Monetary Policy in Unknown Territory
The European Central Bank in the Early Years

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1. Introduction

The creation of a monetary union in Europe on 1 January 1999 is undoubtedly one of the largest experiments in macroeconomic and political economy in recent history. It was the culmination of the so-called 'Maastricht Process' designed to achieve convergence of macro economic policies and developments, which had shaped monetary and fiscal policies in the countries striving for membership in European Monetary Union (EMU) over much of the 1990s.[1] The start of EMU was marked by the conversion of the national currencies of the member states into euros and the beginning of the operations of the new European System of Central Banks (ESCB), which consists of the European Central Bank (ECB) and the national central banks of the member states (NCBs). While euro cash rested in the form of the coins and bills of the previous national currencies – a fact that created substantial confusion in both academic and non-academic circles – all non-cash payments between banks habe been denominated in euros since then. European financial markets quickly adopted the euro as their common unit of account. The replacement of the national currency signs by euro cash at the start of 2002 will complete the introduction of EMU.

The new monetary union now includes 12 member states with a combined population 11 percent larger than that of the US, and a combined GDP of 61 percent of US GDP.[2] Like the US, and in sharp contrast to the individual member states, the euro economy is a fairly closed economy, whose trade with third countries is about 20 percent of its combined GDP. EMU has created a large financial area with a combined stock market capitalization initially of 28 percent of the US, a securities market whose value is about 60 percent of the US market.[3] Financial market integration is still less than perfect, however, due to institutional differences[4] (e.g., in the calculation and payment of interest) and regulatory differences.

Despite the large degree of nominal convergence achieved at the end of the 1990s (the Maastricht Treaty required that countries could have neither inflation rates in excess of 1.5 percent of the three lowest inflation rates among the EU members, nor long-term interest rates in excess of two percent of the long term rates of the three EU members with the

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[1] For a review of fiscal policies in the EMU member states during the 1990s see Hughes-Hallett, Strauch and von Hagen (2001), who show that the Maastricht process influenced fiscal policies most strongly in the smaller states of the EU.

[2] The following data are from European Commission, European Economy Statistical Appendix Fall 2000. EMU started with Austria, Belgium, Denmark, Germany, Finland, France, Ireland, Italy, Luxembourg, Portugal, and Spain. Greece joined on 1 January 2001.

[3] These data are for 1998 and taken from von Hagen (1999a).

[4] See e.g. European Commission (1997).

lowest rates of inflation), the start of EMU was surrounded by many uncertainties. Little was known (and is) about the properties and the stability of basic macroeconomic relations in the new monetary area, especially the demand for the new currency.[5] Aggregate data for the new currency area were not readily available and had to be constructed from national sources on the basis of new, common definitions. Reconstructed time series data span only about one decade, which makes the estimation of empirical models difficult, and even the data now available leave open serious questions of aggregating time series from different countries. The first empirical macro models of the euro economy are only starting to appear, more than two years after the start of the common monetary policy.[6] Monetary policy was thus entering unknown territory and this had to be reflected in the central bank's monetary policy strategy and its implementation.[7]

The institutional environment of the common monetary policy constituted further unknown territory. Specifically, the Maastricht Treaty left the role of the ECB within the European System to be determined, suggesting on the one hand that the ECB would mainly execute the policies determined by the national central banks.[8] By delegating the common monetary policy to the ESCB and giving the ECB the task of executing the monetary policy determined by the ESCB, the Maastricht Treaty (Art. 3 and 5 of the Statutes of the ESCB) suggests that the ECB is subordinated to the NCBs. However, Art. 14.3 of the same statutes holds that the NCBs are an "integral part of the ESCB and act according to the directives of the ECB," suggesting that the latter is superior to the former. According to the ECB's reading of the Treaty, the NCB presidents sit in the Council as individuals, not as representatives of their individual institutions (Gaspar et al, 2001). This would imply that the NCB presidents are not expected to take into account country-specific circumstances when making their decisions. But this reading of the Treaty is not generally accepted, as legal scholars point out that the NCB's membership in the Council comes only as a result of their positions as presidents rather than by personal appointment (Herdegen, 1998). In view of this institutional vagueness, key questions that have caused considerable debate in Europe are how the ECB

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[5] A number of empirical studies in the 1990s pointed to the existence of a conventional money demand function at the EU and showed that its stability exceeded that of national money demand functions. See e.g. Kremers and Lane (1992), Fagan and Henry (1999), Browne et al. (1997). However, these studies were plagued with aggregation problems that made the interpretation of these results difficult (e.g. who argued that the stability of the aggregate function is a statistical artefact).

[6] See Fagen et al. (2001), Coenen and Wieland (2001).

[7] In public statements, the ECB's chief economist Otmar Issing particularly bemoans the lack of individuals in his staff who are familiar with macroeconomic data and their irregularities and, therefore, can explain unexpected developments from historical analogies.

Council members, coming from very different countries and traditions, could reach an agreement on a common monetary policy, to what extent that policy would be affected by national circumstances and preferences, and how it could be communicated effectively to a very heterogeneous European public.[9] Put differently, would the ESCB be able to decide on the right at the right time and thus build credibility?

This paper reviews the challenges and experiences of the new central bank and its monetary policy in the early years of EMU. In section 2, we provide some institutional background for the central bank. In section 3, we discuss the ECB's strategy and its monetary policy so far. In section 4, we look at the evolution of monetary conditions in the euro economy and assess the central bank's policy on that basis. Section 5 concludes.

2. The ECB: Institutional Background

The Maastricht Treaty provides the institutional framework for the ESCB and the ECB. The Treaty required that the NCBs of all participating states must be politically independent, meaning that the central banks cannot lend directly to governments, that they do not take directives nor instructions from governments, and that the central bank presidents and the members of the ECB Board are to be appointed for non-renewable terms of at least five years. According to the Treaty, the ECB is owned by the NCBs.

Monetary policy decisions are made by the Governing Council (ECB Council, for short). The members of the ECB Council are the 12 presidents of the participating NCBs and the six members of the ECB Board, the ECB's chief executives.[10] Formally, Council decisions are taken by majority vote, with each member having one vote and the ECB president a second one in the case of a tie. The ECB Board is responsible for preparing the meetings of the ECB Council. In doing so, it relies on its own staff, but also on a number of ESCB Committees, which include staff members of the NCBs and of which the Monetary Policy committee is the most important one. The practice established now is that the Council members meet informally on the eve of official Council meetings to discuss monetary policy developments in the euro economy. The formal monetary policy discussion at the official meeting is opened by a statement of the chief economiest, Otmar Issing. This gives the ECB

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[8] See von Hagen (2000) for a discussion.

[9] Cecchetti et al (1999) show that preferences over monetary policy outcomes are likely to be similar among the NCB presidents. Nevertheless, NCB presidents could still hold different views about the course of monetary policy due to differences in the national transmission mechanisms.

Board and the chief economist in particular considerable agenda setting power for this debate.[11] Numerous statements by the ECB president, Wim Duisenberg, indicate that the Council takes its decision by consensus or near-consensus rather than simple majority. In both aspects, the ECB Council seems to follow the practice of the Bundesbank Council in earlier years (von Hagen, 1999c). Models of voting show that this reduces the impact of country-specific preferences and shocks on the common monetary policy, though perhaps at the cost of not being able to act quickly in response to euro area-wide shocks (von Hagen, 1999b).

A significant feature of the Treaty is that it mandates the ESCB to regard price stability as the principal objective of monetary policy, a heritage from a similar mandate in Germany's Bundesbank Act. The Treaty, however, does not define what price stability means in operational terms. Given the independence of the central banks, which excludes explicitly their taking directives from other policy bodies on these matters, the Treaty implies that such a definition can only be supplied by the ESCB itself. The principal mandate is qualified (Art. 105(1)) by the call to support the general economic policy in the European Community contribute to the policy goals defined in Art 2 as long as this does not compromise the goal of price stability. As in the Bundesbank case, where a similar qualification exists, this can be expected to remain inconsequential for the ECB: First, because it relates to "general" policies rather than specific actions of the governments, second because it relates to economic policy "in" rather than "of" the Community and there are at least fifteen different ones of the former. The view presented in Issing et al (2001), that the ECB does not regard output stabilization as a secondary goal for monetary policy, is consistent with this.[12]

While monetary policy decisionmaking is centralized in the ECB Council, the actual implementation of monetary policy is largely decentralized. Key features of ECB monetary policy operations are the imposition of an interest-bearing reserve requirement on bank deposits, the provision of automatic-access lending and deposit facilities for banks at the ESCB at prefixed interest rates, which establish a floor and a ceiling for overnight money

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[10] The president of the European Council and a member of the European Commission have the right to participate in ECB Council meetings.

[11] There are other indications as well that the ECB Board operates very much as a collegiate body in which each member has its own responsibilities, rather than a hierarchical body headed by the ECB president. See Marshall (1999).

[12] Specifically, Issing et al. express doubts about the power of monetary policy to systematically stabilize output and argue that low inflation is the ECB's best contribution to real growth.

market rates, and repurchase operations (Repos), i.e., reversible open market operations in eligible securities, as the main tool for creating central bank money. Repos are organized as auctions where banks can submit bids to their NCBs. In contrast, the ECB has almost completely refrained from entering markets directly either by outright open market puchases or sales or by foreign exchange market interventions. This design reflects the desire to involve the NCBs as much as possible in the actual implementation of the common monetary policy.[13] Apart from the institutional interest in keeping high staff numbers (Marshall, 1999), the reasoning behind this is likely to be a strategic one. An ECB permanently active in the market would soon be in a much stronger position relative to the NCBs in determining the course of monetary policy. The reason is, first, that frequent money market interventions would be difficult to coordinate among the national central banks and would, therefore, create a tendency for centralized operations. Second, being active in the market between meetings of the ECB Council would allow the ECB to confront the Council with interest rate developments that, although a majority of the NCB presidents did not approve them, would be difficult to reverse without upsetting the markets. The ECB would thus be in a stronger agenda-setting position than under the current arrangements, where the main operating target is the interest rate of the bi-weekly Repo operations.[14] The provision that reserves averaged over a month are counted against the reserve requirement assures that the daily volatility of money market rates remains low even without frequent central bank interventions.

3. Monetary Policy Strategy

3.1. The Strategy Problem

The ECB's institutional precursor, the European Monetary Institute (EMI) 's (1997, p 11) defined a monetary policy strategy as a " set of procedures according to which a central bank decides how to act in order to achieve its final objective." The purpose of a strategy is to make central bank policy consistent and predictable. Strategies can be regarded from different perspectives. Monetary economists typically focus on optimal-control type arguments. Assuming that the central bank wishes to minimize a quadratic loss function

[13] In fact, Article 12 of the ESCB Statutes requires the ECB to involve the national central banks in the conduct of monetary policy to the largest possible extent.
[14] It is interesting to observe that the Bundesbank Council in the 1970s rejected a Bundesbank Board proposal for a more active open market policy on exactly these grounds. See von Hagen (1998).

defined over inflation (and, possibly, some other variables), the question posed is how to achieve the smallest control-error variance.

In the ECB's strategy problem, two other considerations play an important role. One is the importance of a strategy for communicating with the public. A monetary policy strategy provides a framework for explaining current and defending past central bank actions in public (Gaspar et al., 2001). The EMI (1997) list of "general principles" for assessing a monetary policy strategy emphasizes this aspect: A strategy must convey the impression that the central bank can and intends to pursue a well-defined medium-term objective. For this purpose, a good strategy must enable the central bank to *effectively* pursue its policy goal; it must enhance *accountability* through the formulation and announcement of targets; it must be sufficiently *transparent* for the public to understand why the central bank adopted a given policy; and it must be compatible with central bank independence. Issing et al. (2000, p. 34) argue that the adoption of a strategy is an "attempt to characterize to the best possible extent, given the imperfect knowledge of the economy, how the central bank will respond to the arrival of new information." From this angle, the public announcement of a strategy is an important element of commitment to achieve credibility.

The other consideration is that a strategy regulates the flow of information within the central bank and provides an ordering of proposals and arguments in the internal deliberations of the central bank. In doing so, a strategy shapes the decision making processes in the central bank (see Tietmeyer, 1996; von Hagen, 1999c; Gaspar et al, 2001). This has important implications for the distribution of strategic powers in the central bank and for the extent to which national interests will influence decisions over the common monetary policy.

Devising a monetary policy strategy met with important challenges from all three perspectives. From the optimal-control point of view, the large degree of uncertainty about the euro-area economy is the biggest challenge. In theory, the response of optimal control procedures to uncertainty depends critically on the nature of the uncertainty. Additive uncertainty does not change optimal control responses at all. Multiplicative uncertainty, i.e. random shocks to the parameters of the assumed model describing the link between monetary policy instruments and objectives, does. Brainard's (1967) classical treatment suggests that parameter uncertainty leads to smaller reactions of the policy instrument to changes in the conditioning variables. However, Craine (1979) and Södeström (2000) show that parameter uncertainty may lead to more aggressive policies when the uncertainty

involves the dynamics of the model.[15] Furthermore, parameter uncertainty can make optimal control responses more aggressive if they enable the policy maker to learn about the characteristics of his environment (von Hagen, 1986; Wieland, 2000). Brunner and Meltzer (1969) discuss a different type of uncertainty, namely uncertainty about the "true" economic model when several, non-nested alternatives are available. They argue that policy makers should adopt a mini-max strategy under such circumstances, i.e. monetary policy should aim at minimizing the largest possible damage under all alternative models considered. This is nicely formalized in von zur Muehlen (2001), who shows that the resulting policy nevertheless is not unambiguously less activist than policies under additive uncertainty.

From the perspective of building credibility, the main challenge to the ECB's strategy is the lack of tradition and that the central bank is faced with a European public of very heterogeneous communication cultures. This heterogeneity makes communication especially difficult, since the same concept can have very different meanings in different cultural environments. The European debate over monetary targeting as a strategy for the ECB is particularly telling in this regard. In the German context, the public understanding of monetary targeting was always that money growth provided a yardstick for monetary policy actions, which the central bank used to assess its policies over time horizons of a year or two. That is, the Bundesbank would always use information other than money growth to assess monetary and inflationary developments, and it would allow deviations, even persistent ones, from the monetary target, if doing so was not considered as violating the ultimate goal of price stability. The notion that monetary targets had to be met at all cost had been ruled by the Bank already in the early 1970s (von Hagen, 1998, 1999c).[16] However, when the Bundesbank and German economists advocated the concept of monetary targeting as a strategy for the European monetary policy, this proposal met very violent critique particularly from Anglo-Saxon and Swedish institutions and economists, who saw monetary targeting as a hard-nosed, myopic prescription to keep the money growth rate equal to a number whose virtues would be questionable given the uncertain environment. More recent debates about the "transparency" of monetary policy suffer from similar communication problems.

A similar challenge arose from the perspective of organizing the internal debate of the ECB council. Here again, the heterogeneity of institutional and cultural backgrounds of the

[15] For a treatment of parameter uncertainty in forward-looking models see Hansen and Sargent (2000)

council members and the lack of experience with the internal dynamics of the council made the design of a strategy difficult.

3.2. The ECB's Monetary Policy Strategy

In October 1998, the ECB explained its strategy based on two elements: a definition of price stability, and two pillars on which the assessment of current developments and interest-rate decisions rest.

3.2.1. Price Stability

In October 1998, the ESCB has provided its quantitative definition of price stability, namely an annual increase in the 'Harmonized CPI,' its main gauge of average inflation in the euro area, below two percent. Initial doubts in the public debate that this implied a tolerance for negative inflation rates was soon rejected. Furthermore, the ESCB regards price stability as a goal to be achieved only in the medium run (a time period of unspecified length), implying that it would tolerate temporary deviations of actual inflation from this definition rather than trying to force inflation rates quickly back into the corridor. The emphasis on inflation below two percent in the medium run again is a heritage from the Bundesbank's self-imposed criterion defining price stability. As Issing et al (2001) point out, the ceiling of two percent is also in agreement with the stated preferences of European governments as expressed several times in the European Council's "Broad Economic Guidelines."

The lack of an operational definition of the "medium term" over which price stability is supposed to hold is a visible difference to the practice of central banks following the inflation-targeting approach in recent years. For example, the British chancellor Norman Lamont, introducing the new regime of "inflation targeting" in 1992, wrote that "for the remainder of the Parliament, I propose to set ourselves the objective of keeping underlying inflation within a range of 1-4%, and I believe by the end of the Parliament we need to be in the lower part of the range".[17] The term Parliament refers very specifically to 1997. The British target now is for annual inflation two years ahead. The Bank of Sweden (1997, p. 27) writes that "The Riksbank has formulated [its objective] as limiting the annual increase in the price level to 2

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[16] von Hagen (1995) and Clarida, Gali, and Gertler (1998) show empirically that the Bundesbank often tolerated deviations of money growth from its target.

[17] Quoted from Bowen (1995), p. 55. Underlying inflation refers to the observed change in retail prices excluding mortgage interest payments.

percent, ...". Similarly, the Bank of Spain (1997, p 5) describes its goal as a "twelve-month growth rate of the CPI steadily below 3% during 1997." Thus, inflation-targeters tend to be much more specific about the time horizon over which the target is valid, a point that has drawn criticism about the ECB practice (e.g. Gali, 2001; CEPS, 2000), arguing that the vagueness of the "medium run" reduces the public's ability to form expectation about future price and monetary developments and deflects accountability.

Setting a more precise time horizon for price stability, however, may force monetary policy to counteract discrete, one-time shifts in the price level caused by non-monetary disturbances. Consider a fiscal expansion leading to a one-off increase in the price level in a given year. A central bank with a precise time horizon for its target inflation rate would have to respond with a monetary contraction. Freedman (1996) illustrates this need for a counteracting monetary response, describing how central banks should react to different types of demand and supply shocks. A central bank aiming at low inflation in the "medium run," in contrast, would accommodate the shift in the price level. Prices would rise by more than the trend inflation rate, but so would output and employment in the short run. This is consistent with Issing's (1996) view, who argues that a central bank should adopt "responsibility for the inflation trend, but not for fiscal or wage policy decisions, which lead to one-off price level movements or affect inflation in the short run."

The different attitudes towards non-monetary shocks matter, because trying to counteract the inflationary effects of fiscal and wage policies creates greater conflict between the monetary authority and other economic policy makers. It protects those negatively affected by rising prices more strongly against the consequences of fiscal shocks at the cost of those benefitting from an expansion in output and employment. Ultimately, therefore, the choice of a precise time horizon for an inflation target implies a value judgement of the central bank in favor of the former (Fischer, 1996). Unless they share this value judgement, a more specific time horizon for the target inflation rate will lead to more intense conflicts between the governments and the central bank. As a young institution of a unique type, i.e., one whose authority is derived from an international treaty rather than national legislation, the ECB had a strong institutional interest in avoiding such conflict.[18]

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[18] Issing et al. (2001) note that the unique institutional nature of the ECB creates an element of fragility in the central bank's architecture. It is interesting to note in this context, that the Bank of England now defines its inflation target to hold for annual inflation two years ahead. The idea is that current fiscal and wage policies have worked their way through the price level within a year's time, so that the bank need not respond to them.

In practice, inflation-targeting central banks have tried to avoid such conflicts by defining price stability in terms of adjusted indexes or core inflation rates, the adjustment eliminating certain sensitive prices such as housing prices, food prices, or energy prices from the CPI.[19] Recent critics of the ECB have proposed to eliminate food and energy prices from the HCPI. But if the CPI is the most representative measure of prices for consumers, this just introduces another kind of imprecision into the definition of price stability. On the one hand, it is questionable, whether all relevant sources of price level shifts can be isolated in this way. On the other hand, adjustments typically take out prices rising faster than the remaining ones, i.e., the adjustment is in favor of meeting the targeted inflation rate. It is not clear that such practices improve the accountability of the central bank or the public's abity to form expectations about the actual CPI. In the end, then, there seems to be a trade-off between imprecision in the time horizon and imprecision in the inflation gauge, and little guidance from economics about which type of imprecision matters more.

3.2.2. The Two-Pillars

The EMI's preparatory work had narrowed the choice of a monetary policy strategy down to monetary targeting versus inflation targeting (EMI, 1997). In the end, however, the ESCB adopted a monetary policy strategy that avoided a clear choice between these alternatives. Instead of defining an intermediate target for its policy - a money growth rate or an inflation forecast – the ESCB explains its strategy as being based on two pillars. Accordingly, the first pillar signals the importance of money, the second pillar stands for the role of other variables for the determination of inflation in the medium run.

3.2.2.1. The First Pillar

The key characteristic of the first pillar is the announcement of a reference value for the annual growth of M3. The term "reference value" rather than target indicates that the ESCB does not engage in monetary targeting in the British and Swedish sense mentioned above. Like the Bundesbank in the past, the ESCB will torelate deviations of money growth from the reference, if this is deemed compatible with maintaining low inflation rates. Like the Bundesbank's earlier practice, the assessment of monetary developments under the first pillar goes beyond focusing narrowly on M3 growth and includes an assessment of other

[19] The Bank of Canada, for example, uses a price index that excludes the effect of changes in indirect taxes (Freedman, 1996), while the Bank of England targets, RPIX which excludes housing prices.

monetary and credit aggregates. In essence, the first pillar is equivalent to Bundesbank-style monetary targeting.[20]

A further similarity is the derivation of the reference value on the basis of a simple velocity equation. The reference value takes the growth rate of potential output less an assumed velocity trend as a starting point and adds the implicit target inflation rate.[21] In October 1998, the assumed growth rate of potential output was 2.0 – 2.5%, while the assumed trend in velocity was a decline of (-0.5) – (-1.0)%. The announced reference value was 4.5% (ECB, 1999). Taking midpoints for the growth rate estimates (2,25% and (-0.75)%, respectively) implies an inflation target of 1.5%. There is thus a possible contradiction between the derivation of the monetary reference value and the inflation target suggested by the definition of price stability, which is 1.0% (the midpoint of zero and two).[22]

Issing et al (2001) argue that the First Pillar reflects the long-run correlation between inflation and money growth. In addition, it aims at communicating the medium-term focus of monetary policy to the public, as it relieves the central bank from responding to short-run fluctuations in financial and other variables. Furthermore, by signaling continuity of the Bundesbank's strategy, the ESCB hoped to buy some credibility. With regard to the internal debate in the ESCB, the First Pillar serves to focus the discussion on monetary developments. Importantly, money is currently one of the few variables in the euro economy that can only be interpreted sensibly at the level of the aggregate euro area. This suggests that the First Piller helps to overcome the temptation to concentrate on country-specific variables.

3.2.2.2. The Second Pillar

The Second Pillar consists of a „broadly-based assessment of the outlook for future price developments" in parallel with the First Pillar (ECB, 1998). Initially, the Second Pillar represented the analysis of short-run price developments in the euro area, based on a large and unspecified number of economic and financial variables. According to the ECB (1999),

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[20] Marshall (1999, p. 278) quotes Tietmeyer confirming this view.

[21] Gali (2001) argues that the quantity equation underlying this derivation is empirically empty and, therefore, not appropriate as a guide to monetary policy. This is wrong, however, in the current context, as the ECB (like the Bundesbank) uses two empirical hypotheses in the derivation, (1) that velocity (defined relative to actual output) is determined only by an exogenous trend, and (2), that potential output is to be used in the derivation.

[22] Gali (2001) suggests that the ESCB would be unwilling to tolerate inflatioin rates below one percent due to measurement bias. This would make the definition of price stability consistent with the derivation of the reference value. It is hard to see, however, why the ESCB does not clarify this point.

these included measures of real activity, wage cost, asset prices, fiscal policy indicators, and indicators of business and consumer confidence. No framework was specified how these variables would be used to assess price developments, nor their relative weights in such assessments. The Second Pillar thus adds a completely opaque part to the ESCB's strategy. Issing et al. (2001, p. 74) explain that the relative importance of these variables changes all the time and that there is „no permanently valid way to organize the assessment in a logically consistent manner." This, of course, simply says that the ESCB's assessment of short-run developments is void of systematic analysis and fully discretionary.

The nature of the Second Pillar seems to have changed since the introduction of the Second Pillar. Angeloni et al. (1999) do not mention consumer and business confidence indicators as elements of the Second Pillar any more, perhaps because the emphasis on these variables to justify the ESCB's April 1999 interest rate move (Duisenberg, 1999) had been widely criticized. Angeloni et al. (1999) and Issing et al. (2001) instead add inflation expectations derived from asset prices and market surveys to the list. Gaspar et al. (2001, p. 13) explain that „analysis [under the Second Pillar] is typically centered on the effects of interactions between supply and demand and / or cost pressures on pricing behavior." They suggest that the analysis is now organized in the form of a macroeconomic projection.

This is consistent with the ECB's (2000) explanation of the staff projections particularly for inflation, which the ECB started to publish in its Monthly Bulletin in December 2000. These projections are conditional forecasts based on the assumption of no policy change. The projections published in December are startling for their low precision. For example, the projected HICP inflation rate for 2001 is 1.8-2.8 percent. The ECB does not provide confidence intervals for this projection, but explains that this range corresponds to twice the average absolute error of previous forecasts. This translates into a confidence level of 57 percent (Gali, 2001). Applying a more conventional 95 percent confidence band would correspond to a range of 0.7 – 3.9 percent, which strikes one as a rather imprecise estimate. It is possible, course, that due to the shortage of data the ECB just can't do better.

One interpretation of this gradual development of a more consistent framework is that monetary policy under Second Pillar will eventually become equivalent to inflation forecast targeting. This would increase the transparency of this Pillar and likely lead to deemphasizing short-run developments under this Pillar, too. However, it would sharpen the conflict between the two Pillars and raise the need to opt for one of them to avoid unnecessary confusion of the public.

3.2.2.3. Reconciling the Two Pillars

According to ESCB explanations, the two pillars are used in parallel in monetary policy decision making. There is no indication of what their relative weights are in the process, however. As such, this yields an entirely incomprehensible strategy, as Issing et al. acknowledge at least partially.

Issing et al. (2001) suggest that this ambiguity is the result of the high degree of uncertainty in which ESCB monetary policy evolves and of the need for robust policies in view of this uncertainty. These authors emphasize model uncertainty, i.e., the lack of a single economic model that explains the link between monetary policy and inflation better than all others. But this reasoning is not well-founded. If the central bank has a probability distribution over all economic models considered, this distribution defines the relative weights of the individual models in the decision making process. These weights ought to be relatively stable or vary in systematic ways that can be communicated in principle. If the probability distribution is unknown and the focus is on robust policies in the sense of von zur Muehlen (2001), as suggested by Issing et al. (2001), optimal decision making results in mini-max decisions that focus on avoiding the worst outcomes. This, again can be represented by decision making rules that are easy to communicate. Since the contrast between a reliable long-run money-inflation relation and the need to bring in many more variables to predict short-run price movements is but a particular form of model uncertainty, the same reasoning applies. In short, there is nothing in the specific policy environment of the ECB that would make the use and revelation of the relative weights of the two Pillars impossible.

The true reason why the ESCB has so far denied the public transparency of its strategy is more likely related to the internal decision making processes. Issing et al. (2001, p. 89) explain that, „from a procedural viewpoint, the synthesis“ [between the two Pillars] „begins to take place first and foremost at the moment in which the analyses and options are elaborated and presented to the ECB decision making bodies“. In plain words, the weights are first defined by the chief economist himself. Using the same weights consistently would increase the transparency of the strategy at this stage, but make the chief economist unable to use the information strategically to set the agenda in his interest. The authors go on saying that „at a subsequent stage, the decision making bodies themselves contribute to the synthesis, adding their own elements of judgement.“ That is, the chief economists’s weights are updated by the bargaining process in the ECB Council.

The Two-Pillar of the strategy thus serves the purpose of allowing the ECB Board and the Council members to use information and analysis strategically. Rather than committing itself to a framework enabling the public to understand its decisions, the ESCB was obviously not prepared to give up its discretionary freedom. It remains to be seen whether the consistency of the strategy increases as the decision making institutions mature over time.

3.3. Monetary Policy Decisions 1999-2001

Many observers had expected the ESCB to start its monetary policy by pushing up interest rates even if that was not justified by economic conditions, in order to prove that it was hard-nosed on inflation (e.g. Dornbusch et al., 1998). But the opposite happened. In what was considered to be a surprising concerted step, and, therefore the first true ESCB monetary policy action, all NCBs reduced their interest rates to 3 percent 3 December 1998.[23] While this could still be regarded as a monetary policy reaction to the weakening world economy after the Russian financial crises, the next move, on 8 April 1999 could not. It was awkwardly timed right after the German Finance Minister Oscar Lafontaine's stepping down from office, who had been the most vociferous critic of the ECB and calling for lower interest rates since taking office in October 1998. More significantly, it came at a time when all economies of the euro area except Germany and Italy had recovered from the 1999 slowdown.

The ECB reversed its course in November 1999. It first raised its rate by 50 basis points and then by another 100 basis points distributed over the following 12 months. The ESCB cut rates again in a surprise move in May 2001.

Table 1: Interest Rate Decisions

Date	Change in interest rate	Cumulated change in interest rate	Current money growth rate (M3)	Current inflation rate
12/08/98	-30	-30	5.84	0.8
04/08/99	-50	-80	5.26	1.1
11/05/99	50	-30	6.06	1.5
02/03/00	25	-05	6.11	2.0
06/08/00	50	45	5.37	2.4
10/05/00	25	70	5.11	2.7
05/10/00	-25	45	4.51 (April)	2.6 (March)

[23] The bank of Italy cut its rate to 3.5 percent and to 3.0 percent later that month.

Table 1 shows that the April 1999 rate cut came in the presence of a money growth rate that was slightly too high, and low but rising inflation rates. The upward move over the year 2000 was accompanied first by increasing money growth rates, which started to fall only in the Summer of that year. Inflation continued to increase until the Fall of 2000 and remains significantly above the ceiling set by the ESCB.

3.4. Evaluation of the Monetary Policy via Taylor rules

One possibility for evaluating monetary policy is to compare the policy chosen by the ECB with a benchmark policy. The simple Taylor rule (Taylor, 1993) has found considerable attention as a benchmark rule for the ECB (see, e.g., Peersman and Smets, 1999, Taylor 1998, 1999), since it found considerable empirical support for the EMU area before the introduction of the Euro (see, e.g., Gerlach and Schnabel, 2000). Moreover, Taylor rules are also explicitly employed as a benchmark by parts of the financial press, e.g., by the Financial Times Deutschland.

Therefore, we compare the interest rates set by the ECB with those of a simple Taylor rule, which is given by

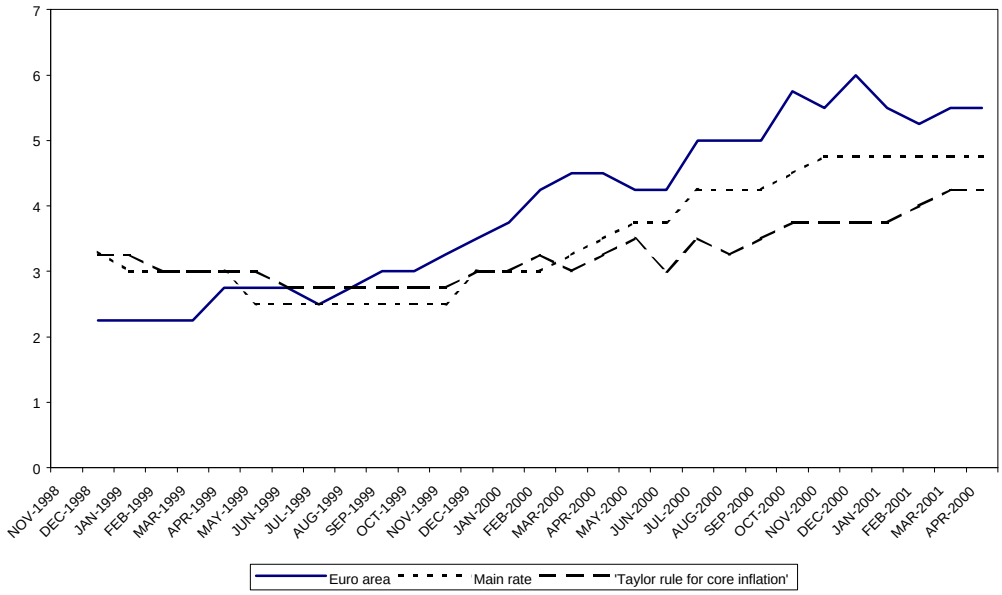
(1) $$\mathrm{i}_t = \mathrm{r}^{eq} + p_t + 0.5\left\{\mathrm{y}_t + \left(\eth_t - \eth^{ob}\right)\right\}$$

where i_t, r^{eq}, p_t, y_t and p^{ob} denote the nominal interest rate, the (constant) equilibrium real interest rate, the inflation rate, the output gap and the inflation objective of the Central Bank. We assume an equilibrium real interest rate of 2.5%, which equals the assumed trend GDP growth rate. As inflation objective we chose 1.5%, the value implicitly used by the ECB for their calculation of the reference value for M3.

A well known problem in applying Taylor rules is the non-observability of output gaps. In fact, the measurement problem is used as justification why the weight of output gaps is lower than the one on inflation (Smets, 1998). Measuring output gaps is even more of a problem in the Euro area, where data concerning output is rather inaccurate and released rather late. Therefore, we used simple interpolations of a sample of available output gap estimates. By pooling several estimates, we should increase the robustness of our monthly output gap measures. The estimates are from the OECD (OECD, 2001), IMF (IMF, 2001) and two series of estimates from the European Commission (EU, 2000 and 2001). Figure 1 reveals that according to the Taylor rule, monetary policy was too restrictive till April 99. This

argument provides another ex-post rationale for the interest rate cut in April 99. However, from July 99 onwards the interest rate was continuously lower than the simple Taylor rule would have predicted. It should be noted that this conclusion is robust to small variations in the coefficients on inflation and the output gap. The reason is that the inflation rate increases and the output gap widens in the euro area after July 1999.

Figure 1: Taylor rules for the Euro Area

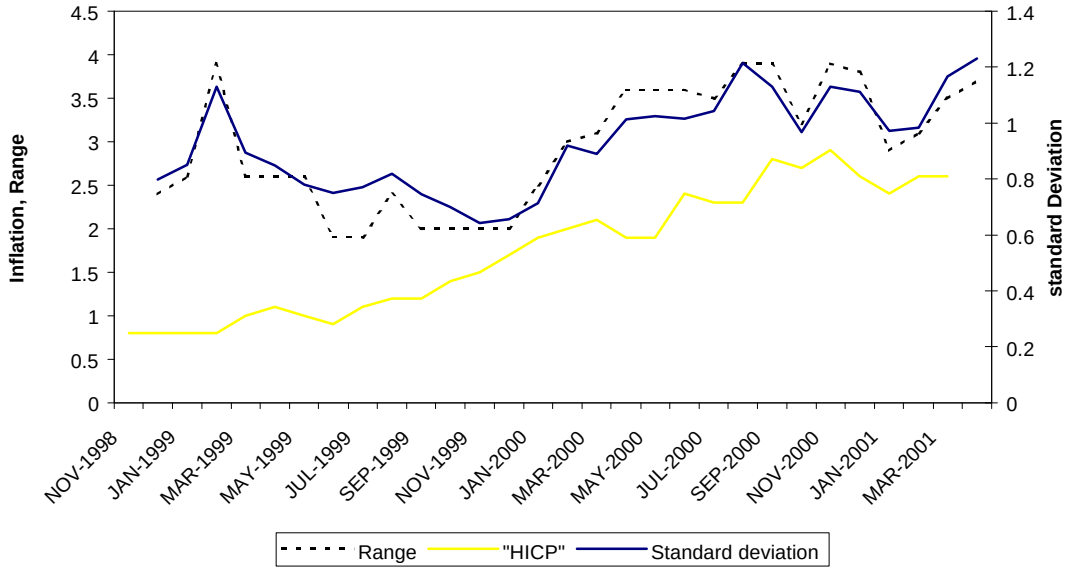


Occasionally it is argued, that contrary to its announcements, the ECB actually cares for core inflation instead of HICP inflation. In figure 1, we also show a Taylor rule with HICP replaced by core inflation, measured as HICP minus food and energy prices. Until May 2000, the data indeed give the impression that the ECB based its interest rate policy on core inflation rather than HICP inflation. However, the data since then indicate that this is not true. Core inflation would not have required the interest rate increase in summer and fall 2000, but would have called for an increase in the beginning of this year.

We have seen that monetary policy can be described as overly lax from a Euro area perspective, at least from an ex-post point of view. However, one of the main difficulties for the ECB is the heterogeneity within European member states. Prior to the formation of EMU, we observed a strong convergence in European inflation rates. Since mid-1999, however, inflation rates started to diverge. In figure 2, we see the both standard deviation as well as the range of inflation rates increased over time. We exclude Greece from the analysis here,

since it joined the EMU only in the beginning of this year. Currently, we can distinguish three different groups of countries with respect to inflation rates. One consists of rather high inflation countries, with an increase in HICP of 4% or higher. These are Ireland, the Netherlands, Portugal and Spain. For a second group of countries, price stability in the ECB sense is not maintained, but the deviation is below 1%. This group consists of Germany, Italy, Belgium, Finland and Luxembourg. Finally, the smallest group of countries, France and Austria, still manages to maintain price stability.

Figure 2: Standard deviation and range of HICP inflation rates

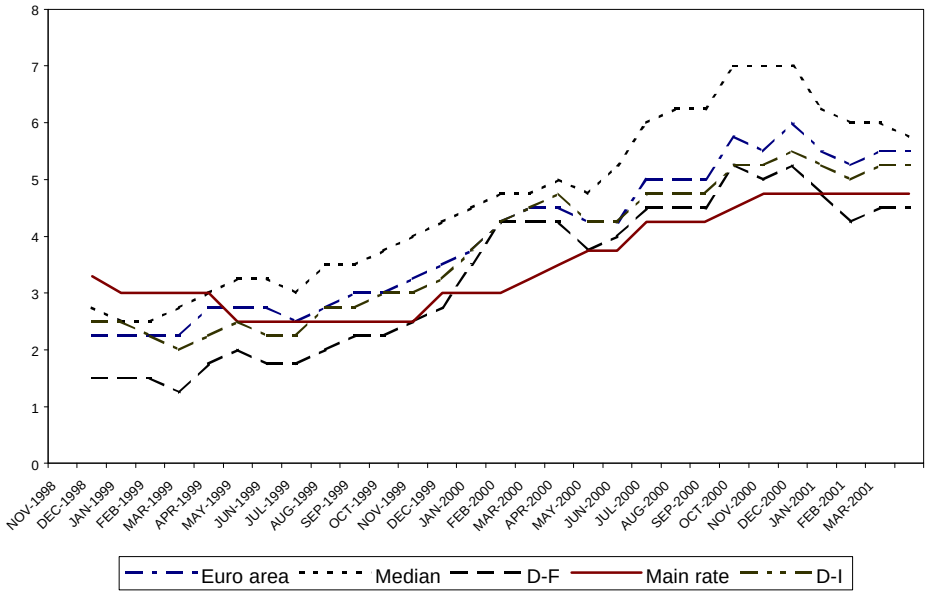


To see whether these asymmetries in inflation performance have affected the ESCB's monetary policy, we investigate three alternative Taylor rules. One is a Taylor rule for the median country in the ESCB. Since, according to the statutes of the ESCB, monetary policy decisions are taken by simple majority, it is plausible to assume that the median country has the largest influence of the common interest rate policy.[24] The second Taylor rule considers Germany and France only. There are several arguments why the ESCB might put a disproportional weight on these two countries. First, they are frequently regarded as the leaders in European integration. Therefore, political pressure and popular support from these two countries might be disproportionately important for the ECB. Moreover, the two countries are the two largest economies in the euro area, combining half of EMU GDP. Finally, a bias

[24] For an analysis of simple majority voting in the ECB Council, see Brückner (2000).

for monetary laxity in EMU could arise from a voting convention in ECB council meetings according to which the common monetary policy focuses always on the weakest member economy.[25] This hypothesis would imply that the ESCB's interest rate policy was catered especially in favor of Germany and Italy, the two weakest EMU ecoomies in the period under consideration.

Figure 3: Taylor rules for Euro Area



In figure 3, we show these three Taylor rules in addition to the ESCB's main interest rate. As it turns out, national Taylor rules for Germany and France are very similar during this period, since France usually had a higher output gap than Germany, but also lower inflation rates. The figure shows that the ESCB's interest policy was more or less consistent with the median country's policy until mid-1999. From then on, the median country would always have asked for a tighter monetary policy than the actual one. Figure 3 also illustrates why this may be so: During the period under consideration, the three largest economies in the euro area would always have demanded an interest rate lower than the small countries, due to their lower inflation rates and smaller output gaps. This implies that the median country wanted an interest rate above what was appropriate for the euro-area average.

[25] Begg et al. (1999) advocate such a rule for the ESCB. Von Hagen (1999) shows that it can be sustainable in a repeated voting game.

The figure shows that the interest rate was initially too high from Germany's and France's perspective. The April 1999 rate cut was thus a move in the direction of these countries. Since the end of the first year of EMU, the actual rate has on average been very close to the one preferred by Germany and France together. Catering monetary policy predominantly to the interests of Germany and Italy would have resulted in a tighter monetary policy in 2000 and 2001, due to the higher Italian inflation rate.

Our interpretation of these findings is that the ESCB's interest rate policy during the first months was shaped mainly by the median country in the ECB Council. This is perhaps not too surprising given that the first "common decision" to cut rates in December 1998 was taken by the NCBs rather than the ECB Council. The growing deviation between the actual policy and the median country's preferred policy from mid-1999 on can be regarded as evidence for the increasing emancipation of the ECB Board from the NCBs. This is consistent with the observation, noted previously, that the ECB's chief economist has considerable agenda setting power in Council meetings. Figure 3 also indicates that the difference between the median country's preferred policy and the one preferred by Germany and France together may have helped the Board to establish its leadership. As shown in von Hagen and Süppel (1994), an interest rate policy determined by the ECB Board is preferable to one determined by the median country from a welfare perspective. It remains to be seen, however, whether the Board can maintain its dominant position in practice, should Germany and France desire very different policies. The most recent rate cut on May 10 is interesting in this regard. Recent data indicate the German economy has slowed down more than the others in the euro area due to the incipient US recession. In addition, Germany and France are facing national elections in 2002 and, therefore, their governments have a particular interest in monetary easing. Although the data required to calculate their Taylor rules are not available, yet, it is plausible to argue that the ECB Council's decision was again influenced heavily by these two countries.

Following the same interpretation, Figure 3 indicates that from mid – 1999 onwards, the ECB Board opted for an interest rate policy that reacted less to changes in output gaps and inflation than indicated by the euro-area Taylor rule, i.e., there is some interest-rate smoothing. This is consistent with the Board's view that monetary policy should be cautious due to the large degree data uncertainties in the euro area (ECB, 2001).

4. Monetary Relations in the Euro Area

In this section, we review the monetary developments in the euro area so far. As indicated in the introduction, ESCB monetary policy is characterized by a scarcity of time series data for the aggregate euro economy. This precludes the use of standard VAR and other time series methods for policy evaluation. Instead, we will use rather simple tools to describe and evaluate monetary developments.

4.1. Money Demand

A number of empirical studies in the 1990s have investigated the existence of a stable long-run money demand function for broad monetary aggregates at the EMU level, see e.g. Browne et al. (1997), Hayo (1999), Fagan and Henry (1999). Generally, they conclude that the stability of money demand at the level of the monetary union is greater than the stability of national money demand functions, with the exception of Germany, where a stable demand function for M3 has been found to exist since the 1980s. The greater stability at the aggregate level has been interpreted as evidence of currency substitution in the pre-EMU monetary systems. More recently, Coenen and Vega (1999) and Brand and Cassola (2000) confirm these results. Broad money demand is found to have standard properties, i.e., long-run real income and price level elasticities of unity and a negative and significant elasticity with respect ot the yield on alternative financial assets.

Here, we use an approach developed in Hayo et al. (1998) using quarterly data data from 1979 – 1997 to estimate a long-run money demand function for the euro area. Based on a cointegrating framework, we find the following long-run demand function,

$$m_t - p_t = y_t - 0.023 i_t ,$$

where m, p, and y are the logs of the money supply, the GDP deflator, and real GDP, respectively, and i is the yield on 10-year government bonds in the euro area. Hayo (1998) finds a similar relationship using data from 1964 onwards, pointing to the stability of the long-run relationship. Equation (1) can be inverted to yield an equation for the velocity of M3.

Figure 1 shows the development of the velocity of M3 for the euro area from 1994 to 2000. Over the entire period, the velocity of M3 has fallen by almost 6.0 percent. This is consistent with the ECB's proposition of a secular decline in the velocity of money, which

justifies the ECB's specific calculation of the reference value for M3 growth. The ECB interprets this decline as an exogenous, negative trend due to changes in portfolio habits and technological changes. However, this is not the only plausible explanation for the development of the velocity of M3. Specifically, the past two decades have seen a gradual decline in longterm interest rates, a consequence of the disinflation and the Maastricht convergence process. Since, according to the long-run money demand function, velocity is a positive function of long-run interest rates, the decline in velocity could also be explained by the downward trend in interest rates.

Figure 4: M3 Velocity

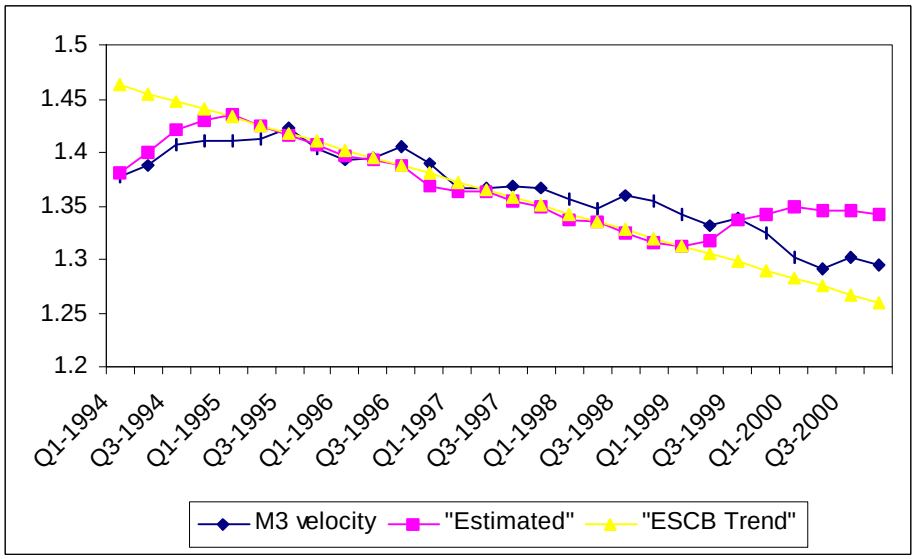


Figure 1 plots both the implied velocity from the money demand function and the linear trend assuming, as the ESCB does, a trend rate 0f (-0.75) percent. Comparing the estimated and the observed velocities confirms, first, the considerable empirical stability of the money demand function, as the plot corresponds to an out-of-sample forecast starting in the first quarter of 1998. The average forecast error in this exercise is 0.5 percent. Second, the estimated model outperforms the trend model clearly in the first part of the plot, where long-term rates were slightly increasing, and so was the velocity. In contrast, the long-run money demand function overestimates velocity somewhat in 2000, while the trend model underestimates it considerably. Fitting a trend model through the observed M3 velocity yields a slope parameter of (-0.43) percent with a standard error of (-0.038). Thus, the slope is significantly different from that assumed in the ESCB's calculation of the monetary reference

value. The latter thus leads to an overly expansionary money growth trend. Overall, we conclude that the evidence so far is consistent with a long-run empirical money demand function stable enough to justify the ESCB's monetary policy strategy under the First Pillar.

4.2. Money Growth

As indicated above, the ESCB's main monetary aggregate is the broad money stock M3. Apart from currency in circulation, M3 contains overnight deposits, deposits with fixed maturities of up to two years, deposits with statutory maturity of up to three months, repurchase agreements of financial institutions, money market fund shares and money market paper, and bank certificates of deposit and short-term obligations of maturities up to two years. Some of these elements of M3 are denominated in non-euro currencies, other elements are traded in secondary markets. This implies that these elements are subject to valuation changes as their market prices change. In calculating the monthly growth rate of M3, the ECB has tried to purge the monetary data from these valuation changes. Apart from the hint that the adjustment is supposed to correct for changes in the money supply not caused by transactions, which is given in the footnotes of the relevant tables in the Monthly bulleting, the reasoning behind this adjustment has never been fully explained by the central bank.

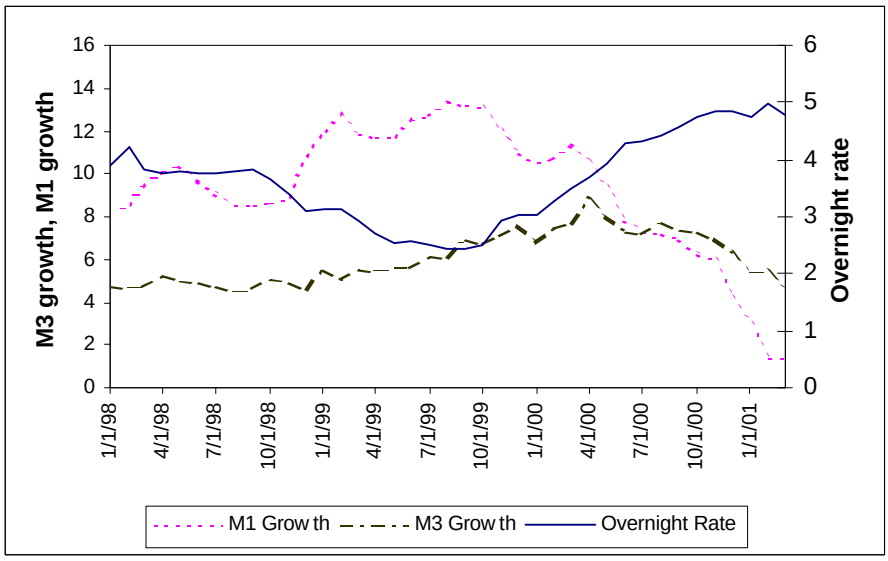
Figure 5 plots the monthly growth rates of M3 calculated from end-of-month balance sheet data (unadjusted gorwth rate) and the ECB's adjusted growth rates. The figure illustrates that the adjusted money growth figures severly understate the monetary expansion from mid-1999 to early 2001. The rising gap between the two series simply reflects the effect of the adjustment in times of a continuous depreciation of the euro. At the peak of the monetary expansion in the Spring of 2000, the difference between the two series was about two percent. Short of a convincing justification for the adjustment, this implies that an inflation potential was building up in the euro area that was considerably higher than what the ECB inferred from its indicator. In contrast, the adjusted growth rates indicate much less of a monetary tightening after September 2000. There is, therefore, a risk that the focus on adjusted money growth rates introduces a bias into the ESCB's monetary policy, one that underestimates inflation risks in times of a weakening of the external value of the euro and one that underestimates monetary tightening in times of an external revaluation. To put it differently, the adjustment underestimates inflation potentials when ESCB monetary policy is

loose relative to the Fed, and underestimates the extent of tightening in times when the Fed loosens relative to the ESCB.

Figure 5: Monthly Growth Rates of M3

At the start of EMU, money growth was already higher than the reference value. Figure 2 shows that it accelerated April 2000. Figure 6 shows that this was driven mainly by a very rapid expansion of M1, which grew stronger following the decline in interest rates in the first months of 1999. Starting in the fall of that year, however, M1 growth came down quickly and substantially, responding to the rise in shortterm rates. In the first few months of 2001, M1 growth was only slightly above one percent and, therefore, below trend output growth.

Figure 6: Money Growth Rates M1 and M3



M3 growth peaked later than M1 and came down more gradually in the second half of 2000.

The difference between the two is due to substitution effects, i.e., portfolio shifts from non-monetary financial assets into the interest-bearing parts of M3. This is illustrated by the fact that the growth rates of money market funds and short-term obligations included in M3 fluctuated between 20 and 32 percent in the six months between October 2000 and March 2001. The ECB has argued recently that a large part of this increase is due to foreign holdings of short-term euro-denominated paper, which do not create inflationary pressures and, therefore, should not be allowed to affect the ESCB's monetary policy (Duisenberg, 2001). Another reason for the rapid increase in these items is the turmoil in internation stock markets in recent months. Taking these items out of M3 would reduce the annual growth rate to 3.3 percent in the first quarter of 2001, well below the monetary reference value. This suggests that the broad monetary aggregate tends to underestimate the extent of a monetary contraction, an observation which resembles earlier experiences of the Bundesbank (von Hagen, 1993). The focus on a broad aggregate thus risks to maintain a tighter stance of monetary policy for longer than what is needed to maintain price stability.

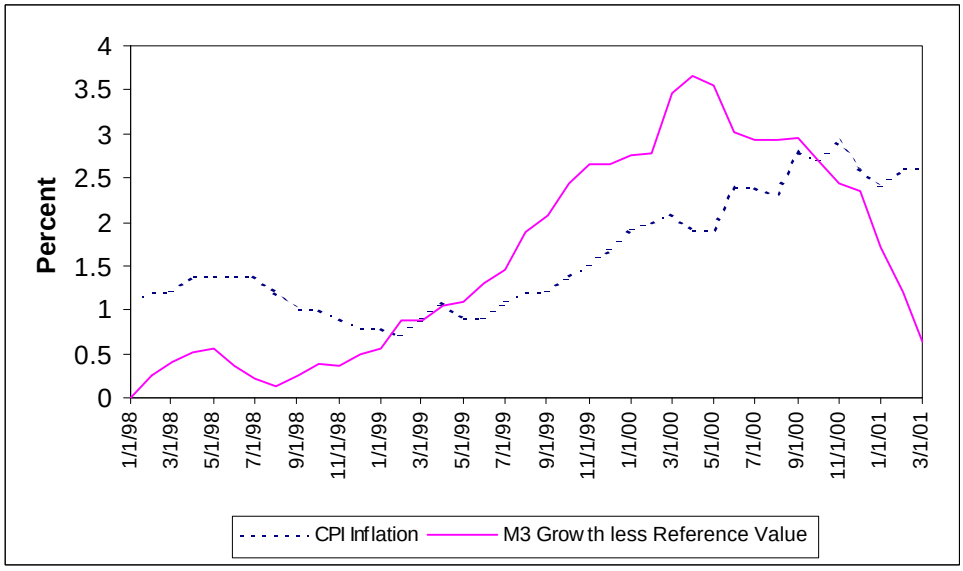
From this perspective, the most recent interest rate cut was justified, if the central bank is satisfied with bringing back inflation to rates below two percent after a period of higher rates. In contrast, an effort to bring inflation down to substantially lower rates in order to regain an average rate below two percent over time, would have called for maintaining the

tight stance of monetary policy. Thus, the most recent decision is interesting as it indicates that the ESCB's definition of price stability allows for base drift in the price level.

4.3. Money Growth and Inflation in the Euro Area

The relationship between money growth and inflation has been the subject of much recent debate in Europe. Proponents of inflation (forecast) targeting argue that money has no predictive value for price level movements. In contrast, the First Pillar of the ESCB's strategy relies on the proposition that excess money growth in an indicator for future inflation. Figure 7 shows the growth rates of M3 together with the CPI inflatio rate since 1998. Euroe area money growth started to accelerate in the fall of 1998, when inflation was still hovering around one percent. Inflation began to accelarate in the summer of 1999, and leveld out in the fall of 2000, a few months after the peak in M3 growth. Eyeballing thus suggests a positive relation between the two variables.

Figure 7: M3 Growth and Inflation



Again, a sophisticated statistical analysis is difficult due to the lack of sufficiently long and rich time series. Here, we continue to use a framework that is simple enough to work even with the short samples currently available. Specifically, we apply our long-run money demand function to the concept of an equilibrium price level (von Hagen, 1995) or P*-model (Hallman et al., 1990) for the euro area. We solve the money demand function for the price

level that would result if all prices adjusted immediately to current output, money and interest rates, i.e., the equilibrium price level:

(3) $p_t^* = m_t - y^r_t + 0.023\, r_t$

Next, we assume that the actual price level follows the equilibrium price level with a lag,

(4) $\Delta p_t = a + b\,(p^*_{t-4} - p_{t-4}) + u_t$

The left hand side is the annual inflation rate. The difference between the equilibrium and the actual price level is the price gap. With b > 0, the actual price level adjusts to the equilibrium price level over time. We estimate this equation using quarterly data from 1995 to 2000. This yields the following equation:

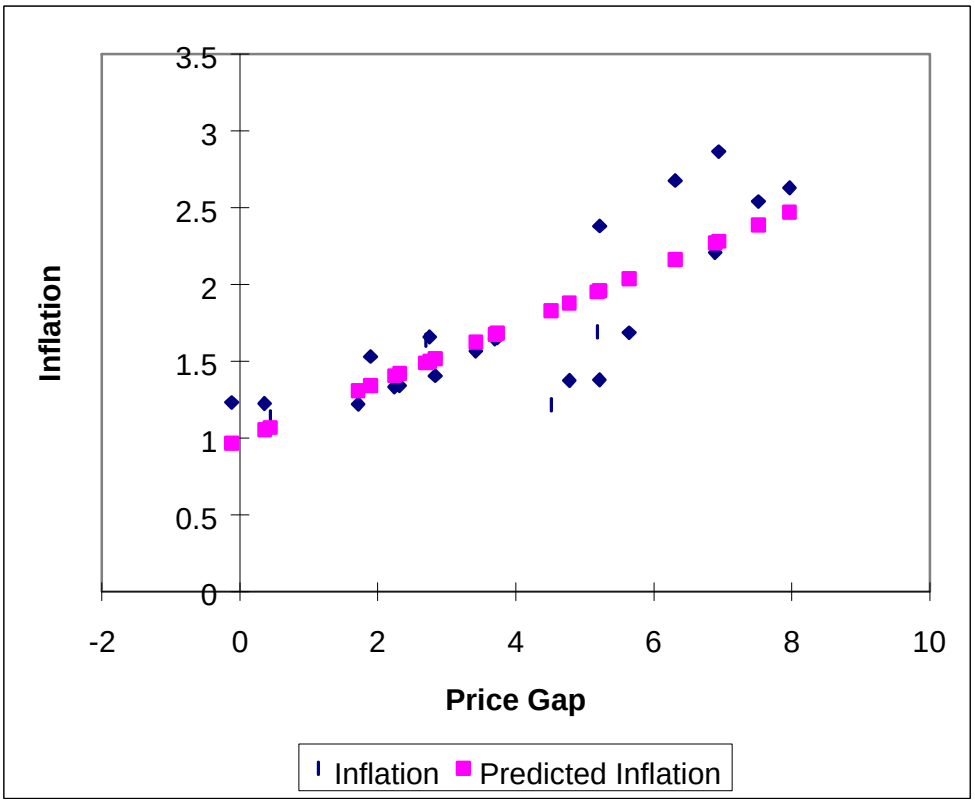
$\Delta p_t = 0.99 + 0.2\, Gap_{t-4}$ $\quad R^2 = 0.66,\ F(1,24) = 42.0$

t-values: (6.5) (6.5)

All parameters are statistically significant at the 1% level. Thus, there is a statistically significant relationship between the observed inflation rate and the lagged price gap. A rise in the price gap by one percent is followed by an increase in euro-area inflation by 0.2 percent a year later. Figure 8, which plots the actual and the fitted inflation rates against the price gap shows that the fit of this model, simple as it is, is quite high.[26] The implication is that the change in the equilibrium price level is an indicator of the future inflation potential caused by current monetary policy. A rising equilibrium price level indicates that the money supply is growing faster than the long-run money demand at current income and interest rates and that this discrepancy results in inflationary pressures.

[26] There is some autocorrelatiion in the residuals of the regression, but the Durbin -Watson test is inconclusive. To address the problems resulting from the use of quarterly data of annual inflation rates, We also estimated this relationship based on quarter-to-quarter inflation rates and the price gap lagged one period. The results are very similar.

Figure 8: Actual and predicted inflation rates based on price-gap model



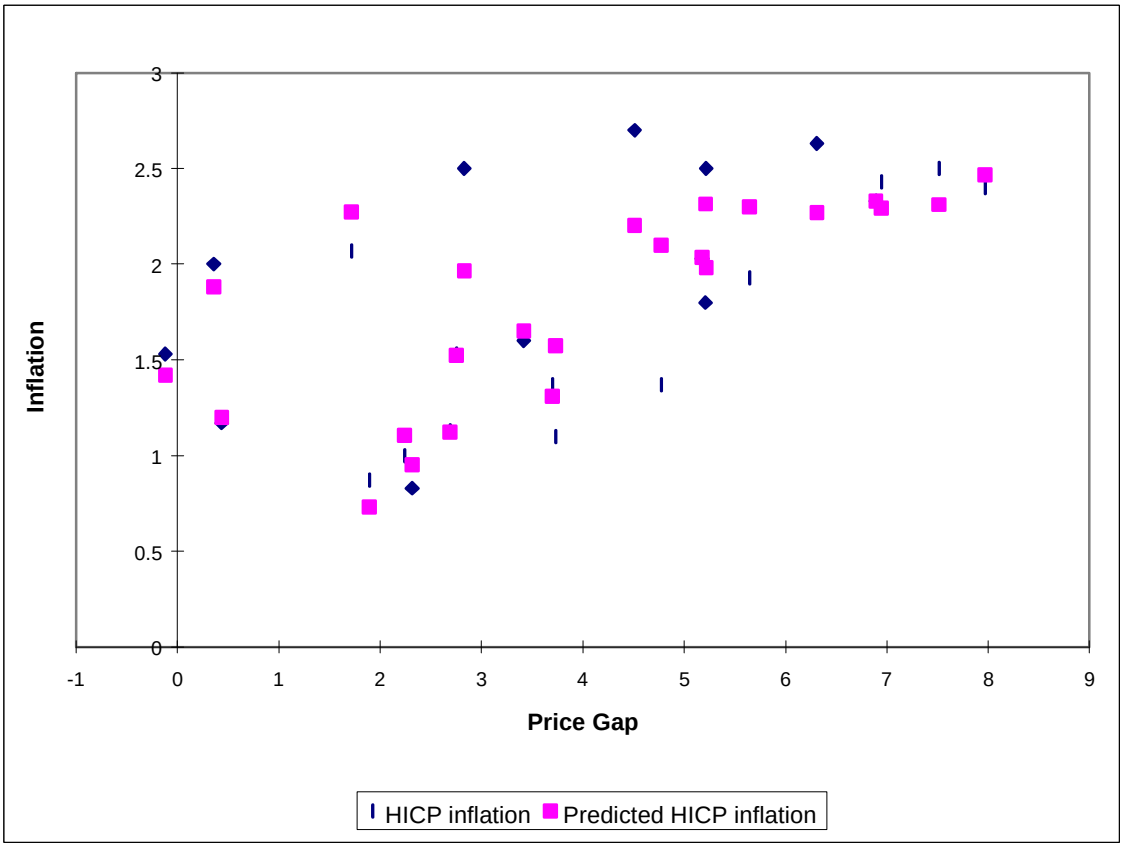
The ECB's main inflation gauge is HCPI inflation rather than the change in the GDP deflator. While consumer prices react faster to exchange rate movements and variations in individual prices such as energy prices, one would still expect the HCPI to move in line with the GDP deflator in the longer run. To see whether this is true, and the equilibrium price level is a good indicator of the long-run development of the HCPI, too, we regress the inflation rate calculated on the basis of the HCPI on our price gap. Following Gerlach and Svensson (2001), we include the change in oil prices lagged by four quarters in this regression. As before, we use data from 1995 to 2000. This yields the following regression model:

$$\Delta p_t = 0.86 + 0.21\, Gap_{t-4} + 0.05 \Delta p_{oil,t}\,; \qquad R^2 = 0.74,\ F(2,20) = 28.9,$$

t-values: (5.9) (6.7) (5.4)

Again, the relationship holds quite well. Figure 8 shows fitted and actual values. Comparing figures 8 and 9 we observe larger deviations of the actual from the predicted inflation rates, which reflects the stronger impact of the exchange rate and energy prices on the consumer price index. Nevertheless, figure 8 indicates that a rise in the price gap will result in higher HCPI inflation rates after some time. These results are in line with Gerlach and Svensson (2001), who estimate a similar relationship between inflation and the price gap (which they call a "real money gap.") Gerlach and Svensson, however, assume a constant velocity of money, i.e., they do not allow for interest rates to affect the long-run demand for money.

Figure 9: Actual and predicted HCPI inflation based on the price-gap model



5. Conclusions

Monetary policy in the new EMU is necessarily an experiment in unkown territory. In this paper, we have presented a review of the institutional background, the strategy, and the monetary policy performance of the ESCB.

A characteristic of the ESCB's monetary policy is the "Two-Pillar" strategy. It is plagued with intransparency and designed to leave much room for discretionary manoeuvre, at the cost of enabling the public to make informed guesses about the central bank's intentions and future actions. Uncertainty about the monetary policy environment is not a valid excuse for this particular approach. We suggest that it has been chosen for reasons of internal decision making.

The ESCB's performance so far suggests that the ECB Board has managed to establish its leadership over the participating national central banks in the ECB Council. The Two-Pillar strategy has been helpful in achieving this. The fact that both France and Germany likely favored a less restrictive monetary policy than what would have been adequate from the median country's perspective on the ECB Council probably helped the ECB Board establish its position. It remains to be seen, however, how the Board can cope with situations in which Germany and France have very different views on monetary policy.

In contrast to widespread expectations before the start of EMU, the ESCB did not choose to tighten monetary policy immediately after assuming responsibility for EMU monetary policy. Instead, monetary policy was too loose in the first year, leading to a gradual revival of inflation.

Monetary and inflation developments of the early years are consistent with the main propositions underlying the First Pillar of the ESCB's strategy. Specifically, the data point to the existence of a stable money-demand function, a significant link between money growth and inflation operating with a lag of about one year, and a responsiveness of the growth of monetary aggregates to short-term interest rates. Yet, the focus on a broad monetary aggregate, and the use of money growth data purged from the valuation effects of exchange rate changes is likely to have introduced a bias into the ESCB's monetary policy, one that kept monetary policy too loose in the first year and a half, and that caused the ESCB to underestimate the extent of the subsequent monetary contraction. As more data come in, the ESCB would probably do well revising and clarifying its strategy by making the relative weights of the two pillars transparent and using a better behaved monetary aggregate as its main policy orientation.

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