Finally, k_i is the lag with which a change in interest rates affects final objectives. In the EMS regime the Bundesbank targets domestic objectives, which possibly include the dollar-DM exchange rate. The other countries follow Germany by using, as targets, the values of the German targets (see Clarida, Gali and Gertler, 1997).

EMU replaces (4) with the following model :

$$\begin{aligned} R_t &= \bar{R} + \beta_1 \sum_{i=1}^{j} w_{1i}\left(E\left(\pi_{t+n}^i \middle| I_t\right) - \pi^{*i}\right) + \beta_2 \sum_{i=1}^{j} w_{2i}\left(E\left(y_t^i \middle| I_t\right) - y^{*i}\right) + \beta_3 \sum_{i=1}^{j} w_{3i}\left(E\left(e_{t+n}^i \middle| I_t\right) - e^*\right) \\ Y_t^i &= \Gamma_{1i} R_{t-k_i}^i + \Gamma_{2i}^{'} X_{it} + u_{it} \end{aligned} \tag{5}$$

where the w_{ij} are GDP weights. The making of EMU changes the reaction function: even if the ECB objectives coincided with those of the Bundesbank, the weights in the reaction function will change--and, as shown in Section 2, optimal weights will have to allow for differences in the transmission mechanism across the EMU. It less obvious that the monetary mechanism, the second equation in both (4) and (5), describing the relation between monetary instrument

[7] We are not aware of any study that attempts to estimate regional sacrifice ratios for the US. It would be interesting to learn what they look like.

and targets, will change, at least for some time. Thus estimates of the Γ_{ij} parameters obtained using data from the EMS regime – i.e. estimated in model (4)--can provide valuable information for the ECB – for example, as we show at the end of this Section, they could be used to construct a monetary Conditions Index for the EMU.

The task of this Section is that of estimating the parameters which describe the impact of monetary policy on output, after controlling for the channel which is bound to disappear: intra-European exchange rate changes. Eventually, even the Γ_{ij} will be affected by the making of EMU. As a way to start it is instructive to survey the evidence so far available.

5.3 The empirical evidence available

The available information on the monetary mechanism in Europe comes in two forms: there is evidence based on "large" econometric models, and evidence based on "small" econometric models. The first is available in compact form thanks to a project organised by Bank for International Settlements (BIS, 1995). The goal of the BIS exercise was to detect cross-country differences in the effectiveness of monetary policy, and ask whether they could be related to cross-country differences in financial structure. The tools used are the large econometric models developed by the national central banks and the multi-country macroeconometric model built by the staff of the Board of Governors of the Federal Reserve, which covers the G7 countries. All models considered use quarterly data, and are used to run the same policy experiment: a temporary (8 quarters) one percent increase in the interest rate directly controlled by the local central bank. Recent attempts at evaluating the impact of monetary policy shocks in different countries using small econometric models are the structural VAR models estimated by Gerlach and Smets (1995) and by Barran, Coudert and Mojon (1997), and the Small Stylised Dynamic Model estimated by the staff of the Bank of England (Britton and Whitley, 1997). These studies differ in the identifying restrictions they impose on the data, but are based on a similar statistical structure--i.e. a reduced form.

If these experiments are to be useful in evaluating the monetary mechanism in EMU, the simulations considered should reproduce conditions inside EMU as closely as possible. Three points are relevant. First, the direct effects on prices and output of a change in interest rates should be separated from the indirect effects working through the exchange rates movements induced by the change in interest rates. Exchange rate movements should then be separated into an intra-EMU channel and an extra-EMU (mostly a dollar) channel, as only the first will disappear inside EMU. This is an important point because in the EMS regime we could observe cross-country differences in the transmission mechanism that are simply the consequence of movements in intra-European exchange rates induced by a change in monetary policy. Second, the exercise should consider the response to a simultaneous change in interest rates in all countries, as this will be the case inside EMU. Third, it should be possible to test the statistical significance of the cross-country differences that are observed in the response of prices and output to a change in interest rates – i.e., given point estimates of the parameters which characterise the monetary transmission mechanism in different countries, one should be able to construct a test of the null hypothesis that such parameters are equal across countries.

Unfortunately, simulations with these characteristics are not available. In the BIS exercise, only for France, Belgium, Italy and the Netherlands are the simulations run under the assumption of exogenous intra-European exchange rates. For other countries it is impossible

to partial out the intra-European exchange rate channel – in particular for Spain, Austria and the UK. Most simulations also consider a change in interest rates occurring in one country at a time, and in none of them it is possible to test the hypothesis of homogeneity in the monetary mechanism. We shall review this evidence, ask how far it can bring us, and then attempt to overcome some of its limitations presenting some new evidence.

Evidence from large econometric models

Table 5.1 presents the response of output and inflation to a 1 percentage point increase in interest rates lasting two years, estimated using the national central bank models. In a first group of countries (Germany, Austria, the UK, Spain and the United States, that we report for comparison) the exchange rate is endogenous; in the second group (France, Holland, Belgium and Italy) intra-European exchange rates are maintained fixed. Thus the two sets of simulations are not directly comparable. Two facts emerge. The UK and Italy appear to be the countries where monetary policy has the strongest impact on output, Spain the country where the impact is smaller. In the UK the fall in output is twice as large as in Germany in the first year of the monetary contraction, three times as large in the second. In Spain the increase in interest rates has virtually no effect on output.

Comparisons among the countries in the second group are more informative, as these simulations assume constant intra-ERM exchange rates. The effect on output of the monetary contraction is smaller in Belgium and in Holland, largest in Italy. The Italian response is twice as large as that in Holland both on impact and three years after the change in monetary policy. Moving next to inflation the impact is largest in Belgium and Italy, surprisingly small in Austria. The perverse response of UK inflation in the short run depends on the presence of housing mortgages in the CPI basket considered: it takes three years for the price of mortgages to work its way through the CPI; when the effect is over, the response of UK inflation is relatively strong – stronger than in Germany.

The data in Table 5.1 can be used to compute output-inflation tradeoffs. These are shown in Table 5.2. looking at the four countries for which results are available under the assumption of fixed intra-ERM exchange rates, the tradeoff appears to be relatively more favourable in the small open economies, Belgium and Holland, compared with France and Italy. The effects of a monetary tightening estimated using the Fed MCM model (reported in Table 5.3) are more similar across countries, suggesting that some of the differences observed when using the national models may be due the different specification of such models. The Fed simulation, however, leaves exchange rates endogenous, and is thus not very instructive in view of EMU. Finally, none of these experiments provides a statistical criterion to judge the significance of the observed cross-country differences. [8]

[8] In principle such a test could be run in the Fed model which is a simulateneaous multi-country model.

Table 5.1 The monetary mechanism in Europe according to the national central banks' models

Percent change in output and CPI inflation, following a 1 percent increase in S-T rates in years t and t+1: basis points deviation from baseline.

	output			inflation		
	year t	year t+1	year t+2	year t	year t+1	year t+2
Endogenous exchange rates						
USA	-7	-50	-121	-3	-21	-68
Germany	-15	-37	-30	-3	-14	-31
Austria	-8	-14	-2	-2	-4	-5
UK	-35	-89	-59	+89	+127	-46
Spain	-5	-1	+3	-5	-12	-22
Infra-ERM exch. Rates fixed						
France	-18	-36	-20	-5	-15	-25
Netherlands	-10	-18	-15	-13	-35	-35
Belgium	-3	-12	-23	-14	-48	-79
Italy	-18	-44	-34	-16	-43	-53

Table 5.2 Output-Inflation tradeoffs in the central banks' models

Output-Inflation tradeoffs: Ratio between the percentage fall in output and the percentage fall in CPI inflation following a 1 percent increase in S-T rates in years t and t+1.
Exchange rates: fixed infra-ERM exchange rates

	year t	year t+1	year t+2
France (*)	3.6	2.4	0.8
Netherl.	0.8	0.5	0.4
Belgium	0.2	0.3	0.3
Italy (**)	1.1	1.0	0.6

(*) Exchange rate fixed only vis-a'-vis the 6 main ERM partners.
(**) Exchange rate fixed vis-a'-vis all ERM partners except the UK

Table 5.3 The monetary mechanism in Europe according to the Fed MCM model

Percent change in output and CPI inflation, following 1 percent increase in S-T rates in years t and t+1: basis points deviation from baseline. Endogenous exchange rates.

	output			inflation		
	year t	year t+1	year t+2	year t	year t+1	Year t+2
USA	-46	-58	-17	-10	-23	-14
Germany	-72	-65	-3	-54	-44	-13
UK	-93	-120	-31	-15	-20	-26
France	-68	-70	-10	-48	-44	-17
Italy	-44	-30	-11	-39	-28	-2

Source: BIS (1995.)

Evidence from small econometric models

Estimating the effects of a monetary contraction using small econometric models results in less pronounced cross-country differences. The model used by Gerlach and Smets (1995) is a trivariate VAR in prices, output and the short-term interest rate; a similar model is estimated by Barran, Coudert and Mojon (1997) who augment the specification by including the exchange rate [9]. The structure of the model is much richer in Britton and Whitley (1997), as it includes domestic demand, imports, exports, short and long rates, inflation, the nominal exchange rate and a few exogenous variables, including the oil price and tax rates. The GS paper uses quarterly data covering the period 1979-1993, while BW consider a longer period spanning from 1964 to 1994, also using quarterly data. GS include all the G7 countries, while BW consider a subset formed by France, Germany and the United Kingdom. Neither model allows for simultaneity across countries.

Identification is the crucial step in a VAR. The GS paper assumes no contemporaneous and no-long run impact of monetary policy shocks on output. This is problematic: the imposition of long-run restrictions requires that all the dependent variables in the estimated system are stationary -- otherwise the long-run responses cannot be constrained because they are explosive-- a condition unlikely to be satisfied by the variables used. The imposition of long-restrictions in misspecified models can result in misrepresentations of the data-generating process (see Faust and Leeper,1997): the GS model describes the whole economy with only three variables, and is therefore likely to be under-parameterised. Moreover, monetary authorities in all countries are assumed to react to the same set of variables: this is an obvious potential source of misspecification, and one that could lead to misrepresentations of monetary policy shocks. The possibility of misspecification also raises an identification problem. Suppose the Bank of Italy reacted to changes in German monetary policy: omitting German rates from the specification of the Italian reaction function would lead to identifying as an exogenous Italian monetary policy innovation what is instead the endogenous response of the Bank of Italy to an innovation in German monetary policy. The reported response of the economy would thus be the response to a wrongly identified impulse. The very limited choice of variables also does not allow to identify a domestic channel from the exchange rate channel, thus making the exercise of little use for our purposes. More importantly, the simulation exercise of interest, namely a coordinated change in interest rates for all countries in EMU, cannot be performed with this model.

In the small structural model estimated by BW, identifcation is instead achieved by imposing on the data the Dornbusch overshooting model. However, in the core European countries the spread between local interest rates and German interest rates has been strongly positively correlated with the Deutschemark exchange rate, in particular since the 1992 ERM crisis, and until the start of the convergence trade, in 1996. This evidence – a widening of the spread paired with depreciation of the weak currencies relative to the Deutschemark – is hardly compatible with the Dornbusch model, thus raising doubts about the identifying restrictions imposed on the data.[10]

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[9] The way in which the identification problem is solved in this model is less than fully convincing: the model includes both interest rates and exchange rates, and identification is recursive.

[10] Another question regards the stability of money demand over the long sample (1964-1994) used in their estimation. An identical specification for money demand is adopted for the three countries, and no tests for structural stability are provided. An incorrect specification of the money demand equation would imply the confusion of money demand shocks with money supply shocks, a crucial issue for the analysis at hand.

Summing up the available evidence

To sum up, the available empirical evidence points to an important difference between the results based on large econometric models and on small econometric models. In particular, the small econometric models do not detect cross-country differences in the monetary transmission mechanism, contrary to what seems to be the evidence from the estimation of large, country-specific econometric models. Small models are subject to misspecifications and depend on the identifying restrictions they impose on the data. Estimates from large models are not statistically comparable across countries, and can only investigate the consequences of a local change in monetary policy. Still the simulations run by the individual central banks contain useful information because they are likely to incorporate the "local wisdom" on the monetary mechanism in a particular country.

5.4 New empirical evidence

In this Section we provide new evidence on the monetary mechanism in Europe. We follow the specification in equation (4) and use similar (small) models for all countries to try to limit the effects of differences in model specification. We also control for the effect of changes in intra-European exchange rates, thus replicating the conditions that will prevail inside EMU. Finally we provide a statistical test of cross-country differences in the impact of interest rate changes on output.

We consider six countries that are representative of the EMU group: Germany, three "core" European countries (France, Italy and Spain) and two "non-core" countries, the United Kingdom and a Nordic country, Sweden. The difference between core and non-core countries depends on the role of the Deutschemark as the nominal anchor in the EMS, our sample period: core countries pegged their currencies to the Deutschemark, while monetary policy in non-core countries was largely unconstrained by German monetary policy. This does not rule the possibility that a non-core country pegs, from time to time, its exchange rate to the Deutschemark; it rules out a policy of consistent pegging, which is instead what defines a core country. We use monthly data starting in 1985: this allows us to have a sufficient number of observations, while excluding a period (up to the mid-eighties) when exchange controls in Europe were widespread, and presumably affected the transmission of monetary policy.

For each country we estimate an output equation and the central banks' reaction function. The output equations yield information on the Γ coefficients in model (4). The estimation of reaction functions allows us to decompose interest rate changes into an expected and an unexpected component. The reason for doing this will become clear later in this paragraph. We limit our analysis to interest rates and output: we tried to extend the model to include exchange rates and inflation, but we eventually dropped them because in the dynamic reduced-form equation for these variables little was significant beyond the lagged dependent variable. In the estimation we also allow for contemporaneous feedbacks among short-term rates and output across European countries. The specification has several advantages in view of our objective of using these numbers to assess the monetary mechanism inside EMU: (i) we can estimate the transmission mechanism in various countries simultaneously, and we are thus able to study the effects of a contemporaneous change in interest rates in all countries; (ii) the question "does the monetary mechanism differ across Europe?" can be translated into a precise statistical test; (iii) because small structural models are "open-loop", exogenous variables can be included at the cost of losing only a small number of degrees of freedom; (iv)

this specification naturally leads to the computation of a Monetary Conditions Index for the ECB.

We also experimented with five open-economy structural VARs, in which each country was interacted with Germany to derive impulse response functions, thus attempting to build upon the work of GS and BW discussed above using a similar approach. However, because of the central role of the DM in the EMS, the German reaction function should include different variables from those included for the "core" countries: the VAR thus ends up including up to eleven variables for each European country. [11] The result is a highly demanding system, given the available sample size. Only the equations for output and interest rates fit reasonably well; those for exchange rates and inflation fit poorly, with most of the explanatory power coming from the first lag of the dependent variable -- a well known problem in exchange rate models – while the poor fit of the inflation equation could be due to the omission of country-specific institutional factors which play an important role in the dynamics of inflation. Hypothesis testing on the similarity of impulse response functions in a VAR is also particularly complicated; moreover, the uncertainty hampering the impulse response functions is such that even very large differences in the size of the responses to monetary shocks were not statistically significant. We thus decided to abandon the VAR approach.

The estimation of model (4) was performed as follows. We first estimate the monetary policy reaction functions assuming that within each operating period (a month) the central bank has a target for the nominal short-term interest rate, R_t^* that depends on the state of the economy as described by expected inflation, the level of output and of the nominal exchange rate.[12] Specifically:

$$R_t^* = \bar{R} + \beta_1\left(E\left(\pi_{t+n}|I_t\right) - \pi^*\right) + \beta_2\left(E\left(y_t|I_t\right) - y^*\right) + \beta_3\left(E\left(e_{t+n}|I_t\right) - e^*\right) \qquad (6)$$

where the variables are defined as in model (4). As pointed out by Clarida, Gali and Gertler (1997), the parameter β_1 plays a crucial role in this specification: it reveals the central bank attitude toward inflation: if $\beta_1 > 1$ the target real rate adjusts to stabilise inflation; with $\beta_1 < 1$ it instead moves to accommodate inflation. The magnitude of β_1 thus provides a yardstick for evaluating the central banks' attitude towards inflation – an information that may be relevant to understanding how different preferences will contribute to the outcome of the votes taken on the ECB board. To see this point define the ex-ante real rate as $r_t = R_t - E\left(\pi_{t+n}|I_t\right)$. Rearranging equation (6) yields:

$$r_t^* = \bar{r} + (\beta_1 - 1)\left(E\left(\pi_{t+n}|I_t\right) - \pi^*\right) + \beta_2\left(E\left(y_t|I_t\right) - y^*\right) + \beta_3\left(E\left(e_{t+n}|I_t\right) - e^*\right) \qquad (7)$$

In order to estimate equation (6) for our six countries we first we adapt it to allow for central banks' tendency to smooth changes in interest rates -- a common practice, justified by the fear of disrupting capital markets, by the potential loss of credibility that could result from sudden

[11] The DM intra-European effective exchange rate, a commodity price index, US short-term interest rates, German interest rates, German output, German price level, and, for the European country considered, domestic interest rates, domestic output, domestic price level, the intra-European exchange rate, and the extra-European exchange rate.

[12] This extends to an open economy the closed-economy specification adopted by Taylor (1993), Clarida and Gertler (1996), Clarida-Gali-Gertler (1997).

policy reversals ("whipsawing" the markets), and by the need to build consensus in support of a policy change (see Goodfriend, 1991):

$$R_t = (1-\rho)R_t^* + \rho R_{t-1} + u_t \qquad (8)$$

where ρ captures the degree of interest rate smoothing, and u is an i.i.d. disturbance representing exogenous shocks to the short rate, arising in the market for reserves or in the exchange rate risk. We shall discuss more carefully this stochastic component while interpreting our empirical results

We estimate simultaneously the reaction functions for the six countries, selecting lags according to Hendry's (1995) general-to-specific strategy.[13] To estimate the system we separate our six countries in three groups: Germany, the European core, and Sweden and the UK. We use short-term rates, 3-month Eurocurrency rates (except for Sweden where we use the call money rate) as the variable from which to extract information on monetary policy. [14] We measure inflation as the yearly CPI inflation, and we use industrial production as the indicator for real activity. We treat the three groups differently as far as the specification of targets and relevant exchange rates is concerned. For Germany the target level of output is a quadratic trend [15], while the target exchange rate is the trade-weighted exchange rate vis-a'-vis other European countries.[16] The core of Europe targets the German values of inflation and output growth; central banks are also assumed to react to fluctuations in the dollar-Deutschemark exchange rate, as these are associated with tensions in their own exchange rate relative to the Deutschemark. German variables also play a role in the determination of the Swedish reaction function. For UK instead we consider, as in the German case, a quadratic trend as the proxy for target output, and we find an important (although limited to the short run) role for German interest rates. Because we use different instruments for different countries we take care of simultaneity estimating the system by FIML. The full specification is reported in Appendix 1: we report in Table 5.4 the relevant parameters.

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[13] Since the parameters we are interested in are equilibrium parameters, the identification of a forward-looking reaction function from a backward-looking one is not relevant to our estimation problem. If in equilibrium expectational errors are not relevant (in econometric terms what we need is stationarity, a much weaker assumption than the zero usually considered in economic models), the model specified in terms of expected rather then observed variables delivers the same elasticities. Our results could thus be interpreted, alternatively, as resulting from the estimation of a reduced form of a forward-looking model--in which combinations of present and past variables are proxies for expected future variables--or of a genuine Taylor-type, myopic rule, in which present and past variables are all that matters for the central bank. Moreover, estimating reduced form equations we need not take a view on the horizon for the forward looking central bank, because current and lagged observed variables are instruments for future variables at any future date, thus providing a data-based criterion for the parsimonious choice of optimal instruments, in the sense that instruments are chosen on the basis of their significance in the estimation of the equations of interest.

[14] The correlation between the level of the relevant policy rate in each country (the tender rate in Germany, France, Spain and Italy; the rate on outright purchases in the UK, and the central bank marginal loan rate in Sweden) and the level of the 3-month money market rate is high (although the correlation between first differences is sometimes much smaller). Between the mid-eighties and the mid-nineties it was .99 in Germany (.68 in first differences), .90 in France (.24), .93 in Spain (.37), .94 in Italy (.81), .99 in the UK (.87), .85 in Sweden (.95) (see BIS, 1995) On the use of three-months rates as a proxy for the policy rate, see also Bernanke and Mihov (1996).

[15] A Hodrick-Prescott filter produces essentially the same results.

[16] We have also tested the significance of the dollar-Deutschemark exchange rate, and of the Federal Funds rate, without finding an independent significant role for these variables.

Table 5.4: The European Central Banks' reaction functions

	β_1	β_2	β_3	ρ	ϕ	*st. err. of eq.*
Germany	0.91	0.32	-	0.89		0.26
	(0.15)	(0.09)		(0.03)		
France	0.5	0.12	0.13	0.60	0.95	0.68
	(0.13)	(0.07)	(0.12)	(0.06)	(0.13)	
Italy	0.34	0.11	0.45	0.74	0.76	0.62
	(0.2)	(0.07)	(0.2)	(0.05)	(0.18)	
Spain	1.96	0.45	1.03	0.94	1.5	0.64
	(0.97)	(0.44)	(0.97)	(0.02)	(0.7)	
UK*	-	-	-	0.98	-	0.44
				(0.035)		
Sweden	0.39	0.38	0.48	0.75	0.75	0.87
	(0.14)	(0.08)	(0.27)	(0.06)	(0.21)	

Standard errors within brackets.
The estimated parameters are derived from the following specifications:

$$R_t^* = \bar{R} + \beta_1\left(E\left(\pi_{t+n}|I_t\right) - \pi^*\right) + \beta_2\left(E\left(y_t|I_t\right) - y^*\right) + \beta_3\left(E\left(e_{t+n}|I_t\right) - e^*\right)$$

$\bar{R} = \phi R^{ger}$ for France, Italy, Spain and Sweden

$$R_t = (1-\rho)R_t^* + \rho R_{t-1} + u_t$$

ϕ captures the long-run elasticity with respect to the German interest rate. The six reaction functions are estimated simultaneously by FIML. Full estimation results are reported in Appendix 1. Standard errors of the residuals of each equation are reported in hundreds of basis points (0.26 reads as 26 basis points).
* The presence of a unit root in the equation for UK rates does not allow to identify the long-run parameters of the reaction function. We have estimated short run elasticities which, as reported in the Appendix, are 0.64 with respect to the German rate, 0.28 with respect to the output gap, and 0.2 with respect to inflation.

All parameters are estimated rather precisely, and the statistical fit is good for all countries, with the only exception of Spain. Note that the β_3 coefficient is positive because it is defined as minus the long-run coefficient of the dollar-Deutschemark exchange rate: when the dollar appreciates against the Deutschemark, core European currencies tend to appreciate against the DM--the polarization effect observed above: central banks in core countries can thus afford a less restrictive monetary policy, while maintaining their peg to the Deutschemark. The point estimates of the β_1 parameters are rather different: if we exclude Spain, which has the highest point estimate but also the highest standard error, Germany has a value not statistically different from one and two standard error away from all the other countries, where the average is about .4, suggesting a tendency to accommodate inflation. Interestingly, the lowest value for β_1 obtains for Sweden and Italy, two countries where monetary policy has traditionally been one of accommodation to wage pressures in the form of currency devaluation – a policy that was reversed only very recently.

We can now decompose interest rate changes into expected and unexpected components. In principle the unexpected components are the equivalent of exogenous monetary policy shocks identified within a structural VAR: however, a closer inspection of the residuals of our models cautions against such a direct comparison. Figure 4 reports the residuals of the six estimated equations. In all countries but Germany, during periods of exchange rate turbulence we observe very big residuals, probably associated with shocks to

the risk premia rather than exogenous monetary policy innovations.[17] In other words, short-term rates contains information on the reaction function--under the maintained hypothesis that the supply for reserves is flat--but are also affected by shocks to the exchange risk premium, which have nothing to with the reaction function. Because such shocks end up pre-eminently in the residuals of the reaction function, they do not appear in the anticipated component of interest rates. This explains why we estimate reaction functions and use the fitted value of interest rates in the output equations. In other words, we do not use expected interest rates because we believe that only unanticipated monetary policy matters. Rather, we stress the point that, in order to gauge the response of the economy to monetary policy, it is necessary to insulate policy-induced variations in interest rates from those movements that originate from shocks to the exchange-risk premium, or from "peso problems".

Are the reaction functions that we estimate stable over the sample ? The UK and Italy left the ERM in September 1992, and Sweden faced two speculative attacks before the 1992 devaluation. There is a clear possibility of a change in regime within our sample. We do not have enough data to run a proper stability test. Looking at the residuals of our fitted model during the EMS crisis suggests that we would reject parameter stability if we could test for it; however, if we interpret those few residuals as produced by an idiosyncratic shock to the exchange risk it is not clear that they could be used as an argument for the instability of the parameters in the reaction function. The estimated reaction functions loose track of the data during the period of exchange rate turbulence, but come back on track as soon as the turbulence disappears. To shed further light on the issue of stability we have retained a number of observations at the end of our sample period and performed out-of-sample forecasting. The results, reported in Figure 5, show an acceptable performance of the model in out-of-sample forecasting, with a particular good performance for Italy and Spain, and a less satisfactory one for France and Sweden. The observed values of the variables are always within the 95 per cent confidence interval of the out-of-sample forecast, with the only exception of a few observation for the French rate. The test of structural stability based on the out-of-sample forecast, reported in Appendix 1, does not lead to the rejection of the null of stability.

We next consider the output equations. We estimate these equations with a very specific question in mind: "Inside EMU, will the effect of monetary policy on output be different in different countries?". To simulate the conditions that will prevail inside EMU our dynamic specification controls for the intra-European exchange rate channel. The output growth equations (y_t-y_{t-12}) include expected monetary policy, unexpected monetary policy, the local currency versus dollar exchange rate, and the local currency versus Deutschemark exchange rate--we thus use the set of variables traditionally considered in the analysis of the monetary transmission mechanism in the US, extending them to allow for small open economies. Fiscal variables are not included: if monetary policy is independent of fiscal policy shocks --as we should expect in the presence of independent central banks-- their omission does not affect the estimates of the impact of monetary policy. The model is estimated by FIML to allow for simultaneity in the determination of European output. The dynamic structure nesting our specification can be described as follows:

[17] Contrary to the US, where the interpretation of SVAR residuals as exogenous monetary shocks is independent of exchange rate fluctutions, more care is required when a similar exercise is applied to small open economies such as Italy, France and Spain.

$$y_t^i = \sum_{j=0}^{k} A_j^i y_{t-j}^i + \sum_{j=0}^{k} B_j^i y_{t-j}^{-i} + \sum_{j=0}^{k} C_j^i \hat{R}_{t-j}^i + \sum_{j=0}^{k} D_j^i \left(R_{t-j}^i - \hat{R}_{t-j}^i \right) + \sum_{j=0}^{k} E_j^i DM_{t-j}^i + \sum_{j=0}^{k} F_j^i \$_{t-j}^i + u_t^i$$

$$i = BD, FR, IT, SP, UK, SW \qquad (9)$$

where y^i is output growth in country i, y^{-i} is the vector containing output growth in the other five countries, $\hat{R}$ is the systematic component of monetary policy, $\left(R_{t-j}^i - \hat{R}_{t-j}^i \right)$ the deviations of short-term interest rates from their value predicted from the estimated reaction functions, and DM^i and $\$^i$ are the exchange rates of currency i vis-a-vis the Deutschemark and the dollar, respectively. The parameters A through F are elements of the Γ vector in model (4).

Within this framework the hypothesis of a common effect of monetary policy (both anticipated and unanticipated) on output can be explicitly tested. In particular we can test that the impact effect of monetary policy is the same across countries by testing the equality of the C_j^i and of the D_j^i. We can also test that the long run effect of monetary policy is the same across countries by testing the restriction that $\frac{C_j^i}{\left(1 - \sum_{j=o}^{k} A_j^i\right)}$ *and* $\frac{D_j^i}{\left(1 - \sum_{j=o}^{k} A_j^i\right)}$ are equal across the six countries.

Our preferred specification for the dynamic model is reported in Appendix 2.[18] Only the fitted values of the interest rate are significant in explaining output growth.[19] Systematic monetary policy has an initial impact with a lag varying from 8 to 12 months, and is always significant, except in Spain.[20] Finally, in the estimated equations we control for the intra-European exchange rate channel by including the local currency-Deutschemark exchange rate.

Equipped with these estimates, we test for the equality across the six countries of the impact of a coordinated monetary policy move. We test for equality for both the impact effect and the effect after two-years. The detailed description of these tests is reported in Appendix 1; the main results are shown in Table 5.5 which reports the absolute values of the elasticities

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[18] We came to this specification by starting from equation (9), and simplifying the model progressively to select the significant explanatory variables. Given the statistical description of the data provided by the reduced form, we proceed to estimate our structural model. In moving from the reduced form to the structural model we have imposed a further set of overidentifying restrictions: in fact the reduced form implied by our estimated structural model is more restrictive than the general reduced form we started off with--in other words our structural model is over-identified.

[19] We tested for the significance of the unexpected component of interest rates in all six countries, obtaining a value of 1.81 for a χ^2 with six degrees of freedom, which does not allow to reject the null hypothesis. This evidence can be related to our previous comment on risk premia, in the sense that the unexpected component captures shocks to the exchange rate premium rather than monetary policy shocks

[20] Our proxy for monetary policy is a generated regressor, so that the coefficients on these variables are consistently but inefficiently estimated (see Pagan, 1982). The inconsistency problem could be solved by using instrumental variables, but the cost, in terms of fewer degrees of freedom, is not affordable in our case. Moreover, given the significance of all coefficients, the correction for the generated regressors problem should strengthen rather than weaken our empirical results.

derived from our estimated structural model. These elasticities refer to a coordinated permanent rise in interest rates having controlled for the exchange rate.

Our findings can be summarized as follows:

- The impact effect of a change in the short rate has a lag (before it becomes significant) of 8 months in Italy, Spain, Sweden and the UK, 9 months in Germany, and 12 months in France Note that the degree of persistence in our estimated model is such that the effect after two-years coincides with the long-term effect for all countries.

- The impact effect on output is always significant, although to a different degree. We report very similar impacts in Germany, France, and UK in the region of 0.45-0.56, smaller in Spain,0.37, and highest in Sweden and Italy, 0.95 and 1.11 respectively. However, the test that all these coefficients are equal does not reject the null of equality at the ten per cent critical level.

- When we consider the effect after two years differences are definitely more marked. The hypothesis that all coefficients are equal is now rejected at the one per cent critical level, pointing towards relevant but not dramatic differences in the effect of monetary policy on output in the countries considered. The impact of monetary policy increases in all countries confirming the results from the analysis of the impact effect. Sweden and Italy still stand out at 2,36 and 2,14, while Germany France and Spain are in the range of 1.4-1.54. The two-year impact has now its minimum in the UK at 0.9—a finding partly explained by the fact that UK monetary policy is not constrained by German monetary policy as it is the case for the other countries in our sample and by the fact that UK output is not as strongly related to the European cycle as the cycle in the other countries. Therefore spill-over effects of a coordinated monetary policy are less important for the UK. Interestingly, also in Spain monetary policy becomes effective. The sharp change in the results for Spain should not come as a surprise, given the high degree of openness of the Spanish economy.

Table 5.5 Measuring the effect of monetary policy on output

Elasticities with respect to a permanent change in all expected domestic short-term interest rates at a constant infra-European exchange rate.

	Impact effect	Effect after two-years
Germany	0,54 (7.8834 [0.0050])	1,40 (6.3867 [0.0115])
France	0,46 (11.678 [0.0006])	1,54 (12.705 [0.0004])
Italy	1,11 (11.152 [0.0008])	2,14 (21.269 [0.0000])
Spain	0,35 (3.2998 [0.0693])	1,54 (5.5502 [0.0185])
United Kingdom	0,47 (14.473 [0.0001])	0,9 (30.448 [0.0000])
Sweden	0,95 (9.1389 [0.1037])	2,36 (28.525 [0.0000])

Testing the hypothesis that the impact effect of monetary policy is the same in all countries:
Wald test for general restrictions
GenRes $Chi^2(5) =$ 9.1389 [0.1037]

Testing the hypothesis that the effect of monetary policy on output after two years is the same in all countries:
Wald test for general restrictions
GenRes $Chi^2(5) =$ 21.245 [0.0007] **

The numbers in the Table are point estimates and, between brackets, values of the $Chi^2(1)$ statistics for the test that monetary policy has no effect on output (the coefficient is zero) in the country considered.

5.5 Building a Monetary Condition Index (MCI) for the ECB

The concept of an MCI was originally developed at the Bank of Canada and it is currently used, for evaluating monetary policy, by the IMF, the OECD, central banks and investment banks. An MCI is computed as the weighted sum of a short-term interest rate and the exchange rate, and is designed to measure a country's monetary stance:

$$MCI_t = \theta_R (R_t - R_0) + \theta_e (e_t - e_0)$$

where t is a time index (t=0 being the base period), and θ_R, θ_e are weights supposed to describe the effect of a change in interest rates and in the exchange rate on the objective(s) of the central bank – typically some measure of real output. For Canada, for instance, the weights are 3 to 1: a one per cent increase in the interest rate has the same impact on output as a three per cent appreciation of the Canadian dollar. The weights are derived from econometric evidence on the impact of interests rates and the exchange rate on aggregate demand, based on single equation models. A typical example of such a model is the following equation estimated for Canada by Duguays (1994), and reported in Ericsson et al. (1997):

$$\Delta y_t = \underset{(0.13)}{0.13} + \underset{(0.11)}{0.52}\,\Delta y_t^* + \underset{(0.11)}{0.45}\,\Delta y_{t-1}^* - \underset{(0.22)}{0.40}\left[\frac{\Delta_8 r_{t-8}}{8}\right] - \underset{(0.12)}{0.15}\left[\frac{\Delta_{12} q_t}{12}\right]$$

$$T = 44 \;\; (1980:1 - 1990:4) \; R^2 = 0.64$$

where the data are quarterly, y is real Canadian GNP, y^* is real U.S. GNP, Δ is the first difference operator, q is the real Canada-US exchange rate and r a real 90-day commercial paper rate. Standard errors are reported within brackets. The ratio of the coefficients on the interest rate and the exchange rate is 2.67, which, rounded to 3, is the relative weight used by the Bank of Canada.

There are serious doubts about the reliability of these indices for economic policy analysis. Both because of the weakness of the empirical model from which they are derived and because of the uncertainty surrounding the point estimates of the two coefficients whose ratio is considered (see Ericsson et al.1996, 1997). In particular Ericsson et al. (1997) re-estimate Duguay's equation obtaining a point estimate of the relative weight of 3.56 (somewhat larger than the 2.67 in the original exercise) with an enormous 95 per cent confidence interval of $[0.74, \infty]$. The width of the confidence interval obviously weakens considerably the operational implications of the index.

MCI's for the countries in our sample can be easily derived from our estimated model. We compute the weights that would be relevant for EMU considering the coefficients on interest rates and the DM/US dollar exchange rate, after controlling for the domestic currency/DM exchange rates. Such weights are derived from the static long-run solution of our estimated model (reported in the Appendix 2) and are reported in Table 5.6.

Relative weights range from a minimum of about 1.3 for Germany and Spain to a maximum of over eight for Sweden. However, they are much more precisely estimated than in the model by Duguay for Canada: only in the case of Sweden does the imprecise estimate of the impact of the exchange rate on output deliver a very wide interval for the MCI weights.

The numbers in Table 5.6 could also be aggregated to construct an MCI for the ECB (more precisely for a subset of the EMU which covers 70 percent of EMU-15 GDP). The implied relative weight (exchange rate to interest rate) is 2.17 with a confidence interval ranging between 0 and 4. [21]

Table 5.6 Estimated weights in a European Monetary condition index

	output elasticities w. r. t. the dollar-DM exchange rate, controlling for the effect of the DM-local currency exchange rate	output elasticities w. r. t. a coordinated change in all expected domestic short-term interest rates at a constant exchange rate	implied weight in an MCI	95 per cent confidence interval on the implied weight in the MCI
Germany	1,007	1,40	1,39	[0- 2,8]
France	0,73	1,54	2,10	[0,35 - 3,85]
Italy	0,74	2,14	2,89	[0,59 - 5,29]
Spain	1,05	1,54	1,46	[0-2,9]
Sweden	0,29	2,36	8,13	[-3,0 - 19,2]
ECB			2,17	[0,08-4,27]

Confidence intervals are constructed by applying a Wald test for the hypothesis of equality of the implied MCI weights to the upper and lower bounds of the intervals. Relative weights cannot been computed for the UK since the DM-dollar exchange rate does not enter the specification of the UK output equation.

6 Why is the monetary mechanism different across Europe ?

The previous Section has documented significant differences in the monetary mechanism across EMU members. Two questions naturally arise: what are the sources of these asymmetries, will they disappear once monetary union takes off, and how fast. The ways in which a change in interest rates affects the economy--the «monetary mechanism» as Modigliani referred to it in his 1963 article—depend essentially on the working of two blocs in the economy: the financial market and wage settlements. In this section we discuss financial structure and its relation to the monetary mechanism. We shall next ask how fast will this structure change and what role will labour market institutions play.

Interest in financial structure is suggested by the empirical evidence in Section 5. The effects of a monetary tightening in countries such as France and Germany, characterised by a bank-centred financial system, are systematically weaker than in the UK where the capital markets play a central role in the financing of industry.

[21] Building the MCI using the ratio of the weighted averages, rather than the weighted average of the individual countries' ratios yields a very similar number: 1.92.

6.1 Three channels of monetary transmission in Europe

How does the monetary transmission mechanism depend on a country's financial structure ? When the central bank changes short-term interest rates, its actions are transmitted to the economy through three main channels. The first is the textbook channel: the change in interest rates affects new marginal spending by modifying borrowing conditions and by affecting asset prices, and thus the market value of wealth. In terms of the simple IS-LM-AS model, monetary policy shifts the LM schedule. But a change in interest rates can affect spending decisions through two additional channels that are related to a country's financial structure: the so-called «credit» and «broad credit» channels. (See Bernanke and Gertler, 1995). When loans and bonds are imperfect substitutes in the balance sheets of banks, following a liquidity squeeze banks reduce the amount of loans they supply. Firms could turn to the bond market, but if bonds and loans are imperfect substitutes, the external finance premium will go up, amplifying the effects of the monetary tightening. A second channel is associated with the credit constraints which may arise when firms' ability to borrow depends on the availability of collateral. An increase in interest rates reduces the market value of collateral (real estate values, for instance) thus affecting the firm's access to bank lending. (See Kiyotaki and Moore, 1997).

The credit channel will be relevant in the EMU because, especially in continental Europe (see Tables 6.1 and 6.2) banks provide the bulk of firms' credit. The contrast with the US and the UK is particularly striking: British and American firms raise on the capital market 3-4 times as many funds as a typical continental European firm, with the possible exception of France where securities' markets have recently developed fast.

Table 6.1 Liabilities of non-financial enterprises

	Securities (loans+securities = 100)		Share of bank loans in total debt liabilities	
			all non-financial enterprises	239 world largest mftg. co.
	1993	1983	1993	1995
Germany	6	2	85.1	63.1
Netherlands	3	4	78.6	47.8 (Benelux)
Austria	2	3	n.a.	--
Belgium	7	12	89.9	--
France	15	8	80.2	46.8
Spain	9	10	77.3	--
Italy	5	7	94.6	73.1
Sweden (Scandinavia)	4	5	80.9	46.8
UK	19	17	49.4	36.0
United States	20	17	32.4	11.0

Sources: BIS (1995), R&S (1997). Private placements of long-term securities, whose status lies somewhere in-between loans and market instruments, in some countries (US) are counted among securities, in other among loans.

Table 6.2 Financial Structure
(1996, Share of GDP)

	Debt & Equity	Bank Assets
EU	147.8	175.6
US	246.3	68.9

Source: authors' calculations based on IMF data

Evidence on the role of collateral in the provision of bank loans points to significant differences across Europe. Sweden and the UK stand out: more than one half of total loans are backed by collateral, suggesting that in these countries a change in interest rates may have a stronger effect on real activity. The ratio is high also in France, as witnessed by the collapse of Credit Lyonnais following the fall in French real estate prices.

Table 6.3 Collateral
Percent of total loans backed by real estate.
Households and firms, 1993

Germany	36
Austria	31
Netherlands	36
Belgium	34
France	41
Spain	33
Italy	40
Sweden	>61
UK	59
United States	66

Source: BIS, (1995).

One reason why the role of banks could give rise to asymmetries in the monetary mechanism, is related to the special relationship between a bank and its customers. When lending is organised in a competitive securities' market, lenders have no reason to cushion the effect on the borrower of a change in policy-determined interest rates. A bank, instead, appreciates the long-term relationship with its customer: it will thus be prepared to absorb, at least temporarily, some of the consequences on an interest rate hike, anticipating that it will be able to make up in the future (see Allen and Gale, 1997.) Another important reason is the lack of competition in the European banking industry The evidence in Table 6.4 points to significant differences in the magnitude, and especially in the timing of the response of bank lending rates to a change in the interest rate controlled by the central bank. The adjustment is instantaneous and complete in the UK. In Germany, one quarter after the change in the policy rate, only a third of such change has been translated into the loan rate, and the adjustment is still far from complete after one year. This evidence confirms the tight relationship between banks and firms in Germany. The response is even slower in France, where a year after the change in policy rates only one half has made it to the lending rate. Sluggishness is lower in Italy, Spain, Belgium and the in Netherlands.

Table 6.4 The response of bank lending rates to a change in the interest rate controlled by the central bank. Response to a 100 basis points increase in policy rates.
Lending rates are on short-term loans, typically overdrafts of business clients.

after:	one month	one quarter	two quarters	one year
Germany	0	36	53	74
Netherlands	71	95	102	103
Belgium	63	95	93	93
France	51	53	55	58
Spain	0	100	104	105
Italy	19	72	97	106
UK	100	100	100	100
United States	70	77	83	85

Source: BIS (1995).

A similar exercize run by the IMF (World Economic Outlook, October 1996, p. 44) confirms these findings. In the IMF estimates a one hundred basis point increase in the policy rate raises bank lending rates by 45 basis points in Germany, 51 in France, 73 in Italy.

6.2 Asymmetries in the income effect of monetary policy

When consumers face liquidity constraints, and hold significant net asset positions, a change in interest rates can affect their ability to spend. European consumers differ a great deal in their net asset positions. In northern countries (see Table 6.5), in the UK and Sweden in particular, consumer borrowing is widespread, and households have substantial financial liabilities. In Southern Europe, instead, consumer credit is underdeveloped, and the same applies to the high-debt states, Belgium, the Netherlands and Italy, where the need to finance large budget deficits has been one reason for preventing the growth of the consumer-debt industry. Germany's relatively higher level of consumers' debt is mostly accounted for by housing mortgages. The maturity of households debt affects the impact on individuals' cash flows of a change in short term rates. Italy stands out on three accounts: for the particularly low level of consumer debt, for the fact that it is mostly short term (the share of consumer debt at adjustable interest rate is very high also in the UK), and for the high level of net interest income as a share of total disposable income – the result of the very large share of public debt directly held by households.

An increase in interest rates will depress consumption where households' financial liabilities are high, as in the UK and Sweden, but also in Spain, while it will raise disposable income and spending in Italy, Belgium and the Netherlands. In the UK, for instance (see the Bank of England simulation discussed in Section 5) following a 1 percent increase in short term rates, consumption falls 27 basis points below the baseline; in Belgium and in the Netherlands it initially remains essentially flat, independently of the exchange rate regime assumed.

Table 6.5 The balance sheet position of households
(percent of annual disposable income, 1993)

	Households financial interest liabilities received by (% of dispos. income)	Composition of household debt:		Borrowing at adjustable interest rate		Net by household.
		bank loans	l-t debt	% of total	mortgages	
Germany	77.9	100.0	72.4	36	90	4.2
Netherlands	64.9	75.8	59.0	8	> 90	10.1
Belgium	41.5	n.a.	23.5	18	majority	6.1
France	51.0	82.2	43.9	13	5 (*)	0.2
Spain	58.0	88.3	n.a.	n.a.	80	4.2
Italy	31.4	94.6	14.7	59/69	75	11.4
Sweden	100.3	90.2	57.3	n.a.	10	-5.5
UK (**)	102.0	97.5	77.6	90	90	5.2
United States	92.0	39.2	67.9	34	15	7.3

Source: BIS (1995)
(*)The lender retains discretion over the time ad size of adjustments.
(**) The UK number includes dividend income.

6.3 Asymmetries in the credit channel: is the relevant lending rate short or long ?

We have documented above the different speed at which banks adjust lending rates to a change in policy rates. The numbers in Table 6.4 refer, however, to interest rates on short maturity lending. But the share of bank lending at short, or adjustable, rates is very different across Europe partly reflecting the inflation history of the various countris. There are two countries, the UK and Italy where most of firm borrowing is short-term, either because, as in Italy, the nature of the contract is short-term, or because contracts are indexed to short term interest rates, or in any case are adjustable at relatively short frequencies. On the contrary, in the countries traditionally characterised by the presence of «universal» banks, lending is predominantly at fixed rates.

The relevant lending rate is important because a decision by the ECB to change the policy relevant interest rate can have different effects at the short and at the long end of the yield curve. For instance, if the ECB reacts to an «inflation scare» by raising the short rate, the long rate may actually fall. It thus makes a great deal of difference if a firm borrows long or short. Given the distinction between Italy and the UK, on the one side, and the rest of continental Europe on the other, a common monetary impulse from the ECB should thus translate relatively faster into changes in spending in the first two countries.

Table 6.6 documents the conditions of lending contracts in Europe and, for comparison, in the United States. The share of lending at short term rates is particularly high in Italy, in Austria and in the UK. Lending terms appear to be short also in Spain – a finding that seems at odds with the evidence indicating a very slow transmission mechanism in that country. Borio (1996) notes that Spanish lending rates, although adjustable at short intervals, really tend to behave like long-term rates because of the sources of financing of Spanish banks.

Table 6.6 Credit at adjustable interest rates
Short-term credit, plus medium and long term credit indexed at s-t interest rates, or adjustable at a frequency < one year, percent of total credit

		by sector:		by instrument:
	all sectors	households	firms	bank loans
Germany	39	36	40	45
Austria	74	--	--	76
Netherlands	25	8	37	35
Belgium	44	18	67	51
France	44	13	56	--
Spain	43/64 (*)	--	--	47/70
Italy	73	59/69	77	79
Sweden	35	--	--	70
UK	73	90	48	85
United States	34	31	35	35

Source: BIS (1995)
(*) 43 percent indexed to short-term rates, 64 percent adjustable within a year.

6.4 Summing up the evidence on financial structure and the monetary mechanism

The empirical evidence presented in Section 5 suggested the following ordering in the impact of a EU-wide change in interest rates on real activity. The impact is largest in Italy and Sweden, smaller in France and in the UK, and smallest in Germany and Spain. The characteristics of the financial system documented above go some way towards explaining the observed asymmetry in the transmission mechanism–thus raising the question: will EMU foster financial integration in Europe, and thus eliminate the current asymmetries ?

- In Sweden the fast transmission of monetary policy to output could be related to the importance of bank credit, and thus of the credit channel; to the short maturity of lending contracts; to the important role of collateral, and to the balance sheet position of households, whose financial liabilities exceed 100% of disposable income. In Italy, short-term bank credit and the balance sheet position of households work in opposite direction, but the first must clearly dominate.

- In the UK and, although to a lesser extent, and only recently, in France, the speed of the transmission could be related to the role of the capital markets in the financing of firms. Collateral could also be important, especially in France.

- Germany and Spain show surprising low responses, although the response in Spain increases when the change in interest rate is EU-wide because the Spanish economy is very open. The importance of bank credit and of the relationships between banks and industry must underlie the slow and small impact of interest rate changes on German output.

7 The monetary mechanism: implications for the ECB

From our discussion of the monetary mechanism in the EMU we draw the following two implications for ECB beaviour:

- Asymmetries in the transmission of a change in policy-determined interest rates to real variables cannot be neglected. A monetary tightening by the ECB will produce an uneven distribution of output losses across the monetary union. For instance, and importantly, we documented how an EMU-wide increase in interest rates affects output by a relatively smaller amount and with longer lags in Germany, compared to other countries (with the exception of Spain). This would result in Germany being partially sheltered from the effects of a monetary tightening, and possibly experiencing higher-than-average inflation. These asymmetries are related to the financial structures of EMU members. The speed at which financial structures will converge—for instance with the development of an EU-wide liquid market for corporate bonds, thus reducing the role of banks in the intermediation of savings—will be an important factor in eliminating such asymmetries. For some time, however, the ECB will have to live with the consequences of these asymmetries. There is however important room for policy here. For example, as suggested in Pennant-Rea et al. (1997) differential capital adequacy requirements could encourage banks to shift from variable rate to fix rate loans and mortgages. Tax changes could also be used to reduce gearing in countries where hosehold debt is relatively high, and to encourage companies to shift from debt to equity financing.

- Computation of a Monetary Condition Index for the ECB suggests that the exchange rate of the Euro will remain important factor in setting monetary policy. We have computed a relative weight of 2.2, which means that inside EMU the effect on output of a one percent change in interest rates will be equivalent to that of a 2.2 percent appreciation of the Euro relative to the dollar. The corresponding number for the United States is roughly 10 (see IMF, World Economic Outlook, May 1996, p.16.) indicating a very weak impact of the dollar exchange rate on US output. The number for Germany is 1.4 indicating a much stronger effect of fluctuations in the external value of the Deutschemark on the German economy. The ECB will care about the Euro-dollar exchange rate less than the Buba cares about the DM-dollar rate, but its concern for the exchange rate will remain much greater than that of the Fed.

8 Changing structure

It is hard enough to enact monetary policy without the benefit of continuity -- except in the broadest terms as the commitment to price stability: even harder when policy targets suddenly turn European, and with an economic structure that remains largely to be explored. The simple question: What is the effect of a 100 basis point increase in the ECB Funds rates on European output, and over what time period, does not have an answer at present. Our effort in exploring the monetary mechanism as attempted to put a first guess on that issue. But the problem for policy makers is certain to be more complicated for two reasons.

First, the Euro will change the way financial markets work, inducing corresponding changes in the monetary mechanism. In addition to pervasive deregulation already underway and innovation, the introduction of the Euro will revolutionise the financial structure of Europe. Europe will in a short period become more nearly like the US and that, of course, has

a bearing on the operation of monetary policy. Assuredly, any notion of a stable relationships between a monetary aggregate and target variables is not going to last—and this, by the way, is an important argument against relying on monetary aggregates as indicators for monetary policy.

Second, but less definitely than financial restructuring, the wage-price process may well evolve as economic actors adjust to operating more clearly in a single market with a common currency. While the arrival of these changes is certain or plausible, the details of the dynamics are altogether unknown. No question, monetary policy suffers an extra handicap as a result.

8.1 The demise of European banks

In making the case for a common money, the European Commission highlighted the benefits of a wide and deep European capital market taking over from narrow, illiquid, repressed and segmented national markets. As we have seen, banks at present play a large role in continental Europe, and the capital market almost none; that may be an overstatement for the government sector but assuredly not for business. It helps then ask what are the plausible features of this new capital market. [22] A suitable comparison might be with the US where there was both deregulation that opens the capital market via competition and structural change that continues to lead to massive merging. Europe's financial system differs substantially from country to country and it differs still from the highly deregulated and competitive system in the United States. This is what we should expect with the creation of the Euro, the accompanying deregulation, and wiht internal market legislation that eases cross border competition:

- Large firms will move into a Euro CD market and a Euro bond market;
- Depositors will shift from traditional deposits to money market fund accounts;
- Households will find they can borrow in a new Euro consumer credit market;
- Real estate lending will move into a Euro securitized market;
- Wholesale business will shift from banks to specialised institutions, including possibly a few banks;
- This includes in particular foreign exchange and distribution of securities.

This transformation is dramatic for banking systems in Europe. How fast the transition is going to be, whether the speed of change will be different across Europe are very relevant questions for the ECB. The banking systems of some European countries are already fragile before the competition even starts. For fragility of the banking system the tails matter and Europe has fat tails (see table 8.1).

[22] These questions are addressed in Prati and Schinasi (1997), and McCauley and White (1997).

Table 8.1 Financial Strength of Banks
(1996, % of banks in the group)

	A	B+	B	C+	C	D+	D	E+	E
US	1.0	7.1	23.0	38.2	27.0	3.7	0	0	0
EUROPE	6.5	11.1	22.2	20.9	22.2	10.5	3.2	0.7	2.6
Germany	11.5	7.7	15.3	30.7	23.0	11.5	0	0	0
UK	3.7	18.5	33.3	18.5	18.5	3.7	0	0	0
Italy	0	0	16.6	33.3	22.2	11.1	0	5.5	11.1
France	3.7	7.4	18.5	14.8	18.5	18.5	14.8	0	3.7
Spain	8.3	25.0	41.7	8.3	16.7	0	0	0	0

Source: authors' calculations based on IMF (1996, p.77)

Having relied on captive customers both for loans and deposits, these banks will suddenly face more competition then they have ever imagined. There is little question that the size of banks in the financial sector will decline, that mergers open a vast scale will be inevitable. The surviving players will surely have to be European in scale.

The situation is worsened by the fact that those banks which today have already a weak financial situation will be worst placed to stay in the game. They will have the highest funding costs and therefore are the first to lose prime customers. In a vicious circle, their credit ratings will worsen until they are ripe for take-over by the government. Unless governments take precautionary measures by a pre-emptive merger policy, banking problems will be important and they may affect macroeconomic performance as was the case in the US in the 1980s, or in Sweden in the 1990s. For monetary policy, in particular, latent banking problems provide an important complication.

If a need for monetary tightening arises, the transition of the banking system and its quality will be significant. Since the quality of banking systems differs substantially on a national basis, as does the distance to be covered by the more financially repressed regimes, monetary policy will be severely complicated by the political fall-out.

Monetary policy operates via the interest rate channel and the credit channel, including credit rationing effects. Financial liberalisation tends to shift the balance more toward interest costs while financial fragility adds credit rationing effects for those customers for whom banks are the natural credit agents. In the transition to a new financial structure the net effects are not obvious.

8.2 The Wage-Price Process

The other area of changing structure that interfaces with monetary policy is the wage-price process. A plausible description of the existing mechanism is that in Germany labour understands the limited inflation tolerance of the Buba and, as a result, practices wage restraint so as to avoid unemployment. Because the Buba reacts directly to prospective price inflation foreshadowed by current wage settlements and productivity developments, there is nothing diffuse in the link between wage hikes and unemployment.

But how will German labour act once central bank policy is geared to European-wide inflation rather than German wages ? Now the cost of a German wage hike is less directly reflected in German unemployment. In fact, unless there is a matching inflationary increase in wages everywhere, European inflation won't rise one-for-one with German wage hikes and thus the need for disinflationary policy is less. Even to the extent that there is a disinflationary reaction from the ECB, the cost is not fully borne by German workers: unemployment will rise everywhere and other countries' increased wage discipline may well provide the room for more German aggression on the wage front--especially if, as discussed in earlier sections of the paper, Germany will be partially sheltered from the consequence of a monetary tightening.

Of course, the story does not end here. In fact, the solution is likely to be a complicated game in cross-border wage-hike. The presumption must be that the disruption of a direct link between wage hikes and unemployment will remove much of the discipline that is now in place. At least that should be the case until a new equilibrium pattern has emerged that involves translation to the European level of the current game between the Buba and German labor. But the new game could be very different. In Germany wages are bargained at the industry level on a regional basis, but settlements are driven by the wage agreement in the metal industry which typically sets the pattern for the entire country. This may happen in the EMU one day, but for some time wage bargaining will remain much more decentralised. The new cross-country game among different national unions could worsen the output-inflation tradeoff the ECB faces, compared with the tradeoff currently faced by the Bundesbank.

The point that the degree of centralization of wage bargaining affects the outcome in terms of wage inflation has been made by Calmfors and Driffill (1988). In a recent paper Cukierman and Lippi (1997) show that the strategic interaction among many uncoordinated unions and a single central bank results in the monetary authorities facing a worse output-inflation tradeoff than they would were they confronted by a single union. The output-inflation tradeoff faced by the central bank worsens as the number of unions increases.

9 Conclusions

Questions such as «will EMU happen, will it be a large EMU, how will the Maastricht criteria be fudged» are history. EMU is around the corner and in a little less than a year a brand new European central bank will be conducting European monetary policy. The challenge is nothing short of formidable.

So far, the Buba has been running German monetary policy and the rest tugged along as well as they could. In conducting monetary policy, the new ECB will face three major issues all connected to the fact that the bank will conduct a «European» monetary policy. Nobody has ever done that. Conducting a European monetary policy involves three challenges.

First, the ECB has to tread the narrow path between an institutional revolution and uninterrupted continuity with the Buba. The capital markets will be unforgiving if they see anything less than Bubaness. But the political community will be unforgiving if they do not see a genuine preoccupation with being European—creating a language and constituency that goes beyond German savers and monetary hawks. The legitimacy which the ECB must build

depends critically on its understanding that its constitution in no way guarantees its political effectiveness. The success relies critically on developing successful communication.

Second, the ECB must conduct a European policy. It cannot get itself to accept solving every local problem by excessive regionalization of its policy; it must work on the broad picture of stabilizing European prices, not putting a lid on German inflation or a floor under French deflation. The challenge is to shift the discussion to European averages and credibly work with these.

Third, the ECB has to develop a grip of the monetary mechanism in the European economy. That task is complicated because financial structures and the wage-price process differ widely. Our research shows that the monetary process differs significantly across countries. Moreover, that process is sure to evolve in part as a result of the financial industry restructuring that is already underway and is accentuated by the common money. Furthermore, as the *Lucas principle* suggests, the wage-price process itself will adapt to the changing focus of European monetary policy. Shooting at a moving target in the fog is no easy task.

Of course, the list of problems does not stop there, but these seem the most pressing for the success of the new institution.

Appendix 1: A simultaneous model for European Central Banks' reaction functions

Estimating the model by FIML
The sample is: 1986 (4) to 1996 (7) less 12 forecasts
The forecast period is: 1995 (5) to 1996 (7)

Equation 1 for gereur

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
gereur_1	0.891721	0.0294841	30.244	0.0000	0.0296211
GERGAP_1	0.035613	0.010844	3.284	0.0014	0.008580
gerinfl_1	0.0989121	0.0334968	2.953	0.0039	0.0334839
LEUROCMB	-3.8735	3.1963	-1.212	0.2283	2.9384
LEUROCMB_1	1.8280	3.3649	0.543	0.5881	3.0374
Constant	9.0146	2.5677	3.511	0.0007	---

σ = 0.2748568

Equation 2 for fraeur

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
fraeur_1	0.608884	0.0613925	9.918	0.0000	0.130890
Dlusdm	-0.0473425	0.0496403	-0.954	0.3425	0.0614359
fginfgp	0.197377	0.0640504	3.082	0.0026	0.0871315
fgoutgp_2	0.0502348	0.0321606	1.562	0.1214	0.0408638
gereur	0.354990	0.0768668	4.618	0.0000	0.128306
Constant	0.994304	0.399784	2.487	0.0145	---

σ = 0.7905663

Equation 3 for itaeur

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
itaeur_1	0.742860	0.0487594	15.235	0.0000	0.0656442
igoutgp_2	0.0293415	0.0207018	1.417	0.1594	0.0187722
iginfgp	0.0874234	0.0579600	1.508	0.1345	0.0524911
Dlusdm	-0.117761	0.0457551	-2.574	0.0115	0.0497379
gereur	0.182556	0.0616186	2.963	0.0038	0.0733637
Constant	1.3561	0.484857	2.797	0.0062	---

σ = 0.7239046

Equation 4 for espeur

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
espeur_1	0.947113	0.0260438	36.366	0.0000	0.0354092
Dlusdm	-0.0548841	0.0413391	-1.328	0.1872	0.0422874
gereur	0.0945353	0.0463672	2.039	0.0440	0.0433974
eginfgp	0.104115	0.0336438	3.095	0.0025	0.0352331
egoutgp_2	0.0240310	0.0204866	1.173	0.2435	0.0205293
Constant	-0.309019	0.414470	-0.746	0.4576	---

σ = 0.6479899

Equation 5 for ukeur

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
gereur_1	-0.631906	0.338605	-1.866	0.0649	0.332702
ukeur_1	0.982808	0.0343590	28.604	0.0000	0.0374112
ukinfl	0.197219	0.116589	1.692	0.0938	0.0977184
ukinfl_1	-0.260765	0.104776	-2.489	0.0144	0.0857059
UKGAP_1	0.288100	0.113090	2.548	0.0123	0.097786
gereur	0.644220	0.347074	1.856	0.0663	0.334636
Constant	0.364141	0.207179	1.758	0.0818	---

σ = 0.4418249

Equation 6 for sweeura

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE

sweeura_1	0.756665	0.0594150	12.735	0.0000	0.104412
sginfgp	0.0949974	0.0337890	2.811	0.0059	0.0387156
sgoutgp_2	0.00925927	0.0193006	0.480	0.6324	0.0265382
Dlusdm	-0.119115	0.0553196	-2.153	0.0336	0.0469181
gereur	0.190666	0.0609325	3.129	0.0023	0.0607255
Constant	0.947113	0.504678	1.877	0.0634	---

σ = 0.8703861

correlation of residuals

	gereur	fraeur	itaeur	espeur	ukeur	sweeura
gereur	1.000					
fraeur	-0.017431	1.000				
itaeur	0.041472	0.41574	1.000			
espeur	-0.015046	0.071597	0.091961	1.000		
ukeur	0.083073	-0.0044000	0.14928	-0.19838	1.000	
sweeura	-0.13321	0.38972	0.36096	0.16067	0.035945	1.000

1-step (ex post) forecast analysis 1995 (5) to 1996 (4)
Parameter constancy forecast tests:
$Chi^2(72)$= 27.466 [1.0000] F(72,103)= 0.381473 [1.0000]

Variables are defined as follows:

country code+eur	= 3month euro interest rate
country code+inflgap	= domestic annual CPI inflation -German annual CPI inflation
country code+outgap	= domestic annual ind. prod. growth -German annual ind.prod. growth
UKGAP	= (log(UK ind. prod) - trend)/log(UKind.prod.)
GERGAP	= (log(GER ind. prod) - trend)/log(GERind.prod.)
lusdm	= log(Dmeark/US dollar exchange rate)
dlusdm	= lusdm -lusdm(-1)
LEURODM	= log (trade weighted eschange rate of D.Mark versus other European currencies)
country code+infl	= domestic annual CPI inflation

Appendix 2: A simultaneous model for output growth in European countries

Estimating the model by FIML
The sample is: 1987 (8) to 1996 (7)

Equation 1 for gergr

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
gergr_1	0.632420	0.0637645	9.918	0.0000	0.0628239
ldmusd_7	0.297369	0.146407	2.031	0.0450	0.139560
ldmusd_8	-0.201092	0.204009	-0.986	0.3268	0.193797
ldmusd_9	0.318809	0.205465	1.552	0.1240	0.227106
ldmusd_10	-0.344989	0.205503	-1.679	0.0965	0.211222
ldmusd_11	0.341072	0.203646	1.675	0.0972	0.218865
ldmusd_12	-0.0409441	0.147966	-0.277	0.7826	0.163295
gerexp_7	-0.544586	0.193959	-2.808	0.0060	0.241900
gerinfl	0.780524	0.658626	1.185	0.2389	0.686797
gerinfl_1	-0.312329	0.643862	-0.485	0.6287	0.645569
Trend	0.00862428	0.0113536	0.760	0.4494	0.0106476
Constant	-6.0565	3.1497	-1.923	0.0575	---

σ = 2.2992

Equation 2 for fragr

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
fragr_1	0.458538	0.0818901	5.599	0.0000	0.0758772
lffrdm_7	-0.999742	0.459279	-2.177	0.0320	0.498254
lffrdm_8	1.0915	0.624803	1.747	0.0839	0.615757
lffrdm_9	-0.203694	0.612135	-0.333	0.7400	0.613545
lffrdm_10	-0.319902	0.616076	-0.519	0.6048	0.739180
lffrdm_11	-0.162622	0.622957	-0.261	0.7946	0.622679
lffrdm_12	0.318590	0.445841	0.715	0.4766	0.467715
frexp_12	-0.259972	0.106251	-2.447	0.0162	0.0970546
frainfl	0.560428	0.570001	0.983	0.3280	0.612662
frainfl_1	-1.0256	0.572429	-1.792	0.0763	0.586139
gergr	0.390702	0.0729802	5.354	0.0000	0.0732930
Constant	18.128	17.544	1.033	0.3041	---

σ = 1.40373

Equation 3 for itagr

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
itagr_1	-0.00996280	0.104106	-0.096	0.9240	0.104521
llitdm_7	0.373817	0.329518	1.134	0.2594	0.199996
llitdm_8	0.0209002	0.497179	0.042	0.9666	0.248475
llitdm_9	0.480808	0.501722	0.958	0.3403	0.379765
llitdm_10	-0.470175	0.514026	-0.915	0.3626	0.422336
llitdm_11	-0.297799	0.521260	-0.571	0.5691	0.450751
llitdm_12	-0.131641	0.328535	-0.401	0.6895	0.293640
itexp_9	-0.655477	0.344351	-1.904	0.0600	0.368860
fragr	1.0362	0.174990	5.921	0.0000	0.173850
itainfl	-0.965540	1.2213	-0.791	0.4311	1.0959
itainfl_1	0.0412934	1.2208	0.034	0.9731	1.0626
Constant	19.456	20.983	0.927	0.3561	---

σ= 2.94748

Equation 4 for espgr

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
espgr_1	0.394137	0.0830905	4.743	0.0000	0.0948182
lpesdm_7	0.286201	0.268215	1.067	0.2886	0.248496

lpesdm_8	0.347928	0.352076	0.988	0.3255	0.297950
lpesdm_9	-0.679454	0.360072	-1.887	0.0622	0.289478
lpesdm_10	0.330727	0.372101	0.889	0.3763	0.311992
lpesdm_11	0.283486	0.349522	0.811	0.4193	0.261650
lpesdm_12	-0.383636	0.268636	-1.428	0.1565	0.221055
spexp_8	-0.0153479	0.131444	-0.117	0.9073	0.141767
gergr	0.632339	0.128718	4.913	0.0000	0.134842
espinfl	0.551355	0.699815	0.788	0.4327	0.755166
espinfl_1	-0.866878	0.686824	-1.262	0.2100	0.680693
Constant	-32.622	21.753	-1.500	0.1370	---

σ = 2.54496

Equation 5 for ukgr

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
ukgr_1	0.481043	0.0780222	6.165	0.0000	0.0758935
lukstdm_7	0.233287	0.134815	1.730	0.0868	0.129186
lukstdm_8	-0.0713298	0.198821	-0.359	0.7206	0.199570
lukstdm_9	-0.280373	0.201989	-1.388	0.1683	0.237578
lukstdm_10	0.450799	0.204010	2.210	0.0295	0.212536
lukstdm_11	-0.443625	0.200005	-2.218	0.0289	0.191257
lukstdm_12	0.124151	0.137662	0.902	0.3694	0.131297
ukexp_8	-0.472802	0.124281	-3.804	0.0003	0.113527
ukinfl	0.528370	0.326901	1.616	0.1093	0.375509
ukinfl_1	-0.427712	0.350149	-1.222	0.2249	0.391209
Trend	-0.0265013	0.00928428	-2.854	0.0053	0.0103522
Constant	7.8154	3.3094	2.362	0.0202	---

σ= 1.30911

Equation 6 for swegr

Variable	Coefficient	Std.Error	t-value	t-prob	HCSE
swegr_1	0.480163	0.0817576	5.873	0.0000	0.0869585
lskrdm_7	0.502191	0.284397	1.766	0.0806	0.262294
lskrdm_8	-0.268818	0.432612	-0.621	0.5358	0.432879
lskrdm_9	0.00369276	0.440444	0.008	0.9933	0.436083
lskrdm_10	0.0393872	0.430794	0.091	0.9273	0.398790
lskrdm_11	-0.167540	0.433804	-0.386	0.7002	0.401022
lskrdm_12	0.0490933	0.293668	0.167	0.8676	0.280668
sweexp_9	-0.853747	0.259250	-3.293	0.0014	0.244572
sweinfl	-0.652961	0.350581	-1.863	0.0656	0.409517
sweinfl_1	0.715181	0.356982	2.003	0.0480	0.413538
gergr	0.151681	0.120263	1.261	0.2103	0.111817
Constant	-0.285656	5.4420	-0.052	0.9582	---

σ = 3.01219

loglik = -405.97122 log|ê| = 7.51799 |ê| = 1840.86 T = 108

correlation of residuals

	gergr	fragr	itagr	espgr	ukgr	swegr
gergr	1.000					
fragr	-0.33022	1.000				
itagr	-0.072832	-0.23508	1.000			
espgr	-0.32946	0.38457	-0.0079274	1.000		
ukgr	0.012213	0.33067	-0.037535	0.11707	1.000	
swegr	-0.26998	0.049377	0.023138	0.37447	0.28048	1.000

Static long run

frexp_12 spexp_8 ukexp_8 gerexp_7 sweexp_8 itexp_9 ldmusd_7

gergr	0.0000	0.0000	0.0000	-1.482	0.0000	0.0000	1.007
fragr	-0.48013	0.0000	0.0000	-1.069	0.0000	0.0000	0.72676
itagr	-0.49260	0.0000	0.0000	-1.097	0.0000	-0.64901	0.74564
espgr	0.0000	-0.025332	0.0000	-1.546	0.0000	0.0000	1.051
ukgr	0.0000	0.0000	-0.91106	0.0000	0.0000	0.0000	0.0000
swegr	0.0000	0.0000	0.0000	-0.43229	-1.642	0.0000	0.29389

Standard errors of static long run

	frexp_12	spexp_8	ukexp_8	gerexp_7	sweexp_8	itexp_9	ldmusd_7
gergr	0.0000	0.0000	0.0000	0.58624	0.0000	0.0000	0.26667
fragr	0.17598	0.0000	0.0000	0.27978	0.0000	0.0000	0.12916
itagr	0.10859	0.0000	0.0000	0.30841	0.0000	0.32779	0.15440
espgr	0.0000	0.21652	0.0000	0.42185	0.0000	0.0000	0.20870
ukgr	0.0000	0.0000	0.16511	0.0000	0.0000	0.0000	0.0000
swegr	0.0000	0.0000	0.0000	0.33249	0.47628	0.0000	0.21908

Testing the homogeneity restriction:

(a) impact effect of a common monetary policy:

GenRes $Chi^2(5) =$ 9.1389 [0.1037]
&7-&18-(&21)*&7=0;&7-&29-&30*(&18+&21*&7)=0;&7-&40-&41*&7=0;
&7-&51=0;&7-&62-&65*&7=0;

(b) effect of a common monetary policy on output after two years:

GenRes $Chi^2(5) =$ 21.245 [0.0007] **
&7/(1-&0)-&18/(1-&11)-(&21/(1-&11))*&7/(1-&0)=0;
&7/(1-&0)-&29/(1-&22)-(&30/(1-&22))*(&18/(1-&11)+(&21/(1-&11))*&7/(1-&0)) =0;
&7/(1-&0)-&40/(1-&33)-(&41/(1-&33))*&7/(1-&0)=0;
&7/(1-&0)-&51/(1-&44)=0;
&7/(1-&0)-&62/(1-&55)-(&65/(1-&55))*&7/(1-&0)=0;

Restrictions are written after dropping the constant from our estimated model and labelling all estimated parameters from &0 to &65.

Variables are defined as follows:

infl+country code	annual inflation
gr+country code:	annual growth in industrial production
exp+country code:	fitted value from the reaction functions
ldmusd:	log of the DMark/US dollar exchange rate
lpesdm:	log of the Spanish peseta/DMark Exchange rate
litdm :	log of the Italian lira/DMark exchange rte
lffrdm:	log of the Frenc franc/DMark exchange rate
lukstdm	log of the UK sterling/DMark exchange rate
lskrdm	log of the Swedish Krona/Dmark exchange rate

References

Allen, F. and D. Gale (1997), «Financial Markets, Intermediaries, and Intertemporal Smoothing», Journal of Political Economy, 105, no. 3, pp. 523-546.

Bank for International Settlemets (1995), Financial Structure and the The Monetary Policy Transmission Mechanism. Basel.

Barran,F. Coudert V., and Mojon(1997) La transmission des politiques monetaires dans le pays europeens, Revue Francaise d'Economie,12,2, 133-176

Bernanke, B.S. and M. Gertler (1995), «Inside the black box: the credit channel of monetary transmission mechanism», The Journal of Economic Perspectives, 9, Fall.

Bernanke B. and I. Mihov (1996) «What does the Bundesbank target ?», European Economic Review.

Borio, C.E.V. (1996), «Credit Characteristics and the monetary policy transmission mechanism in fourteen industrial countries», in K. Alders et al. eds., Monetary Policy in a Converging Europe. Amsterdam: Kluwer Academic Publishers.

Britton E. and J.Whitley (1997), «Comparing the monetary transmissin mechanism in France, Germany, and the United Kingdom: some issues and results», Bank of England Quarterly Bulletin, May.

Calmfors L. and J. Driffill (1988), "Bargaining Structure, Corporatism, and Macroeconomic Performance", Economic Policy, 6, April, 14-61.

Carlino,G. and R.deFina (1996), «Does Monetary Policy Have Differential Regional Effects?» Federal Reserve Bank of Philadelphia, Business Review.

CEPR (1997), «Options for the Future Exchange Rate Policy of the EMU», Unpublished manuscript.

Clarida R. and M. Gertler (1996), «How the Bundesbank conducts monetary policy», NBER W.P. No. 5581.

Clarida R., J.Gali and M.Gertler (1997), «Monetary policy rules in practice: some international evidence», paper presented at 1997 ISOM Conference.

Cukierman, A. and F. Lippi (1997), «Central Bank Independence, Centralization of Wage Bargaining, Inflation and Unemployment», Unpublished manuscript.

Duguay P. (1994), «Empirical evidence on the strength of the monetary transmission mechanism in Canada: an aggregate approach» Journal of Monetary Economics, 33(1), 39-61.

Eika, K.H., Ericsson N.R. and Nymoen R. (1996), «Hazards in implementing a monetary condition index», Oxford Bullettin of Economics and Statistics, 58(4), 765-790.

Ericsson N.R., E.S. Jensen, N.A. Kerbeshian and R. Nymoen (1997), «Understanding a monetary condition index», Unpublished manuscript.

Faust, J. (1996), «Whom Can We Trust To Run the Fed? Theoretical Support for the Founders' Views.» Journal of Monetary Economics. 37, pp.267-283.

Faust J. and E.M.Leeper (1997), «When do long-run identifying restrictions give reliable results ?» Journal of Business Economics and Statistics

Gerlach S.and F.Smets (1995), «The monetary transmission mechanism: Evidence form the G-7 countries» , BIS discussion paper .

Gildea, J.(1992), «The Regional Representation of Federal Reserve Bank Presidents.» Journal of Money, Credit and Banking Vol.24, No.2 (May)

Goodfriend M. (1991), «Interest rates and the conduct of monetary policy", Carnegie Rochester Series on Public Policy, 34, 7-30.

Havrilevsky,T. and J.Gildea (1992) «Reliable and Unreliable Partisan Appointees to the Board. of Governors.» Public Choice , 73, May, pp 397-417.

---------- (1996/5) «The Biases of Federal Reserve Bank Presidents.» Economic Inquiry 33(1) April, pp.274-284.

International Monetary Fund (1996) International Capital Markets. Washington DC

Kiyotaki, N. and J. Moore (1997), «Credit Cycles», Journal of Political Economy, 105, 2, pp, 211-248.

Levin, A., J.Rogers and R.Tryon (1997), «A Guide to FRB/Global» Unpublished manuscript, Board of Governors of the Federal Reserve.

McCauley, R.N. and W. R. White (1997), «The Euro and European Financial Markets» in P.Masson, T. Krueger and B. Turtleboom (eds.), EMU and the International Monetary System. Washington: IMF.

Mundell, R.A. (1961), «A Theory of Otimum Currency Areas», American Economic Review 51, 657-65.

OECD (1997), Economic Outlook. Paris: OECD, June

Pennant-Rea, R. et al (1997), «The Ostrich and the EMU». London: Centre for Economic Policy Research.

Prati A. and G.J. Schinasi (1997), «EMU and International Capital Markets: Implications and Risks», in P.Masson, T. Krueger and B. Turtleboom (eds.), EMU and the International Monetary System. Washington: IMF.

S&P (1997), International Financial Aggregates. Milan: Ricerche e Studi.

Tootell,G. (1991), «Regional Conditions and the FOMC Votes of District Presidents», New England Economic Review, March/April.

---------- (1997), «Reserve Banks, the Discount Rate Recommendation, and FOMC Policy.» Unpublished manuscript, Federal Reserve Bank of Boston.

von Hagen, J. (1997), «Monetary Policy and Institutions in the EMU», Swedish Economic Policy Review, 4, 1, Spring, pp. 51-115.

---------- and R. Suppel (1994) «Central Bank Constitutions for Federal Monetary Policy», European Economic Review, 38, 774-782.

Figure 1: Output gaps in Europe and in Germany

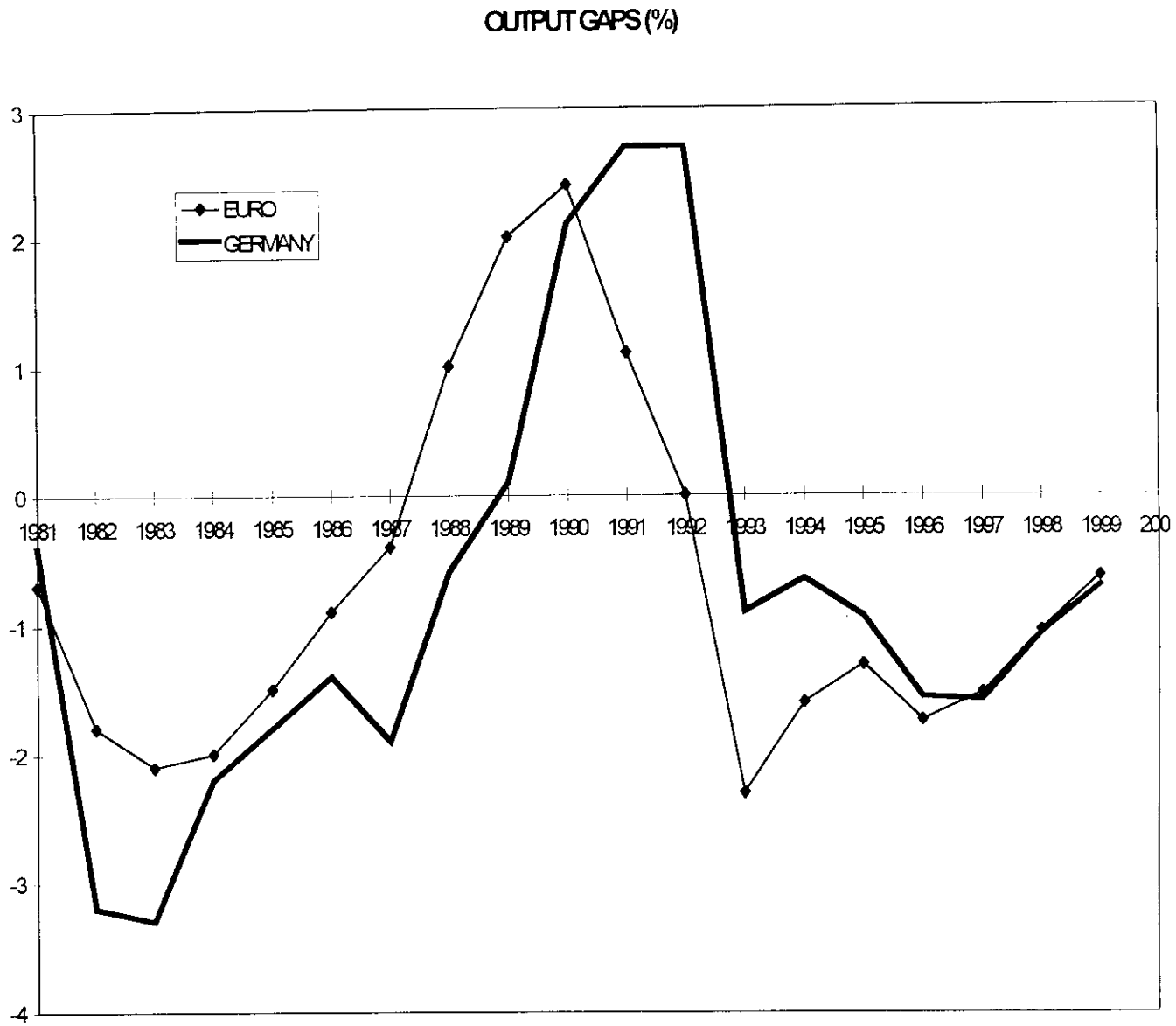

Figure 2: The impact of a German fiscal espansion of one percent of GDP, starting in 2000:1 on real GDP in Germany

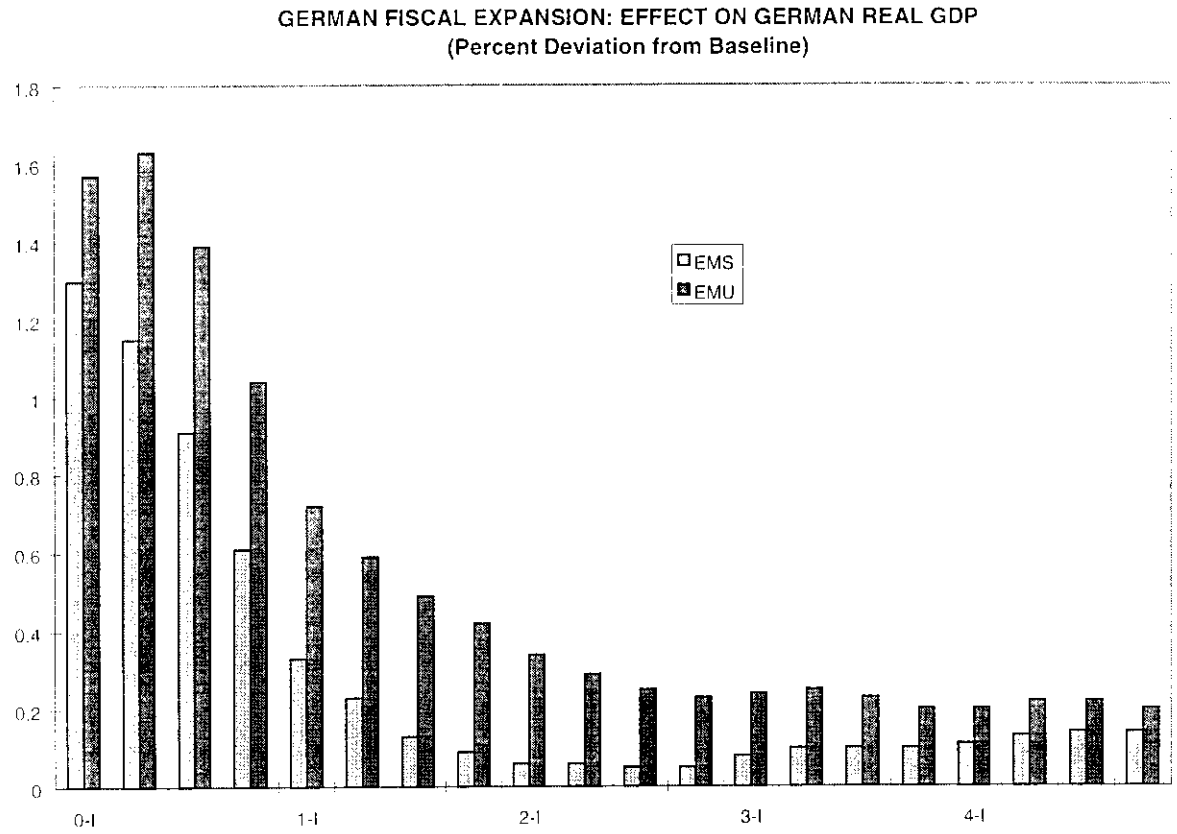

Figure 3: The impact of a German fiscal espansion of one percent of GDP, starting in 2000:1 on real GDP in France

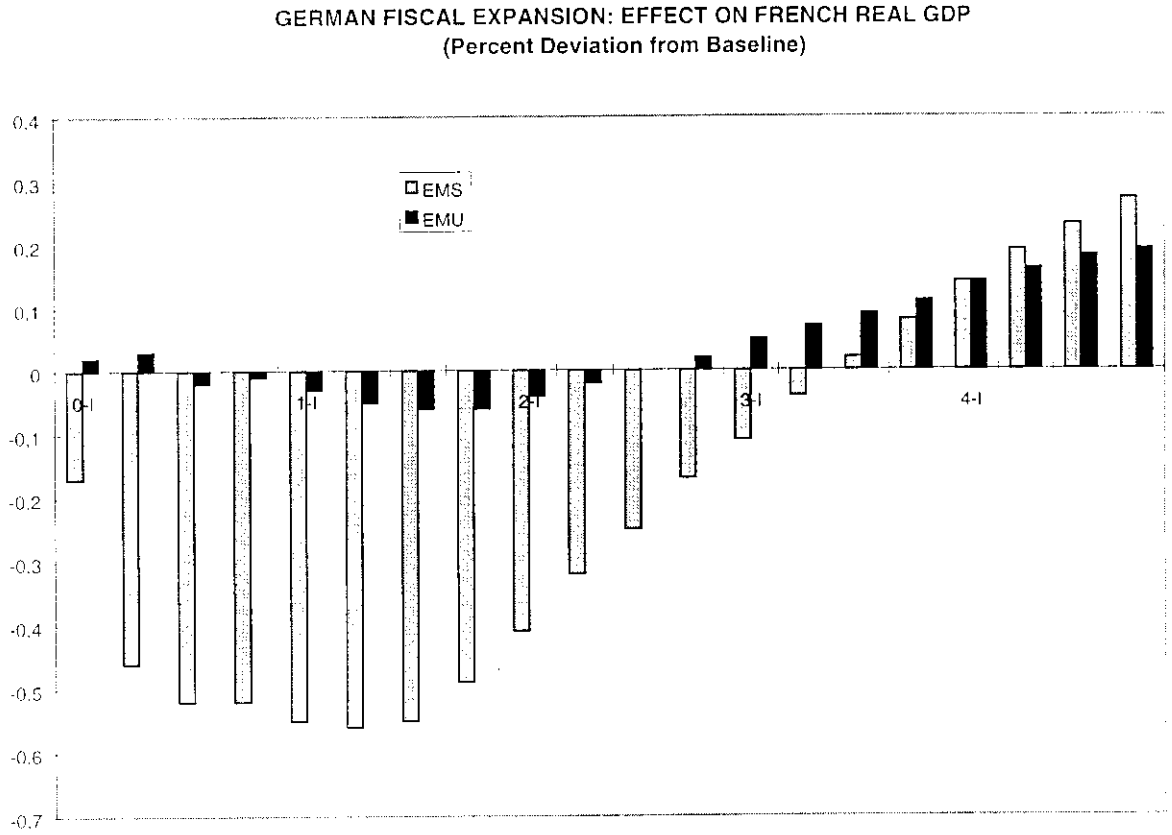

Figure 4: Modelling European Central Banks reaction functions: the difference between actual and fitted short-term interest rates

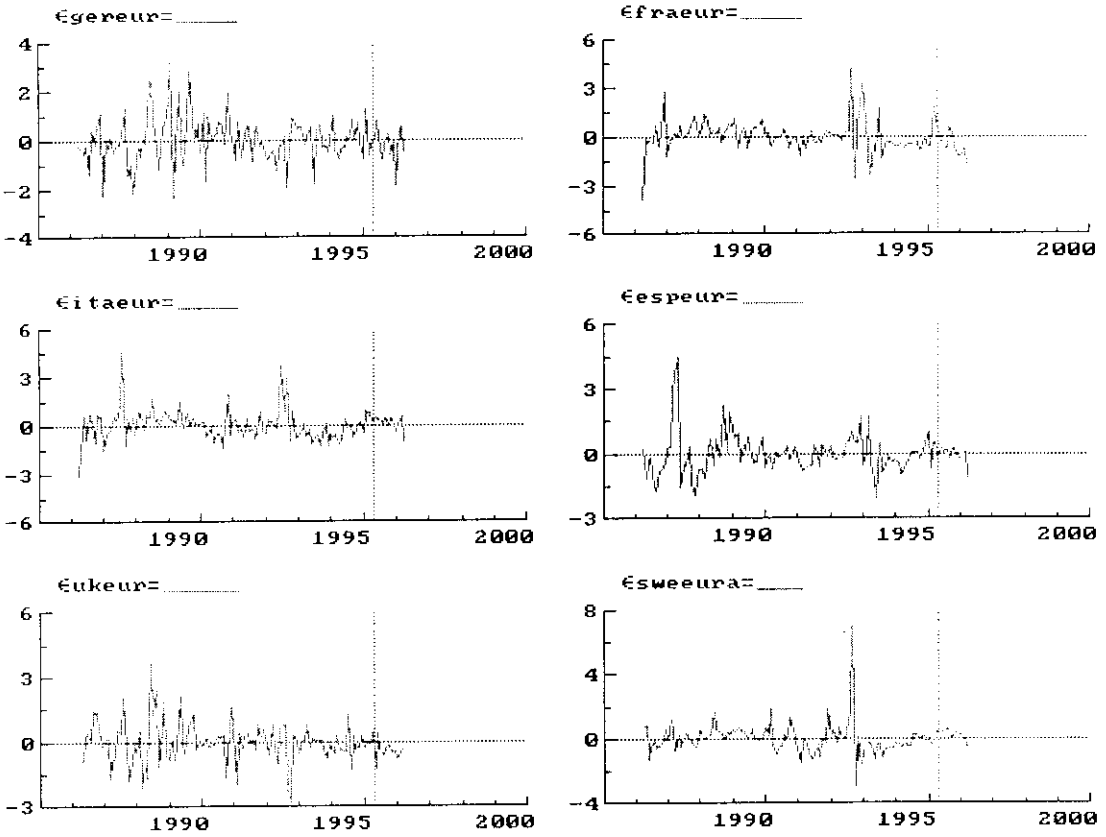

Figure 5: Modelling European Central Banks reaction functions: out-of-sample forecasting