Monetary Policy Issues for the Eurosystem

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Abstract

The paper discusses the choice between inflation targeting and monetary targeting as a strategy for the Eurosystem, the actual strategy that the Eurosystem has recently announced, the framework for policy decisions appropriate for achieving the Eurosystem's goals, the role of exchange rate management in the EMU, and the Eurosystem's accountability and transparency. The choice between inflation targeting and monetary targeting is in effect a choice between high and low transparency. Inflation targeting and monetary targeting, in practice, imply similar policy decisions, but monetary targeting implies that policy decisions are explained in terms of money-growth developments that are not essential for policy. The Eurosystem has specified an operational inflation target, although in a somewhat ambigious way. More importantly, its announced monetary strategy is deficient, since it proposes to give a prominent role to an essentially irrelevant money-growth indicator in analysis and communication, but will keep secret the inflation forecast that will, in practice, be the decisive input in policy decisions. Exchange rate policy is controlled by the Council of finance ministers in the EMU; this is a major flaw in the Maastricht Treaty and a threat to the independence of the Eurosystem. The European Parliament may have a crucial role in ensuring the accountability of the Eurosystem; the minimum transparency needed for effective outside monitoring and evaluation of the Eurosystem's policy decisions require published inflation forecasts and most likely published minutes and voting records of the Governing Council.

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1 Introduction

The purpose of this paper is to discuss some monetary policy issues for the Eurosystem, which conducts monetary policy in the Euro area from January 1, 1999.[1]

[Preview of results to be added.]

Section 2 discusses the Eurosystem's choice of monetary strategy, Section 3 discusses the Eurosystem's announcement of October 13, 1998, Section 4 discusses the appropriate targets and operating procedures for the Eurosystem, and Section 6 discusses the appropriate degree of transparency. Section 7 contains some conclusions. An appendix includes the October 13 announcement and some other details.

In spite of the length of this paper, several important issues are not covered, for instance, potential problems with the relatively weak center and the high degree of decentralization in the Eurosystem, issues of financial stability and lending of last resort, fiscal interaction, and international monetary coordination.[2]

2 The choice of monetary strategy for the Eurosystem: inflation targeting or monetary targeting?

The choice of monetary strategy for the Eurosystem was previously narrowed down by EMI [35] to be between inflation targeting (practiced by the central banks in New Zealand, Canada, United Kingdom, Sweden and Australia) and monetary targeting (practiced by the Bundesbank in Germany), or possibly a combination of these two alternatives.[3] Exchange-rate targeting, interest-rate targeting and nominal GDP targeting was considered inappropriate (EMI [35], p. 1).

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[1] The "Eurosystem," a "user-friendly expression" adopted by its General Council, consists of the European Central Bank, ECB, and the national central banks, NCBs, of the 11 Member States adopting the euro. Decisions in the Eurosystem are made by the 17 members of the Governing Council, consisting of the 6 members of the Executive Board of the ECB and the 11 governors of the NCBs. The European System of Central Banks, ESCB, also includes the 5 NCBs in the European Union that have not adopted the Euro.

The relation between ECB and the Eurosystem is somewhat similar to that between the Federal Reserve Board and the Federal Reserve System (the latter includes the Federal Reserve Banks). Since monetary policy will be decided by the ESCB's Governing Council rather than by the ECB's Executive Board, it is logical to speak of the monetary policy of the Eurosystem rather than that of the ECB.

[2] These issues are discussed in, for instance, Begg [3], Begg, Giavazzi and Wyplosz [5], Begg, De Grauwe, Giavazzi, Uhlig and Wyplosz [4], Obstfeld [63] and the report by Blanchard, Gros, Emerson, Mayer, Saint-Paul, Sinn and Tabellini [46].

[3] Finland and Spain have announced inflation targets, while still being members of the ERM, the Exchange Rate Mechanism of the European Union. Israel has announced inflation targets while still maintaining an exchange rate band. Recently the Czech Republic joined the ranks of inflation-targeting countries.

The National Bank of Switzerland also has a monetary target. The discussion about monetary targeting in the EMU has almost exclusively focused on Bundesbank-style monetary targeting, though.

"First, an exchange rate objective is not considered appropriate since, for an area potentially as large as the euro area, such an approach might be inconsistent with the internal goal of price stability. Second, the use of an interest rate as an intermediate target is not considered appropriate given difficulties in identifying the equilibrium real interest rate which would be consistent with price stability. Third, employing the growth rate of nominal GDP which can be viewed as consistent with price stability as an intermediate target would provide a clear nominal framework and would have the advantage of not being sensitive to shocks in the income velocity of money. However, nominal income would be difficult to control by the ESCB, could lead to misinterpretation of the ultimate goal of the ESCB, could be subject to substantial data revisions and might lead to an indeterminate price/volume division in the short run, thus creating uncertainty about the inflation performance of the economy. Furthermore, the fact that nominal income targeting is not used at present in any EU Member State makes it inadvisable for the ESCB to adopt this strategy. For these reasons, special attention is paid in this report to only two strategies, monetary and direct inflation targeting."

There has been considerable debate about the Eurosystem's monetary strategy among academics and central bankers. Inflation targeting has been promoted by a large majority of academics as well as by central bankers with experience of inflation targeting and previous failures in non-German countries of monetary targeting. Monetary targeting has mainly been promoted by some German academics and by German central bankers. More recently, central bankers in Germany and in the Eurosystem have suggested a combination of the two alternatives. On October 13, finally, the Eurosystem announced its strategy, indeed a kind of combination. The Eurosystem's decision is discussed and scrutinized in section 3. In that section I will provide definitions and some general discussion of the two alternatives, inflation targeting and monetary targeting.

In discussing monetary policy strategy, I will distinguish two of its elements, the framework for policy decisions and communication. By the *framework for policy decisions*, I mean the monetary policy procedures inside the central bank, which, from observations of various indicators, eventually result in decisions about the central bank's instruments, that is, decisions intended to achieve the central bank's targets; in short, the principles for setting the instruments (which in the Eurosystem's case will be a repurchase rate).[4] By *communication*, I mean the central bank's way of communicating with outsiders (the general public, the financial market, governments, policymakers and policymaking institutions, which, in the Eurosystem's case, in-

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[4] Possible alternative terms are "decision process," "implementation" (in the broad meaning of implementation of the monetary-policy goals rather than in the narrow meaning of the implementation of a particular monetary policy decision) or "operating procedures" (as it is used in Freedman's [41] paper for the 1996 Jackson Hole conference). The last term has nevertheless been avoided here, since it is frequently used in the United States in reference to the choice and the use of an operating target, like non-borrowed reserves or the federal-funds rate.

cludes EU institutions and national governments and parliaments). Communication is part of the implementation of monetary policy, in that it affects the efficiency of monetary policy by, for instance, influencing expectations, predictability and credibility of the policy. Communication also influences how transparent policy is, which is crucial for the accountability and arguably also for the political legitimacy of the policy.

2.1 Inflation targeting

Inflation targeting, as practised by an increasing number of inflation-targeting central banks, has three main characteristics, (1) an explicit quantitative inflation target, (2) a framework for policy decisions, inflation-forecast targeting, which uses an internal conditional inflation forecast as an intermediate target variable, and (3) a high degree of transparency and accountability. Real-world inflation targeting is "flexible" inflation targeting rather than "strict", in the sense that it allows concerns not only about inflation variability around the inflation target but also about real variability in the economy.[5] This can be represented by an intertemporal loss function in period t,

$$E_t(1 - \delta) \sum_{\tau=0}^{\infty} \delta^{\tau} L_{t+\tau}, \tag{2.1}$$

where E_t denotes expectations conditional on information available in period t, δ, the discount factor, fulfills $0 < \delta < 1$ and the period loss function is given by

$$L_t = \frac{1}{2}[(\pi_t - \pi^*)^2 + \lambda x_t^2], \tag{2.2}$$

where π_t is inflation in period t, π^* is the inflation target, and x_t is the output gap, with $\lambda > 0$ being the relative weight on output gap stabilization. As emphasized in the literature, this translates into a more gradual adjustment of inflation towards the inflation target, and an aim at the inflation target at a longer horizon than the shortest possible.[6] Furthermore, a loss function as above implies that the conditional inflation forecast will become an intermediate target at an appropriate horizon, say about two years ahead. The framework for policy decisions of the central bank is then to compute conditional forecasts for inflation and possibly for the output gap and then set its instrument, normally a short interest rate, such that the corresponding conditional inflation forecast about two years ahead hits the inflation target.[7]

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[5] See, for instance, Svensson [81] for discussion and references to the literature.
[6] See Ball [2] and Svensson [78].
[7] The loss function above does not induce an average inflation bias, since the implicit output target is taken to be the natural output level and therefore consistent with the natural-rate hypothesis (that monetary policy cannot systematically affect average unemployment/the natural output level). Indeed, motivations for inflation

It is worth pointing out that under this framework for policy decisions, the instrument will depend on all the information that enters the conditional forecasts, including the current inflation and output gap. Note, in particular, that the current output gap will also affect the instrument under hypothetical strict inflation targeting, when $\lambda = 0$ and the output gap does not enter the loss function — for the simple reason that the current output gap helps predict future inflation.

Communication under inflation targeting is mostly direct and to the point. The Reserve Bank of New Zealand, Bank of England and Sveriges Riksbank publish high-quality *Inflation Reports* with conditional inflation forecasts, where they motivate their policy and explain ex post outcomes. Bank of England (and soon Sveriges Riksbank) also publishes voting records and non-attributed minutes from the meeting of its Monetary Policy Committee. This makes inflation targeting very transparent, simplifies external monitoring and evaluation of the policy, improves incentives for the central banks to perform well, and increases the accountability of the central banks.

Under inflation targeting, the central bank's rhetoric is highly consistent with the actual policy pursued. Given the high degree of transparency, significant discrepancies are not difficult to detect by competent central-bank watchers.[8]

2.2 Monetary targeting

Whereas the rhetoric and the practice coincide under inflation targeting, this is arguably not always the case under monetary targeting. Therefore, monetary targeting must be defined with some special care. I will specify two kinds of monetary targeting, "strict" money-growth targeting (which is hypothetical and not pursued by any central bank) and "pragmatic" monetary targeting (which is the policy that was actually pursued by Bundesbank).

targeting, by governments, parliaments and central banks, put much emphasis on the natural-rate hypothesis, and it can be argued that the hypothesis constitutes one of the foundations of inflation targeting. The high degree of transparency and accountability in inflation targeting may then ensure that any concern about the real economy is consistent with the natural-rate hypotheses and therefore reduces, or eliminates, any inflation bias. This then translates into an output-gap target in (2.2) that is equal to zero.

This highlights a fundamental asymmetry between inflation and output in inflation targeting. There is both a level goal and a stability goal for inflation, and the level goal (that is the inflation target) is subject to choice. For output, there is only a stability goal and no level goal. Or, to put it differently, the level goal is not subject to choice; it is given by the capacity output level. Therefore, I believe it appropriate to label minimizing (2.2) as "(flexible) inflation targeting" rather than "inflation-and-output-gap targeting," especially since the label is already used for the monetary policy regimes in New Zealand, Canada, United Kingdom, Sweden and Australia.

[8] [Extend on transparency about λ.]

2.2.1 Strict money-growth targeting

Let me first define strict money-growth targeting.[9] This involves specifying a money-growth target for a monetary aggregate, say M3. The money-growth target is set so as to be consistent with an inflation target, in the sense of achieving an average inflation equal to the inflation target. Strict money-growth targeting can be represented by the period loss function

$$L_t = \frac{1}{2}(\Delta m_t - \Delta m^*)^2, \tag{2.3}$$

where m_t denotes the (log) quantity of money in period t, $\Delta m_t \equiv m_t - m_{t-1}$ denotes money growth, and Δm^* is the money-growth target. Since money growth reacts with some lag to the interest rate, the framework for policy decisions involves making an conditional forecast for money growth and setting the interest such that the conditional forecast hits the target at the appropriate horizon.

In any reasonable model of the transmission mechanism, minimizing the loss function (2.3) is not the same as minimizing the loss function (2.2). This simply reflects that money is not an intermediate variable in the transmission mechanism from the instrument to inflation. It is not the case that the instrument affects inflation in the medium term exclusively by first affecting money growth (with a lag), and then by money growth affecting inflation.[10] As a consequence, although a money-growth target may bring about the desired *average* inflation rate over a sufficiently long period, in the medium term there is a conflict between stabilizing money-growth and stabilizing inflation. Thus, there is a tradeoff between inflation variability and money-growth variability. This is particularly clear if we consider strict inflation targeting, that is, with $\lambda = 0$ in (2.2). Strict inflation targeting minimizes inflation variability around the inflation target, which would normally lead to substantial money-growth variability. Money-growth targeting minimizes money-growth variability around the money-growth target, which can be chosen such that average inflation equals the inflation target, but money-growth targeting would normally lead to considerable inflation variability around the inflation target. This is illustrated in figure 2.1. There, the curve illustrates the efficient tradeoff between inflation variability and money-

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[9] By "strict" targeting of a variable I mean that no other variable enters the loss function; "flexible" targeting allows other variables in the loss function. By "unconditional" targeting, I mean that the target level is fixed for a substantial period; "conditional" money-growth targeting, discussed in Svensson [78] and [81] and briefly in appendix B, allows the target level to be state-contingent and adjusted with new information.

[10] By an intermediate variable in the transmission mechanism I mean a variable such that the instrument affects a target variable *exclusively* via first affecting the intermediate variable and then the intermediate variable affecting the target variable. Money is simply not an intermediate variable in this sense. See the simple model of the transmission mechanism below, and see Svensson [81] for further discussion. Early discussion of these issues can be found in Friedman [42] and Bryant [15].

growth variability. Strict inflation targeting minimizes inflation variability at point SIT, whereas money-growth targeting minimizes money-growth variability at point SMT.[11]

Figure 2.1: The tradeoff between inflation and money-growth variability, $\text{Var}[\pi_t]$ and $\text{Var}[\Delta m_t]$.
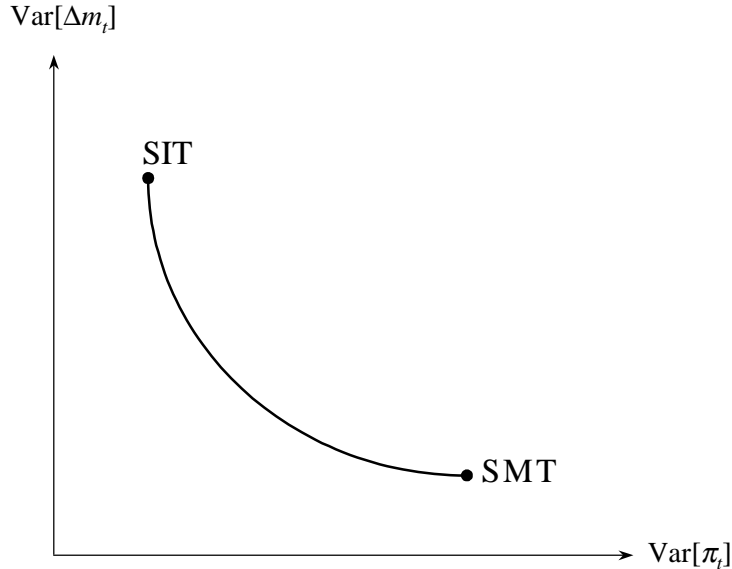
In terms of the frequently used tradeoff between inflation variability and output-gap variability, shown in figure 2.2, flexible inflation targeting would corresponds to a compromise between inflation and output-gap variability at point FIT, whereas strict monetary targeting would correspond to a point inside the efficient tradeoff, like point SMT.[12] [13]
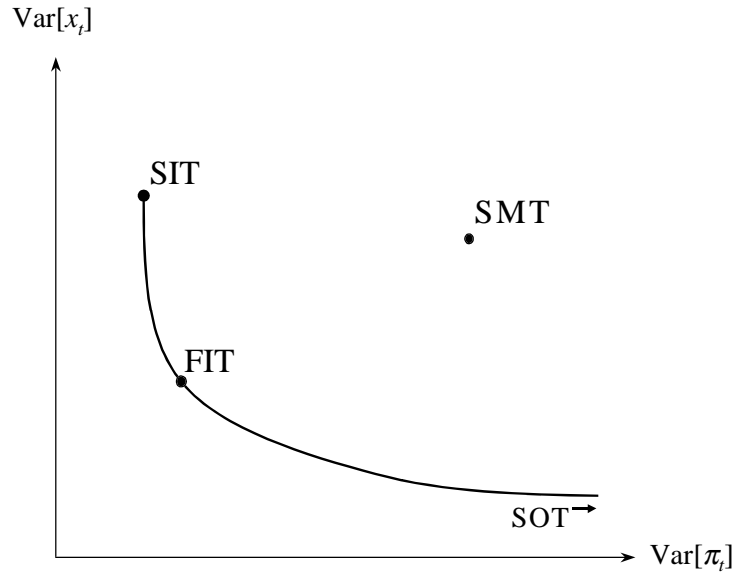
2.2.2 Pragmatic monetary targeting

Strict money-growth targeting means giving priority to the money-growth target when conflicts with the inflation target arises. This would lead to high inflation variability. This is probably the very reason why Bundesbank is notorious for disregarding its money-growth targets, and hence not implementing strict money-growth targeting. Instead Bundesbank engages in what has been called pragmatic monetary targeting.

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[11] The curve results for a period loss function (2.2) replaced by $L_t = \frac{1}{2}[(1-\omega)(\pi_t - \pi^*)^2 + \omega(\Delta m_t - \Delta m^*)^2]$ and an intertemporal loss function like (2.1) below (where $\delta \to 1$), and where ω varies from zero (resulting in point I) to unity (resulting in point M).

[12] The curve results for a period loss function (2.2) and an intertemporal loss function like (2.1) (where $\delta \to 1$), and where λ varies from zero (resulting in point SIT) to infinity [resulting in the minimum output-gap variability but potentially a nonstationary inflation, indicated by point SOT (for "strict output targeting") potentially being infinitely far to the right].

[13] The inefficiency of any intermediate-targeting strategy, including monetary targeting, was pointed out in early criticism of monetary targeting by Friedman [42] and Bryant [15].

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Figure 2.2: The tradeoff between inflation and output-gap variability, $\text{Var}[\pi_t]$ and $\text{Var}[x_t]$.

Pragmatic monetary targeting involves having an inflation target, over the years called "unavoidable inflation", "price norm", or "medium-term price assumption". It has been 2 percent for many years. Since the Bundesbank's Council's meeting in December 1996, it has been 1.5–2 percent.[14] Starting from this inflation target, Bundesbank then, for each year, has derived a money-growth target for M3 by adding predicted potential-output growth and subtracting a velocity trend. Bundesbank has then set a target corridor around the monetary target, for 1998 3 percentage points wide.

The problem now, as noted above, is that in the medium term there will normally be a conflict between stabilizing inflation around the inflation target and stabilizing money-growth around the monetary target. A number of studies of Bundesbank's monetary policy, by both German and non-German academics, have come to the unanimous conclusion that, in this conflict, Bundesbank has given priority to the inflation target and has disregarded the monetary target.[15] One piece of evidence is from estimates and interpretations of Bundesbank's reaction function.

[14] In Bundesbank [20], p. 21, this interval is referred to as "[Bundesbank's] medium-term price assumption, which is a definitive expression of its price stability target."

[15] This litureature includes Neumann [62], von Hagen [89], Bernanke and Mihov [7], Clarida and Gertler [24], Clarida, Gali and Gertler [23] (note a crucial typo: the coefficient for money supply in Table 1 should be 0.07 instead of 0.7), Laubach and Posen [56], and Bernanke, Laubach, Mishkin and Posen [6].

These show no trace of reacting to current or anticipated misses of the money-growth targets.[16] The evidence for this conclusions includes the fact that Bundesbank's inflation record has been unprecedented, while it has missed its money-growth target about half the time. A graph from Bundesbank's Annual Report 1995, [19], is most revealing, see figure 2.3. Furthermore, these

misses seem deliberate and are hardly due to imperfect control. Figure 2.4 shows the German overnight interest rate (which is highly correlated with the Bundesbank's repurchase rate) and the German CPI inflation during 1993–1996. There is no sign of dramatic interest-rate changes in order to bring money in line with the monetary target, and inflation seem to be under control.

Figure 2.3: Growth of German M3 (Chart 12 in Deutsche Bundesbank [19])
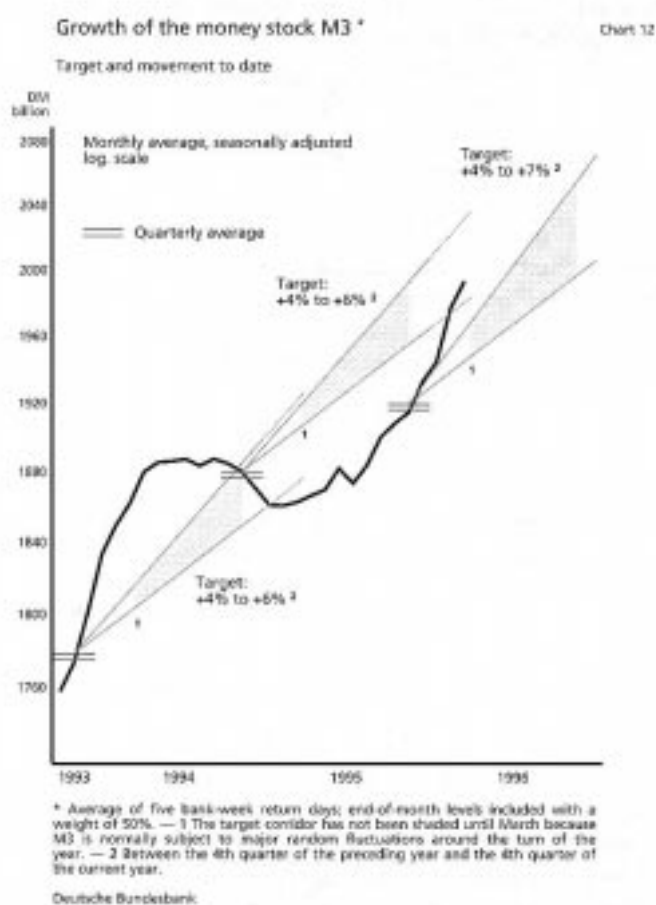
Although Bundesbank's internal framework for policy decisions is a well-kept secret, it seems inconceivable that it could have achieved its inflation record without a forward-looking medium-term approach to monetary policy, where conditional inflation forecasts are an important ele-

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[16] However, depending on the form of the money-demand function, there are some difficulties in interpreting reaction functions consistent with monetary targeting, cf. Svensson [81].

Figure 2.4: German overnight rate and CPI inflation, 1993–1996
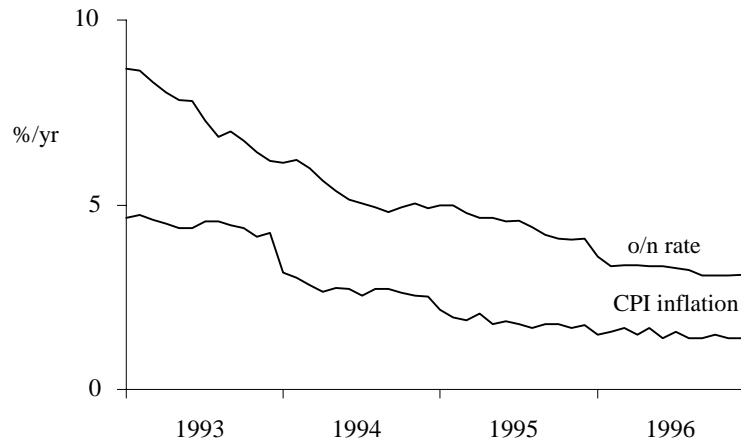
ment. My conclusion is that pragmatic monetary targeting is likely to have a framework for policy decisions similar to flexible inflation targeting. I interpret von Hagen [89] and [90] as previously having come to the same conclusions. Thus, Bundesbank's policy can be seen as having the same period loss function as flexible inflation targeting, (2.2), rather than that corresponding to strict money-growth targeting, (2.3), and would reach a point like FIT in figure 2.2.

The big difference between inflation targeting and pragmatic monetary targeting is then with regard to Bundesbank's communication with outsiders. Bundesbank communication was entirely within the monetary targeting framework, with frequent ad hoc explanations of the regular misses of the monetary target. Given that the framework for policy decisions in reality seems to disregard the monetary targets, the discussion about the misses of the monetary targets was basically irrelevant for Bundesbank's monetary policy. Thus, pragmatic monetary targeting can be described as "inflation targeting in disguise", or "inflation targeting in actions, monetary targeting in words." The rhetoric was simply inconsistent with the framework for

policy decisions.[17] [18]

What explains this strange state of affairs? von Hagen [90] provides a fascinating account of the rise of Bundesbank's monetary-targeting framework. His account provides ample evidence that the framework was important and perhaps crucial in the sometimes delicate political situation of Bundesbank, where its role was mainly to increase and maintain Bundesbank's independence and protect it from political interference.[19]

2.3 Summary

Inflation targeting and pragmatic monetary targeting appear to be similar with regard to the loss function and the framework for policy decisions. The difference is with regard to communication and transparency. Under inflation targeting, communication is direct and to the point. The rhetoric is consistent with the framework for policy decisions. Words match actions, and vice versa. Inflation targeting is "inflation targeting in the open," whereas pragmatic monetary targeting is "inflation targeting in disguise." Under pragmatic monetary targeting, the communication and discussion is deliberately mainly focused on irrelevant misses of the monetary targets and the ad hoc explanations thereof. In practice, the choice between inflation targeting and pragmatic monetary targeting is a choice between transparency and nontransparency.[20] [21]

Given this, I believe the advocacy of monetary targeting for the Eurosystem has been somewhat misguided. In appendix D, I scrutinize the arguments in favor of monetary targeting that have been put forward by EMU Monitor, a panel of European academics.[22]

3 The Eurosystem's monetary policy strategy

The goals for monetary policy in the EMU are specified in the Maastricht Treaty. According to its Article 105(1),

> "The primary objective of the ESCB shall be to maintain price stability. Without prejudice to the objective of price stability, the ESCB shall support the general

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[17] In line with the discussion in Lohmann [58], there may be two very different audiences for the Bundesbank's announcements. One, the experts, is informed and sees through the rhetoric and understands the true reasons for repeated misses of the monetary targets. The other, the general public, is uninformed and believes that the monetary-targeting framework is essential.

[18] Posen [67] has coined the term "monetary masquerade".

[19] One easily recalls an argument sometimes presented in favor of the nontranspareny of the Federal Reserve System; nontransparency is a way to keep Congress at arms-length and maintain independence.

[20] Thus, I agree with Laubach and Posen [56] in their detailed description of actual Bundesbank policy, but I disagree with their conclusion that Bundesbank's pragmatic monetary targeting nevertheless is transparent.

[21] See Schmid [72] for a recent official Bundesbank view of its monetary targeting.

[22] The panel currently consists of Patrick Artus, Eward Bomhoff, Manfred Neumann, Alessandro Penati and Jürgen von Hagen.

economic policies in the Community with a view to contributing to the achievement of the objectives of the Community as laid down in Article 2..."

According to Article 2, the Community shall have as its task

"to promote throughout the Community a harmonious and balanced development of economic activities, sustainable and non-inflationary growth respecting the environment, a high degree of convergence of economic performance, a high level of employment and of social protection, the raising of the standard of living and quality of life, and economic and social cohesion and solidarity among Member States."

EMI [35] and the Executive Board of the ECB [36] have previously defined price stability as an inflation rate between 0 and 2 percent (per year). This could be interpreted as a target range for an EMU-wide inflation of 0–2 percent, or as a point inflation target of 1 percent with a tolerance interval of ± 1 percentage point.[23]

The second sentence in Article 105(1) could arguably be interpreted as including stabilization of real variables around their natural levels, that is, flexible rather than strict inflation targeting. This could be represented by a Eurosystem period loss function that includes stabilization of the output gap, as in (2.2) with $\lambda > 0$. As emphasized in the literature and noted above, this translates into a gradual adjustment of inflation towards the inflation target, and aims at the inflation target at a longer horizon. Furthermore, a loss function as above implies that the conditional inflation forecast will become an intermediate target at an appropriate horizon, say 2–2.5 years ahead. The task of the Eurosystem would the be to set its instrument, an EMU-wide short nominal interest rate, such that the corresponding conditional inflation forecast 2–2.5 years ahead hits the inflation target of 1 percent per year.

After its meeting on October 13, 1998, the Governing Council of the ECB finally announced the main elements of its monetary policy strategy, namely (see appendix A):

"• a quantitative definition of the primary objective of the single monetary policy, price stability;

• a prominent role for money with a reference value for the growth of a monetary aggregate; and

• a broadly-based assessment of the outlook for future price developments."

3.1 The definition of price stability

With reference to the primary objective for the Eurosystem to maintain price stability, the Governing Council announced on October 13 that

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[23] Alternatively, it might be interpreted as implying that a point inflation target not necessarily at the midpoint but somewhere within the interval 0–2 percent.

> "the ESCB's monetary policy strategy will focus *strictly* [emphasis added] on this objective."

This might be interpreted as $\lambda = 0$, a zero weight on output-gap stabilization, corresponding to strict inflation targeting rather than flexible.

Furthermore, the Governing Council adopted the following definition of price stability:

> "*Price stability shall be defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area* [the Monetary Union Index of Consumer Prices (MUICP)] *of below 2%.* Price stability is to be maintained over the medium term. The current rate of HICP inflation in the euro area [1.2% for August 1998, 1.0% for September] is in line with this objective."

As commentators quickly pointed out, this definition of price stability was indeed ambiguous, since it did not specify a lower bound for inflation. About a month later, on November 10, it appeared that the ambiguity was eliminated, when the ECB president, Willem Duisenberg [28], clarified that "increase" in the definition excludes decrease and deflation. It would seem to follow that the lower bound was zero and that the definition refers to an inflation rate between 0 and 2 percent.[24] This would have been consistent with the previous statements of EMI and the Executive Board referred to above. The midpoint of the interval would the be close to the August MUICP inflation rate and equal to the September rate, which, hence, certainly was "in line with this objective." Thus, the midpoint of 1 percent could have been taken to be the inflation target π^* and serve as an anchor for inflation expectations.[25]

The ambiguity was not completely resolved, though. On November 12, Duisenberg [29] stated:

> "We did not announce a floor for inflation, because we know that the price index may include a measurement bias, but we do not know its magnitude."

To this date, no explicit lower bound has been announced.

A lower bound can probably be inferred from the reference value for money growth, though. When the reference value was announced on December 1, it appeared that a point inflation target of 1.5 percent had been used (see further below). If that point inflation target is interpreted is taken to be in the middle of the interval, the lower bound is 1 percent. Hence, it seems to me

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[24] This is how I interpreted the definition of price stability in the first version of this paper.

[25] Could the definition indicate an inflation target π^* just below 2 percent? ("2.5 percent or less," the ambiguous inflation target for Bank of England announced by the Chancellor of the Exchequer in June 1995, was later interpreted as just below 2.5 percent; the current unambiguous target of 2.5 percent was announced in May 1997). Hardly, since such an inflation target, if successful, would mean that inflation would exceed 2 percent about 50 percent of the time, due to unavoidable short-term volatility.

that the definition should currently be interpreted as the interval 1–2 percent, equivalent to an inflation target of 1.5 percent.

Is an inflation target of 1.5 percent appropriate? It happens to coincide with the midpoint of the current target range of 0–3 for New Zealand since 1997 (during the period 1990–1996, the target range was 0–2 percent) That the inflation target exceeds zero can be motivated by measurement bias, nonnegative nominal interest rates and possible downward nominal price and wage rigidities. The other inflation-targeting countries now have inflation targets (or midpoints of the target range) ranging between 1.5 in New Zealand, 2 percent in Canada, Sweden and Finland (before joining the EMU), and 2.5 percent in United Kingdom and Australia (the Reserve Bank of Australia has an inflation target in the form of the range 2–3 percent for average inflation over an unspecified business cycle). As noted above, Bundesbank has 1.5–2 percent (which could hence be translated into a point inflation target of 1.75 percent); thus, the Eurosystem seems to be aiming slightly lower than the Bundesbank. Interestingly, 2 percent is the borderline in Akerlof, Dickens and Perry [1], who study the effects of downward rigidity of nominal wages, whereas 1 percent is the borderline in Orphanides and Wieland [64], who examine the consequences of non-negative nominal interest rates. These studies indicate that inflation targets below those borderlines risk reducing average output or increasing average unemployment.[26] Altogether, announcing an explicit inflation target (a point target or a range) may be more important than whether the target (the midpoint of the range) is 1.5, 2 or 2.5 percent.

The Governing Council also stated:

> "Furthermore, the statement that 'price stability is to be maintained over the medium term' reflects the need for monetary policy to have a forward-looking, medium-term orientation. It also acknowledges the existence of short-term volatility in prices which cannot be controlled by monetary policy."

This could be interpreted as targeting inflation at a longer horizon than the minimum possible, which is consistent with flexible inflation targeting and $\lambda > 0$. Probably the Eurosystem will target inflation at a horizon of about two years, as most inflation-targeting central banks do. A quote from the January *Monthly Bulletin* [34, p. 47] gives additional support for an interpretation with $\lambda > 0$, as well as some weight on minimizing interest rate variability:

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[26] For reasons explained in Gordon [45], I believe that Akerlof, Dickens and Perry [1] reach a too pessimistic conclusion. On the other hand, their data is from the United States and Canada, and downward nominal wage rigidity may be more relevant in Europe. The conclusions of Orphanides and Wieland [64] are sensitive to assumptions about the size of shocks and the average real interest rate, the latter which is taken to be 1 percent for the United States. If the average real rate is higher in Europe, and the shocks not much larger than in the United States, nonnegative interest rates may be of less consequence in Europe.

"... a medium-term orientation of monetary policy is important in order to permit a gradualist and measured response [to some threats to price stability]. Such a central bank response will not introduce unnecessary and possibly self-sustaining uncertainty into short-term interest rates or the real economy..."[27]

3.2 A prominent role for money; a major role for an inflation forecast

The Governing Council also announced that the monetary policy strategy would consist of "two key elements," later called "the two pillars:"

"● money will be assigned a prominent role. This role will be signalled by the announcement of a quantitative reference value for the growth of a broad monetary aggregate. The reference value will be derived in a manner which is consistent with— and will serve to achieve—price stability.

Deviations of current monetary growth from the reference value would, under normal circumstances, signal risks to price stability. The concept of a reference value does not imply a commitment to mechanistically correct deviations over the short term.

The relationship between actual monetary growth and the pre-announced reference value will be regularly and thoroughly analysed by the Governing Council of the ECB; the result of this analysis and its impact on monetary policy decisions will be explained to the public. The precise definition of the reference aggregate and the specific value of the quantitative reference value for monetary growth will be announced by the Governing Council of the ECB in December 1998;

● in parallel with the analysis of monetary growth in relation to the reference value, a broadly-based assessment of the outlook for price developments and the risks to price stability in the euro area will play a major role in the ESCB's strategy. This assessment will be made using a wide range of economic and financial variables as indicators for future price developments."

The text clearly emphasizes the role of the relationship between actual monetary growth and the announced reference value in the communication with the general public. The text is silent on whether inflation forecasts will be published or not; at the press conference Duisenberg reportedly stated that inflation forecasts will not be published (Financial Times [39]). About a month later, Duisenberg [28] stated in no uncertain terms that inflation forecasts would not be published. The reasons given were that

"... publishing an inflation forecast would obscure rather than clarify what the Governing Council is actually doing. The public would be presented with a single number intended to summarise a thorough and comprehensive analysis of a wide range of indicator variables. However, such a summary would inevitably be simplistic. Moreover, because publishing a single inflation forecast would be likely to suggest that

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[27] Note possible ambiguity: whereas this quote can be interpreted as indicating $\lambda > 0$, the first quote in the subsection can be interpreted as indicating $\lambda = 0$.

> monetary policy reacts mechanistically to this forecast, publication might mislead the public and therefore run counter to the principle of clarity."

The reasons given are somewhat surprising, since it is common knowledge that the inflation-targeting central banks that publish inflation forecasts provide considerable discussion and explanation of the assumptions, data and analysis behind the inflation forecasts, including a discussion of the uncertainties involved. Both Bank of England and Sveriges Riksbank publish uncertainty bands and fan charts. The Reserve Bank of New Zealand provides extensive verbal discussion of the uncertainty involved. No inflation-targeting central bank publishes a single number and no explanation of assumptions, data and analysis. What they publish is indeed "broadly-based assessments of the outlook for price developments and risks to price stability."

The quantitative reference value for monetary growth was announced on December 1, namely 4.5 percent for M3. This was calculated from an estimated trend growth of real GDP in the euro area, 2–2.5 percent per year, an assumed trend decline in velocity of 0.5–1 percent per year, and the definition of price stability, "below 2%." Adding the midpoint of the intervals for GDP and velocity gives 3 percent. To get to 4.5 percent, "below 2%" has to be 1.5 percent. Hence the Eurosystem's inflation target seems to be 1.5 percent, and if that is the midpoint of an interval, that interval has to be interpreted as 1–2 percent.

The prominent role for money seems very problematic. The fact is that the deviation between monetary growth and any reference value is a very poor indicator of "risks to price stability," that is, inflationary or deflationary pressure. This is the case under normal circumstances, even absent any velocity shocks, as is shown below. A monetary policy that effectively maintains low and stable inflation must instead rely on inflation forecasts. This is easily illustrated in a simple model of a closed economy.

3.3 The simplest model of the monetary transmission mechanism

The role of inflation forecasts and money growth as indicators in a policy aimed at maintaining low and stable inflation is easily shown in a very simple model, which nevertheless matches some stylized facts.[28] Thus, we can use this model to test the soundness of the Eurosystem's monetary policy strategy. If its strategy is deficient in this simple model, it is likely to be even more deficient in a more complicated model with more forward-looking elements, and, indeed,

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[28] This model is a variant of the one used in Svensson [78] and [79], and is further discussed there. It is estimated for the United States in Rudebusch and Svensson [69], and estimated and used for the EMU in Peersman and Smets [65], Gerlach and Smets [44] and Taylor [88].

in the real world.[29]

Consider an aggregate model for the EMU as a whole. Let EMU-wide aggregate demand be given by the equation

$$x_{t+1} = \beta_y x_t - \beta_r(i_t - \pi_{t+1|t} - \bar{r}) + \beta_z z_t + \eta_{t+1}. \tag{3.1}$$

Aggregate demand is expressed in terms of the EMU-wide output gap, so x_t is the output gap in year t, given by

$$x_t \equiv y_t - y_t^n, \tag{3.2}$$

where y_t is EMU-wide (log) output and y_t^n is the EMU-wide (log) natural output level in year t. The ECB's instrument, i_t, is a short nominal interest rate (the repurchase rate), π_t is MUICP-inflation between year $t-1$ and t, z_t is an exogenous variable (easily generalized to a vector of exogenous variables), and η_{t+1} is an iid mean-zero shock to the output gap that is not known in year t. Inflation expectations $\pi_{t+1|t}$ are given by $\mathrm{E}_t \pi_{t+1}$, the expectation of π_{t+1} conditional on information available in year t. The coefficients β_y and β_r are positive, $\beta_y < 1$, and the constant $\bar{r}$ is the average real interest rate, the natural real interest rate.

Let aggregate supply be given by the equation

$$\pi_{t+1} = \pi_t + \alpha_x x_t + \alpha_z z_t + \varepsilon_{t+1}, \tag{3.3}$$

where the coefficient α_x is positive and ε_{t+1} is an iid mean-zero shock.

Thus, the central bank can affect the output gap with a one-year lag, and inflation with a two-year lag. In year t, π_t, y_t and $\pi_{t+1|t}$ are predetermined and cannot be affected by monetary policy.[30]

Suppose the demand for a broad EMU-wide monetary aggregate, like M3, is given by a standard money-demand equation,

$$m_{t+1} - p_{t+1} = \kappa_y y_t - \kappa_i i_t + \kappa_z z_t + \nu_{t+1}, \tag{3.4}$$

where the coefficients κ_y and κ_i are positive and ν_{t+1} is an iid mean-zero shock. Thus real money demand is supposed to adjust, with a lag, to output, the nominal interest rate and the

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[29] The model abstracts from open-economy issues. It agrees with conventional wisdom on the monetary transmission mechanism, in that inflation is determined by aggregate demand and aggregate supply, without any explicit role for money. Money is introduced via a money-demand function and hence determined by demand. See Svensson [82] and [81] for further discussion of these points and for extensions to open economies and to forward-looking behavior.

[30] The choice of a year as a period allows pedagogical simplifications. Rudebusch and Svensson [69] and the other empirical papers referred to in footnote 28 use a quarterly variant of the model.

exogenous variable. Some adjustment lag is realistic and consistent with the central bank having imperfect control over the monetary aggregate. Arguably, a one-year adjustment lag is too long. Therefore, I will also consider the variant when there is no adjustment lag in money demand. Note that money demand is, realistically, a function of output rather than of the output gap.

Finally, suppose that the central bank has an intertemporal loss function in year t given by (2.1) with the periodloss function (2.2). Consider, for simplicity, the case of strict inflation targeting, $\lambda = 0$, so the period loss function is

$$L_t = \frac{1}{2}(\pi_t - \pi^*)^2.$$

It is easy to see that the first-order condition for minimizing the intertemporal loss function (2.1), subject to (3.1) and (3.3), simplifies to

$$\pi_{t+2|t} = \pi^*, \tag{3.5}$$

where $\pi_{t+2|t} = \mathrm{E}_t \pi_{t+2}$ denotes the two-year-ahead conditional inflation forecast, given by

$$
\begin{aligned}
\pi_{t+2|t} &= \pi_{t+1|t} + \alpha_x x_{t+1|t} + \alpha_z z_{t+1|t} \\
&= \pi_{t+1|t} + \alpha_x[\beta_y x_t - \beta_r(i_t - \pi_{t+1|t} - \bar{r}) + \beta_z z_t] + \alpha_z z_{t+1|t} \\
&= \pi_{t+1|t} + \alpha_x \beta_y x_t + \alpha_x \beta_z z_t + \alpha_z z_{t+1|t} - \alpha_x \beta_r(i_t - \pi_{t+1|t} - \bar{r}),
\end{aligned}
\tag{3.6}
$$

where I have used (3.3) and (3.1).[31] [32]

Combining (3.5) and (3.6) and solving for the instrument level result in the optimal reaction function under strict inflation targeting,

$$i_t = \bar{r} + \pi^* + \frac{1 + \alpha_x \beta_r}{\alpha_x \beta_r}(\pi_{t+1|t} - \pi^*) + \frac{\beta_y}{\beta_r} x_t + \frac{\beta_z}{\beta_r} z_t + \frac{\alpha_z}{\alpha_x \beta_r} z_{t+1|t}. \tag{3.7}$$

Thus, the optimal policy can be described as using the relevant current information about the state of the economy to construct a conditional two-year-ahead inflation forecast, and then setting the instrument such that the two-year-ahead conditional inflation forecast equals the inflation target. Such policy will result in the instrument being a function of the inflation

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[31] In this annual model with a two-year control lag for inflation, strict inflation targeting corresponds to the two-year-ahead conditional inflation forecast equal to the inflation target. In a quarterly model, with a control lag for inflation equal to a few quarters (less than eight), an eight-quarter-ahead conditional inflation forecast equal to the inflation target can be interpreted as an approximation of a first-order condition for flexible inflation targeting, since eight quarters is then longer than the minimum control lag.

[32] The analysis is easily adapted to the case of flexible inflation targeting, $\lambda > 0$. As shown in Svensson ??, the first-order condition (3.5) is then replaced by

$$\pi_{t+2|t} - \pi^* = c(\lambda)(\pi_{t+1|t} - \pi^*),$$

where $c(\lambda)$ is an increasing function of λ, with $0 \leq c(\lambda) < 1$, $c(0) = 0$ and $c(\lambda) \to 1$ for $\lambda \to \infty$.

target and the information about the state of the economy that is relevant for constructing the conditional inflation forecast. In this model, the relevant information is the predetermined one-year-ahead inflation forecast, $\pi_{t+1|t}$, the output gap, x_t, and the current and forecasted values of the exogenous variable, z_t and $z_{t+1|t}$.[33] The predetermined one-year-ahead inflation forecast is by (3.3) constructed from current inflation, the current output gap, and the current exogenous variable, according to

$$\pi_{t+1|t} = \pi_t + \alpha_x x_t + \alpha_z z_t. \tag{3.8}$$

The conditional two-year-ahead inflation forecast in this example corresponds to the "broadly based assessment of the outlook for future price development" mentioned in the Eurosystem's October 13 announcement of the strategy.

3.4 An optimal indicator of inflationary or deflationary pressure ("risks to price stability")

What is the best indicator of "risks to price stability," that is, inflationary or deflationary pressure, in this setup?[34] The most intuitive indicator is obviously one that signals by how much the inflation target is likely to be missed in case policy is not adjusted. Such an indicator would also signal in what direction and by how much the instrument should be adjusted. An obvious candidate is the deviation between an appropriately defined inflation forecast and the inflation target. For this purpose, define $\Pi_{t+2|t}(i)$ as the two-year-ahead inflation forecast conditional upon a given interest rate i and the state of the economy in year t (that is, $\pi_{t+1|t}$, x_t, z_t (or, by (3.8), π_t, x_t, z_t) and the forecast $z_{t+1|t}$), that is,

$$\Pi_{t+2|t}(i) \equiv \pi_{t+1|t} + \alpha_x \beta_y x_t + \alpha_x \beta_z z_t + \alpha_z z_{t+1|t} - \alpha_x \beta_r (i - \pi_{t+1|t} - \bar{r}). \tag{3.9}$$

Then, call $\Pi_{t+2|t}(i_{t-1})$ the two-year-ahead conditional "unchanged-interest-rate" inflation forecast, that is, the conditional inflation forecast when the interest rate is unchanged from last year, $\Delta i_t \equiv i_t - i_{t-1} = 0$. Finally, define the "inflation-forecast" indicator I_t^π as the deviation of

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[33] Thus, we see that the reaction function includes the output gap as an argument, since it affects the two-year conditional inflation forecast, even if the output gap does not enter the loss function.

[34] Note that by indicator, we mean a variable that conveys useful information to the central bank, in particular indicating the required direction of change of the instrument. This meaning of indicators seems to be different from that used in Brunner and Meltzer [13] and [14]: "The *indicator* problem of monetary policy is the problem of constructing a scale that is invariant to up to a monotone transformation and that provides a logical foundation for statements comparing the thrust of monetary policy" ([14], p. 2). An indicator in the Brunner and Meltzer sense could, in the simple model used here, arguably be the difference between the short real interest rate and the natural real interest rate, $i_t - \pi_{t+1|t} - \bar{r}$. Friedman [42] expresses doubts about the usefulness of the Brunner-Meltzer indicator.

the conditional unchanged-interest-rate inflation forecast from the inflation target,

$$I_t^\pi \equiv \Pi_{t+2|t}(i_{t-1}) - \pi^*. \tag{3.10}$$

This indicator is, arguably, a very appropriate indicator of inflationary or deflationary pressure. It indicates by how much inflation two-year-ahead is likely to exceed the inflation target in case monetary policy is "unchanged," in the sense that the instrument is kept unchanged. Therefore, it indicates whether the instrument needs to be adjusted in order to minimize the loss function.

Furthermore, I_t^π indicates both the direction and the magnitude of the optimal change in the instrument. We have

$$\Pi_{t+2|t}(i_t) - \Pi_{t+2|t}(i_{t-1}) = \frac{\partial \Pi_{t+2|t}(i_{t-1})}{\partial i} \Delta i_t. \tag{3.11}$$

Combining this with (3.5), we get the optimal adjustment of instrument,

$$\Delta i_t = \frac{1}{-\frac{\partial \Pi_{t+2|t}(i_{t-1})}{\partial i}} I_t^\pi = \frac{1}{\alpha_x \beta_r} I_t^\pi, \tag{3.12}$$

where I have used (3.9) and (3.10). Thus, the required change in the instrument is proportional to the inflation-forecast indicator, more precisely the inflation-forecast indicator divided by the negative of the policy-multiplier, $-\partial \Pi_{t+2|t}(i_{t-1})/\partial i = \alpha_x \beta_r$.[35]

Using (3.9), the inflation-forecast indicator can be expanded as

$$I_t^\pi = \pi_{t+1|t} - \pi^* + \alpha_x \beta_y x_t + \alpha_x \beta_z z_t + \alpha_z z_{t+1|t} - \alpha_x \beta_r (i_{t-1} - \pi_{t+1|t} - \bar{r}). \tag{3.13}$$

It is a particular way of aggregating the information about the state of the economy, and hence a particular linear combination of $\pi_{t+1|t}$, x_t, z_t and $z_{t+1|t}$. Due to (3.8), it can equivalently be written as a linear combination of π_t, x_t, z_t and $z_{t+1|t}$,

$$I_t^\pi = \pi_t - \pi^* + \alpha_x (1 + \beta_y) x_t + (\alpha_z + \alpha_x \beta_z) z_t + \alpha_z z_{t+1|t} - \alpha_x \beta_r (i_{t-1} - \pi_{t+1|t} - \bar{r}). \tag{3.14}$$

3.5 The inadequacy of money-growth indicators

How appropriate is a money-growth indicator of the kind suggested by the Eurosystem? First, we need to derive a reference value "in a manner which is consistent with... price stability" (let me leave the question whether the reference value also "will serve to achieve... price stability" open for a while). By (3.4), money growth is given by

$$\Delta m_{t+1} = \pi_{t+1} + \kappa_y \Delta y_t - \kappa_i \Delta i_t + \kappa_z \Delta z_t + \Delta \nu_{t+1}. \tag{3.15}$$

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[35] The analogue of (3.12) under Brainard-type [11] parameter uncertainty is easily derived, cf. Svensson [79].

Let the reference value, Δm^*, be the average money-growth consistent with average inflation equal to the inflation target.[36] Average money growth is given by the unconditional expectation

$$\mathrm{E}[\Delta m_{t+1}] = \mathrm{E}[\pi_{t+1} + \kappa_y \Delta y_t - \kappa_i \Delta i_t + \Delta \nu_{t+1}] = \mathrm{E}[\pi_t] + \kappa_y \mathrm{E}[\Delta y_t],$$

where I have used that average inflation is bounded and that the unconditional mean of the exogenous variable is zero, which implies $\mathrm{E}[\Delta z_t] = \mathrm{E}[\Delta i_t] = 0$. Furthermore, consistency with the inflation target requires

$$\mathrm{E}[\pi_t] = \pi^*.$$

Then the reference value that is "consistent with price stability" is given by

$$\Delta m^* \equiv \pi^* + \kappa_y \mathrm{E}[\Delta y_t]. \tag{3.16}$$

Note that this reference value is consistent with the Eurosystem's derivation. Identify predicted trend growth in output with average output growth, $\mathrm{E}[\Delta y_t]$.[37] By (3.4), (log) velocity is given by

$$v_{t+1} \equiv p_{t+1} + y_{t+1} - m_{t+1} = y_{t+1} - \kappa_y y_t + \kappa_i i_t - \kappa_z z_t - \nu_{t+1}.$$

Then the velocity trend is

$$\mathrm{E}[\Delta v_{t+1}] = \mathrm{E}[\Delta y_{t+1} - \kappa_y \Delta y_t + \kappa_i \Delta i_t - \kappa_z \Delta z_t - \Delta \nu_{t+1}] = (1 - \kappa_y)\mathrm{E}[\Delta y_t].$$

Thus, the reference value is

$$\pi^* + \mathrm{E}[\Delta y_t] - \mathrm{E}[\Delta v_t] = \pi^* + \kappa_y \mathrm{E}[\Delta y_t],$$

which agrees with (3.16).

The Eurosystem suggests that "[d]eviations of current monetary growth from the reference value would, under normal circumstances, signal risks to price stability." Let us examine whether this is the case. Define the money-growth indicator

$$I_t^m \equiv \Delta m_t - \Delta m^*. \tag{3.17}$$

By (3.15) and (3.16) we get

$$I_t^m = (\pi_t - \pi^*) + \kappa_y(\Delta y_{t-1} - \mathrm{E}[\Delta y_t]) - \kappa_i \Delta i_{t-1} + \kappa_z \Delta z_{t-1} + \Delta \nu_t. \tag{3.18}$$

---

[36] This is an *unconditional* reference value, independent of the current state of the economy. Se appendix B for a discussion of a *conditional* reference value that can serve as a complex (and nontransparent) money-growth target, the fulfillment of which is equivalent to strict inflation targeting.

[37] That is, I assume that the unconditional and the conditional forecast of the growth of potential output are equal, $\mathrm{E}_t \Delta y_{t+1}^n = \mathrm{E}[\Delta y_t^n]$, and use $\mathrm{E}[\Delta y_t] = \mathrm{E}[\Delta y_t^n]$.

It is not clear what this money-growth indicator signals. Above all, it is not clear why it would signal "risks to price stability" or inflationary or deflationary pressure, except that the first term on the right side of (3.18) is the current deviation of inflation from the inflation target. However, this term is quite trivial and does not need a monetary indicator to be observed. Besides, it only contains very partial information; it is only one of several components of the optimal inflation-forecast indicator I_t^π, cf. (3.14). The money-growth indicator can be of either sign, independent of the sign of I_t^π or whether I_t^π is zero and no change in the instrument is required. Thus, the money-growth indicator I_t^m does generally not indicate in which direction the instrument should be changed. It mainly resembles a noisy indicator of $\pi_t - \pi^*$.

3.5.1 Strict money-growth targeting

If the money-growth indicator is meaningful, targeting money-growth, in the sense of minimizing the deviations of money growth from the reference value (that is, strict money-growth targeting), should not be an unreasonable policy. Then interest rate should be set so that the one-year-ahead conditional forecast of money-growth indicator equals zero,

$$I_{t+1|t}^m = 0.$$

Solving for the corresponding change in the interest rate gives

$$\Delta i_t = \frac{1}{\kappa_i}(\pi_{t+1|t} - \pi^*) + \frac{\kappa_y}{\kappa_i}(\Delta y_t - \mathrm{E}[\Delta y_t]) + \frac{\kappa_z}{\kappa_i}\Delta z_t - \frac{1}{\kappa_i}\nu_t. \tag{3.19}$$

Let us compare this to the optimal interest rate adjustment according to (3.12),

$$\Delta i_t = \frac{1}{\alpha_x\beta_r}(\pi_{t+1|t} - \pi^*) + \frac{\beta_y}{\beta_r}x_t + \frac{\beta_z}{\beta_r}z_t + \frac{\alpha_z}{\alpha_x\beta_r}z_{t+1|t} - (i_{t-1} - \pi_{t+1|t} - \bar{r}). \tag{3.20}$$

It is clear that these two reaction functions are quite different, and that setting $I_{t+1|t}^m = 0$, would normally create considerable variability in inflation, since (3.20) minimizes inflation variability. Note that this would be true even if velocity shocks were zero, $\nu_t \equiv 0$. Not only are the coefficients different, the reaction functions also involve different variables, above-trend output growth for monetary targeting ($\Delta y_t - \mathrm{E}[\Delta y_t]$) and the output gap for strict inflation targeting (x_t). Furthermore, they are of different form, in the sense that (3.19) is a difference form whereas (3.20) is basically a level form, see (3.7).

Thus, as Taylor [86] has observed, money-growth targeting implies a particular reaction function. However, in contrast to what is indicated by Taylor himself, this reaction function

may be quite different from the reaction function he is associated with and promotes; and even more so when more realistic demand functions are considered, see below.

A reaction function like (3.19) may seem attractive for the simple reason that it requires minimum information, in the sense that only parameters of the money demand function is needed (although those parameters may not be easy to estimate at the onset of EMU). However, this does not change the fact that this minimum information seems to be the *wrong* minimum information; it is simply inadequate to efficiently stabilize inflation. One aspect of this is that a lower interest rate sensitivity of money demand, a lower coefficient κ_i, would, everything else equal, require larger interest rate changes. The magnitude of κ_i is, of course, related to the controllability of money demand; Cabrero, Escrivá, Muñoz and Peñalosa [21] show that current estimates of potential aggregate money-demand functions for the EMU indicate that monetary aggregates would be considerably less controllable in the EMU than in Germany, even if the parameters were stable, and hence require larger interest changes to fulfill a given monetary target.

3.5.2 Other money-demand formulations

Furthermore, this inadequacy of monetary targeting is not due to the assumed adjustment lag for money demand. In order to stack the cards in favor of the money-growth indicator, assume that money-growth adjusts without a lag, so that

$$\Delta m_t = \pi_t + \kappa_y \Delta y_t - \kappa_i \Delta i_t + \kappa_z \Delta z_t + \Delta \nu_t.$$

The money-growth indicator would then be

$$I_t^m = (\pi_t - \pi^*) + \kappa_y(\Delta y_t - \mathrm{E}[\Delta y_t]) - \kappa_i \Delta i_t + \kappa_z \Delta z_t + \Delta \nu_t.$$

It is now directly affected by the current instrument and can hence not be observed before the instrument setting. It does not seem more informative about inflationary or deflationary pressure.

Solving for the interest rate change that makes the current money-growth indicator equal to zero gives

$$\Delta i_t = \frac{1}{\kappa_i}(\pi_t - \pi^*) + \frac{\kappa_y}{\kappa_i}(\Delta y_t - \mathrm{E}[\Delta y_t]) + \frac{\kappa_z}{\kappa_i}\Delta z_t + \frac{1}{\kappa_i}\Delta v_t. \tag{3.21}$$

This is similar to (3.19), except that current inflation is substituted for the one-year-ahead inflation forecast and that the velocity term is different. This reaction function is still inadequate, even in the absence of velocity shocks.

Considering a more realistic money-demand function does not make the money-growth indicator or the reaction function corresponding to strict monetary targeting more attractive. This is demonstrated in appendix C, which considers a typical empirical quarterly money-growth demand equation for western German M3 estimated by Gerlach [43]. Other similar money-demand equations, for instance those estimated and discussed in Issing and Tödter [52] or Wolters, Teräsvirta and Lütkepohl [91], would give similar results.

A general way of understanding the inadequacy of money-growth indicators and money-growth targeting is to recall the tradeoff between inflation variability and money-growth variability, illustrated in figure 2.1. Strict inflation targeting minimizes inflation variability around the inflation target, which leads to substantial money-growth variability. Strict money-growth targeting minimizes money-growth variability around the money-growth target, which can be chosen such that average inflation equals the inflation target, but money-growth targeting leads to considerable inflation variability around the inflation target. This is the case even if money-demand shocks were zero, for the simple reason that the reaction function that stabilizes money growth is manifestedly different from the reaction function that minimizes inflation variability (or minimizes a weighted average of inflation variability and output-gap variability, cf. figure 2.2).

3.6 Summary

There are many sensible aspects of the Eurosystem's October 13 announcement, for instance, the choice of the MUICP (which does not include interest-rate) as the main index, the focus on the Euro area as a whole, the warning about unavoidable and uncontrollable short-term volatility of prices, the emphasis on the medium term, and the statement that the use of a reference value "does not imply a commitment to mechanistically correct deviations over the short run." Still, the announcement and the strategy proposed have a number of conspicuous deficiencies.

First, the statement that the Eurosystem "will focus strictly on [the price stability] objective" is somewhat at variance with the medium-term emphasis, since the medium-term horizon can be rationalized by a concern about output-gap variability and hence correspond to flexible inflation targeting and a loss function like (2.2). Second, the strategy gives a prominent role for an essentially useless monetary reference value and monetary indicator, in analysis and communication. Third, although the strategy assigns a major role for an inflation forecast, and this forecast will, in practice, be crucial for policy decisions, the Eurosystem (for no good

reasons; cf. the quote from Duisenberg [28] above) does not intend to focus communication on this forecast, but instead intends to keep it secret and therefore completely nontransparent.[38]

Thus, as many commentators have noticed, the Eurosystem seems to have opted for a fair amount of ambiguity, relatively little transparency and considerable discretion. What could be the explanation for this choice? Potential explanations are a desire to maximize continuity with the Bundesbank and a general desire to maximize independence and discretion, and a belief that the latter is best achieved by avoiding transparency and accountability.

What could motivate a desire for a continuity with Bundesbank? Two possibilities are that (1) the Eurosystem, thereby, hopes to inherit some credibility from the Bundesbank and (2) the Eurosystem does not want to disappoint the German public.

But why would continuity with the Bundesbank be the best way of gaining credibility? Bundesbank's credibility seems to depend on its inflation record and not on its monetary targeting record. Given the many misses of the monetary targets, it appears that Bundesbank's credibility is *in spite of* the monetary-targeting framework, not thanks to it. It seems that Bundesbank's inflation record has brought respectability and (inflation-)credibility to monetary targeting rather than the other way around. Monetary targeting, measured as the frequency of hits, may not have been more successful in Germany than in many other countries where monetary targeting was eventually officially abandoned. This is certainly consistent with the conclusion above that Bundesbank, in effect, has pursued inflation targeting rather than monetary targeting.

If the above argument is correct, alleged monetary targeting need not give the Eurosystem any credibility per se. Instead, it must maintain any initial credibility, and gain any new credibility, by showing a good track record for inflation. The absence of an initial track record together with an ambiguous and intellectually weak strategy with irrelevant money-growth reference values and ad hoc explanations for unavoidable misses is unlikely to enhance credibility and more likely to diminish it.

Why would it be important not to disappoint the German public? It seems that the German public has been led to believe that monetary targeting is an essential part of Bundesbank's impressive inflation record. Furthermore, it appears that the German public's (still quite reluctant) acceptance of Germany joining the EMU is, to a large extent, conditional on the understanding that the Eurosystem will behave very similar to the Bundesbank. Announcing a strategy

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[38] Issing [51] has defended the Eurosystem's transparency and accountability with reference to the frequence and volume of information the Eurosystem intends to make public; the relevant aspect is not frequency and volume but content, though.

deviating too much from Bundesbank's official strategy would then be politically dangerous and endanger the Eurosystem's legitimacy with the German public. Perhaps the Eurosystem has already done as much as it dares, by giving the reference value less status than an official monetary target and even daring to mention the major role of an inflation forecast?

On the other hand, in the new political situation in Germany, with the new government being doubtful about Bundesbank and Eurosystem monetary policy, too much loyalty to Bundesbank's official framework may backfire. More transparent and direct communication, together with an intellectually stronger strategy, might be more effective, as further discussed in sections 5 and 6.

A desire to maximize independence and discretion by minimizing transparency and accountability is probably natural to any bureaucracy. However, this way of maximizing independence may be quite ineffective, since the political legitimacy of the Eurosystem may be weakened from a perceived lack of transparency and accountability. Furthermore, a lack of transparency makes it more difficult to rebut criticism. Whereas pragmatic monetary targeting may have been very effective for achieving and maintaining Bundesbank's independence in the 1970s, cf. von Hagen [90], the political situation for the Eurosystem is quite different and there is no reason why this should be effective now. As argued in section 6, transparency and accountability may be more effective for safeguarding the Eurosystem's independence and maintaining monetary stability in EMU in the long run.

4 Achieving price stability: Targets and the framework for policy decisions

This section tries to specify what the Eurosystem must do in order to successfully fulfill its objectives according to the Maastricht Treaty. The Eurosystem basically needs to translate the objectives into operational targets, and then find the framework for policy decisions that best achieves those operational targets.

4.1 Specifying the targets

The Eurosystem's operational definition of price stability has been interpreted above as a target range for the MUICP-inflation between 1 and 2 percent, with the interval's midpoint, $\pi^* = 1.5$ percent, as the inflation target. The Eurosystem's statement about the medium term needs to be operational. In line with other inflation-targeting central banks, the appropriate horizon for the inflation forecast to equal the inflation targets may be in the 1.5–2.5 years range, depending upon the nature of the disturbance and the initial deviation from the target. There will be

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short-term volatility of inflation, part of which the Eurosystem cannot control because of the unavoidable lags in the effects of monetary policy, part of which it should not attempt to control, because that would require drastic instrument adjustments likely to cause undue volatility of economic variables other than inflation. This corresponds to flexible inflation targeting, and a loss function like (2.2) with $\lambda > 0$.

After a few years, when some experience has been gained and the policy regime can be evaluated, the Eurosystem may want to reconsider its definition of price stability. In particular, with more experience of inflation targeting in the EMU and in inflation-targeting countries outside the EMU (perhaps after 5 or 10 years) the Eurosystem may want to consider *price-level* targeting rather than inflation targeting. It is often forgotten that inflation targeting implies base drift for the price level and hence a nonstationary price level. To call this price stability is indeed misleading. True price stability would require a stationary or at least a trend-stationary price level.[39]

4.2 The framework for policy decisions: How to set the repurchase rate

With an intertemporal loss function given by (2.1) and (2.2), the operational problem of the Eurosystem is formally, first, to find a feasible set Y^t of conditional forecasts of EMU inflation, $\pi^t \equiv (\pi_t, \pi_{t+1|t}, \pi_{t+2|t}, ...)$, the EMU output gap, $x^t \equiv (x_t, x_{t+1|t}, ...)$ and interest rate paths $i^t \equiv (i_t, i_{t+1|t}, ...)$, and, second, to choose $\{\pi^t, x^t, i^t\} \in Y^t$ so as to minimize (2.1) with L_t given by (2.2). The first element of the instrument path, i_t, is then the appropriate current instrument setting. This is equivalent to considering the conditional forecasts π^t and x^t as intermediate targets.

For this purpose, the Eurosystem must be able to calculate EMU-wide conditional inflation and output-gap forecasts. The Eurosystem must be able to calculate such forecasts for unchanged interest rates, for arbitrarily given interest rate paths, and for arbitrary reaction functions. It must then also estimate and determine policy multipliers, like $\frac{\partial}{\partial i_t}\pi_{t+T|t}$ and $\frac{\partial}{\partial i_t}x_{t+T|t}$. It must determine the essential information input needed in these forecasts, and collect the appropriate data.

The Eurosystem also needs to be able to incorporate both model and extra-model information, that is, different kinds of informal information, and to make judgemental adjustments. By its nature, the inflation- and output-gap-forecasting framework actually enforces a certain

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[39] Svensson [83] provides some discussion of price-level targeting and references to the literature.

amount of discipline on judgemental adjustments. In order to motivate why a particular piece of information should influence the current instrument setting, a convincing case must be presented why this piece of information will affect the inflation forecast or the output-gap forecast at a horizon at which monetary policy can have some effect. Without such a case, there is no reason for adjusting the instrument. Thus, "information needs to be filtered through the forecasts," in order to have any effect on the instrument.[40]

Several inflation-targeting central banks have translated this framework into a condition of the form

$$\pi_{t+T|t} = \pi^*,$$

where the horizon T is a function of current information. That is, an approximate first-order condition for a minimum of the loss function is that the conditional inflation forecast for the planned instrument path coincides with the inflation target for an appropriate horizon, where the horizon may depend on the state of the economy.[41] As discussed above in section 2, this may allow a crucial role for the inflation-forecast indicator

$$I_t^\pi \equiv \Pi_{t+T|t}(i_{t-1}) - \pi^*,$$

the conditional unchanged-interest-rate inflation forecast for this horizon. Then desired changes in the instrument are indicated by

$$\Delta i_t = \frac{1}{-\frac{\partial \Pi_{t+T|t}(i_{t-1})}{\partial i_t}} I_t^\pi.$$

4.3 Aggregated EMU forecasts vs. disaggregated national forecasts

As the October 13 announcement makes clear, the Eurosystem is concerned about the aggregate HICP for EMU as a whole, the MUICP. Should the Eurosystem then construct forecasts directly for EMU-wide aggregates, or should these aggregate forecasts be constructed from disaggregated national forecasts? Constructing forecasts for the EMU-wide aggregates directly could have the advantage that some national forecast errors might cancel. On the other hand, if the coefficients in the various aggregate supply and aggregate demand equations differ sufficiently, forecast

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[40] See Svensson [77] and [81] for further discussion.

[41] For instance, the horizon depends on the initial deviaton of inflation from the inflation target. See Svensson [81] for discussion of alternative approximate first-order conditions.

precision should be higher with disaggregated forecasts.[42] For instance, MUICP inflation fulfills

$$\pi_t = \sum_{j=1}^{J} \omega_t^{\pi j} \pi_t^j,$$

where π_t^j and $\omega_t^{\pi j}$ are HICP inflation in country j, $j = 1, ..., J$, and the weight of π_t^j in MUICP inflation π_t, respectively.[43] Then the T-period-ahead conditional inflation forecast is given by

$$\pi_{t+T|t} = \sum_j \omega_{t+T|t}^{\pi j} \pi_{t+T|t}^j$$

(where I disregard the conditional variance between $\omega_{t+T}^{\pi j}$ and π_{t+T}^j), and the policy multiplier $\frac{\partial}{\partial i_t} \pi_{t+T|t}$ will given by

$$\frac{\partial \pi_{t+T|t}}{\partial i_t} = \frac{\partial}{\partial i_t} \sum_j \omega_{t+T|t}^{\pi j} \pi_{t+T|t}^j = \sum_j \omega_{t+T|t}^{\pi j} \frac{\partial \pi_{t+T|t}^j}{\partial i_t},$$

(where I disregard the term $\frac{\partial}{\partial i_t} \omega_{t+T|t}^{\pi j}$). Since the policy multipliers $\frac{\partial}{\partial i_t} \pi_{t+T|t}^j$ for HICP inflation and other monetary policy responses in the different countries are likely to be different, it seems that it will be necessary to start from national conditional forecasts and use nationally disaggregated data. This also allows NCBs models and accumulated experiences in forecasting to be taken into account.

Parallel to this, the Eurosystem should, of course, experiment with aggregate models of the EMU transmission mechanism. Interestingly, Gerlach and Smets [44], Peersman and Smets [65] and Taylor [88] have already estimated and used variants of the Rudebusch and Svensson model [69] for the EMU area, with reasonable and encouraging results.

4.4 The transmission mechanism with a new common currency and a regime shift

The irrevocably fixed exchange rates, the new common currency and the new monetary policy regime seem to imply considerable uncertainty about the transmission mechanism of monetary policy and possibly shifts thereof. One issue is whether price- and wage-setting behavior, their inertia and their sensitivity to output gaps and unemployment will change. That is, will aggregate supply relations change? Another issue is whether the sensitivity to interest rate changes of the output gap, unemployment and general real activity to interest rates will change. That is, will aggregate demand relations change?

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[42] There is considerable evidence of differences in the transmission mechanism in the EMU Member States, for instance due to differences in the amount or the maturity of indebtedness, see for instance Begg [3], Dornbusch, Favera and Giavazzi [27] and Ramaswamy and Sloek [68].

[43] The country weights are computed every year and reflect the country's share of private final domestic consumption expenditure.

ECB statements, for instance Issing [50], have warned that expectations formation might change in the new circumstances, thereby making old relations unstable. I am not so convinced; it seems that inflation expectations are already rather low and stable in Europe, and absent major mistakes by the Eurosystem, there is no obvious reason why they should change significantly. Also, in the absence of realignments of their central parities, the core countries of the EMU already have effectively had the same monetary policy and similar inflation rates for several years.

The introduction of the Euro will arguably mainly have consequences in the financial sector, by increasing financial integration and financial competition, and by speeding up the rate of financial innovation. On the other hand, considerable financial integration and innovation have already taken place in several EU countries, following the liberalization and deregulation of financial markets. In some countries, there is already a fair amount of experience of monetary policy under financial innovation.

Given this, the effects on aggregate supply and aggregate demand relations may be less dramatic and more gradual, and the construction of reasonably reliable conditional forecasts less difficult, than what appears at first sight.

The most dramatic effects will obviously concern the denomination and substitutability of financial assets and monies. Consequently, the demand for the new currency is likely to be both more unpredictable and potentially more unstable than anything else. It goes without saying that this means that the information content of monetary aggregates becomes even smaller than normal in the short and medium run, perhaps even in the long run.

It may be sobering to recall that the introduction of inflation targeting in the United Kingdom, Sweden and Finland occurred under rather dramatic circumstances. The countries went through dramatic boom-bust experiences, very serious banking and financial-sector crises, and a dramatic sudden shift from a fixed exchange rate to a new monetary policy regime with a floating exchange rate. Furthermore, this occurred in a situation with very low credibility for monetary policy, with high and unstable inflation expectations, much above the announced inflation targets. At least for Sweden (where I am naturally more informed) the central bank's commitment to the fixed exchange rate was so strong, that there was no contingency planning. When the krona was floated in November 1992, the new inflation-targeting regime, which was announced in January 1993, had to be conceived from scratch (although of course with the benefit of the experiences mainly from New Zealand and Canada). It is not easy to rank dif-

ficulties and changes in the transmission mechanism, but it seems to me that the difficulties facing the Eurosystem are still not of the same magnitude as the difficulties that the central banks of United Kingdom, Sweden and Finland were facing. Since those central banks have, nevertheless, managed quite well, the odds for the Eurosystem may be quite good, provided it adopts a similar framework for policy decisions.

In particular, the Eurosystem seems to start in a situation when credibility is high, in the sense that inflation expectations are low and stable. Low and stable inflation expectations are likely to both cause considerable reversion of inflation towards the target and make the impact of the monetary policy instrument larger, thus making the achievement of the Eurosystem's targets correspondingly easier.[44]

4.5 The role of monetary aggregates

What is the role of different monetary aggregates in this framework? A rational role for monetary aggregates seems simply to be one set of indicators among many others, whose usefulness depend exclusively on their performance in predicting inflation. Thus, the issue is simply how useful current money growth is as an input in a two-year conditional inflation forecasts.

Under normal circumstances, the information content of money growth for inflation forecasts in the short and medium term seems to be quite low. In Estrella and Mishkin [31], money has essentially no predictive power beyond lags of inflation and output in forecasting inflation for the United States and Germany. Stock and Watson [74], examining inflation forecasts for the United States, also find low or no predictive power of money. These empirical findings are consistent with the current conventional wisdom with regard to the transmission mechanism, where money plays no role in the aggregate supply block determining inflation. Only in the long run does a high correlation between money growth and inflation result.

Under the special circumstances of the introduction of a new common currency, the demand

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[44] In order to see this, consider a forward-looking variant of the aggregate supply relation (3.3),

$$\pi_{t+1} = (1 - \alpha_\pi)\pi_{t+2|t} + \alpha_\pi \pi_t + \alpha_x x_t + \varepsilon_{t+1}.$$

where $0 < \alpha_\pi < 1$. With good credibility, the expectation term, $\pi_{t+2|t}$, will be close to the inflation target, π^*. Consequently, there will be automatic reversion towards the inflation target, which, in itself, makes inflation targeting easier.

With regard to the effect of the instrument, in more elaborate models of the aggregate demand equation than (3.1) (see Svensson [82] for an example and for references to the literature), aggregate demand is affected by a variable $\rho_t \equiv \sum_{\tau=0}^{\infty}(i_{t+\tau|t} - \pi_{t+\tau|t} - \bar{r})$ which is approximately proportional to a long real interest rate, r_t^T, according to $\rho_t \approx T(r_t^T - \bar{r})$, where T is the maturity of the real interest rate. With high credibility, inflation expectations $\pi_{t+\tau|t}$ are approximately equal to the inflation target, so $\rho_t \approx \sum_{\tau=0}^{\infty}(i_{t+\tau|t} - \pi^* - \bar{r})$ and potentially more strongly affected by expected future short nominal rates than when expectations are more variable.

for money is likely to be quite unpredictable and possibly very unstable, since the main structural changes are likely to occur in financial markets and in banking. Then the information content of money is, a priori, likely to be even lower than under normal circumstances. Thus, the uncertainty associated with the introduction of the new currency is an argument in favor of relying less, rather than more, on monetary aggregates.

4.6 An instrument rule instead of inflation targeting?

Could the Eurosystem apply a simple instrument rule, where the instrument is specified as a simple function of a few observed macrovariables. Frequently discussed instrument rules are those of Taylor [85] and Henderson and McKibbin [48]. Could the Eurosystem simply implement those? If it did, it would seem to be the first time in monetary history. In practice, no central bank follows an explicit instrument rule, in the sense of being committed ex ante to a particular instrument rule.

Such behavior would correspond to "interest-rate targeting," in the following sense. Let the period-loss function be

$$L_t = \frac{1}{2}(i_t - i_t^*)^2, \tag{4.1}$$

where i_t^* is a time-varying interest-rate target, a time-varying target-level for the central bank's instrument, a short interest rate. For instance, let the interest rate be given by a Taylor rule with interest smoothing,

$$i_t^* \equiv \rho i_{t-1} + (1 - \rho)[\bar{r} + \pi^* + 1.5(\pi_t - \pi^*) + 0.5x_t], \tag{4.2}$$

where $0 < \rho < 1$.

Clearly, a first-order-condition for minimizing (2.1) with the period loss function (4.1) is simply

$$i_t = i_t^*. \tag{4.3}$$

I believe it is obvious that no central bank is committed to a period loss function of this kind, with a corresponding interest rate target. Every central bank would be likely to resist any attempt to commit it to such behavior. No central bank reacts in a prescribed mechanical way to a prescribed information set. Every central bank uses more information than what the frequently suggested simple rules rely on. As further discussed in Svensson [81], the role of simple or complex instrument rules, as opposed to "targeting rules", is, in practice, never to commit the banks. Instead, they at most serve as base-lines, that is, as comparisons and frames of reference,

for the actual policy and its evaluation. Thus, even under normal circumstances, they are not a substitute for a framework for policy decisions. Under the special circumstances at the onset of the EMU, it would obviously be a specially formidable challenge to fix the parameters of a simple instrument rule, including the average real interest rate.

Even if central banks are not committed to follow a particular instrument rule, this does not exclude that central banks' behavior ex post may be similar to a simple instrument rule. If current inflation and the current output gap are approximate sufficient statistics for the state of economy and together with the instrument the major determinants of future inflation and output gap, a central bank which pursues flexible inflation targeting will react in systematic way to current inflation and output (for instance, as in (3.7) when $z_t \equiv 0$). But if additional variables are considered relevant determinants of future inflation and output gaps, such a central bank will also react to those (as in (3.7) when $z_t \neq 0$).

Interestingly, Gerlach and Smets [44], Peersman and Smets [65] and Taylor [88] have already estimated and used variants of the simple Rudebusch and Svensson model [69] for the EMU area. Their results indicate reaction functions similar to the Taylor rule are likely to perform reasonably well for the EMU. As for the United States, the reaction functions in Taylor [85] and Henderson and McKibbin [48], although not optimal, could thus perhaps serve as rough benchmarks, but not as rules, for the interest rates actually chosen by the Eurosystem.

5 Exchange-rate management

The EMU will be a more closed economy than the individual Member States of the EMU. What implications does this have for the exchange-rate management and the exchange-rate variability of the Euro relative to third-country currencies? This has been discussed at length in the literature, with regard to exchange-rate policy both relative to the currencies of the "outs," the countries in the European Union who are not members of the EMU (Greece, Sweden and the United Kingdom) and relative to the large currencies, the US dollar and the yen.[45] Here, I will briefly discuss two issues, the institutional framework for exchange-rate policy in the EMU and the role of exchange rate policy under inflation targeting in a relatively closed economy.

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[45] See, for instance, Persson and Tabellini [66] on the relation between ins and outs and Begg, Giavazzi and Wyplosz [5] on exchange rate policy relative to the rest of the world.

5.1 Exchange-rate policy in the EMU

The institutional framework for exchange-rate policy in the EMU is specified in the Maastricht Treaty. As is widely known, this constitutes a major flaw in the Treaty. As almost every undergraduate economics student would know (but, it seems, not many legislators), under free capital mobility, monetary and exchange rate policy cannot be separated. A particular monetary policy implies a particular exchange rate policy, and vice versa.[46] Nevertheless, whereas the Maastricht Treaty has assigned monetary policy decisions to the Eurosystem, it has assigned decisions about exchange-rate policy for the Euro to the Council of the European Union, in practice the Council of finance ministers of the EMU Member States.

More precisely, Article 109(1) in the Treaty (see appendix E) specifies that the Council, "acting unanimously, may conclude formal agreements on an exchange rate system for the [Euro]." By a qualified majority, the Council may "adopt, adjust or abandon the central rates of the [Euro] within the exchange rate system." Furthermore, such decisions can only be taken after "consulting the ECB *in an endeavour* [emphasis added] to reach a consensus consistent with the objective of price stability." This does not seem to provide much protection for the primary objective of price stability.

In addition, Article 109(2) specifies that, in the absence of an exchange rate system, the Council, acting by a qualified majority, "may formulate general orientations for exchange rate policy in relation to these [non-Community] currencies." Here, however, the primary objective seems better protected: "These general orientations shall be without prejudice to the primary objective of the Eurosystem to maintain price stability." Still, it is not clear whether it is the council of finance ministers or the Eurosystem who decides whether a particular general orientation is without prejudice to the primary objective or not.[47]

Thus, the Maastricht Treaty contains a conspicuous inconsistency and a potential threat to the independence of the Eurosystem, by giving governments a potential direct influence over

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[46] This is most easily seen from uncovered interest parity, where expected depreciation is related to the interest-rate differential between domestic and foreign interest rates. Thus, under free capital mobility, interest rates cannot be set independently of exchange rates, and vice versa.

[47] The new Riksbank Law in Sweden, to be passed the second time by the Swedish Parliament on November 25, 1998 (two passes with an election in-between required, since it involves a change in the constitution), provides a clever solution to this dilemma. Although the government gets to decide on the exchange rate system, the Riksbank gets to decide on the *implementation* of the exchange rate system, including central parities if there is a fixed exchange rate system. Thus, if the government tried to circumvent the objective of price stability written into the law by deciding on a fixed exchange rate system against a weak currency (or a basket of weak currencies), the Riksbank could still fulfill the price-stability objective by regularly revaluing the krona. Still, with regard to exchange-rate policy (but not with regard to the primary objective and the independence of the Riksbank) the new law is a deterioration, in that the previous law allowed the Riksbank, as one of the few central banks in the world, to decide on the exchange-rate system itself.

monetary policy. This need not be an innocuous inconsistency, with the rise of new social-democrat and/or leftist governments in the European Union (currently only Spain and Ireland have non-socialist or non-social-democrat governments), several of which have challenged the Eurosystem and called for lower interest rates and monetary policy aiming at increasing growth and employment. In particular, the new German chancellor and the finance ministers of Germany and France have been very vocal, the finance ministers also asking for exchange-rate target zones. This is certainly of some significance, given that the Maastricht Treaty gives the governments of the EMU the right to introduce such target zones. To quote the French finance minister, Strauss-Kahn [75],

> "... we should also monitor developments in exchange markets, and stand ready to express views on these developments, as well as *make use if necessary of the provisions of art. 109 of the Maastricht treaty.* There is in my view no contradiction between price stability and *the reasonable degree of exchange rate stability we should be aiming at*, but this will obviously require close co-operation between the ministers of the Euro-11, *whose responsibility for exchange rate policy is clearly stated in the treaty*, and the ECB, which has the duty of maintaining price stability. Or aim should be to make clear to our partners, and to the markets, that speculations about a 'European benign neglect' are entirely misplaced." [Emphasis added.]

> "A reasonable degree of exchange rate stability between the dollar and the euro will not only be required on bilateral grounds. It will also be a public good for the world economy, that will benefit to [sic] a large number of countries with diversified trade and financial relations. Europe and the US will have a joint responsibility in delivering this public good, and... we should discuss with our American friends how best to avoid the coexistence of two large currency zones, whose degree of openness is limited, giving rise to a kind of 'reciprocal benign neglect'."[48]

Thus, the classic time-consistency problem may not be dead in Europe. Short-run political manipulation of monetary policy cannot be excluded, either via political pressure on the Governing Council, or via decisions on exchange-rate management, either in the form of formal agreements with non-Community countries (although they do not seem very likely and require unanimity by the governments) or in the form of general orientations (which may be more likely and only requires qualified majority).

What is the best defence of the Eurosystem in the face of such an onslaught? I am afraid that the traditional instinctive reaction of many central bankers when attacked is to hide behind less transparency and more ambiguity. I believe this is an increasingly inappropriate and ineffective method of defense. Instead, I believe more transparency is a more appropriate defense and

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[48] Strauss-Kahn gave his remarks at a CEPR meeting in London. In a previous CEPR Occasional Paper, Begg, Giavazzi and Wyplosz [5] had stated that "most of the time the European and the US authorities will treat the dollar-euro rate with benign neglect."

probably also more effective. As further discussed in section 6, with clear targets, transparent explanations and, in particular, published inflation forecasts, the Eurosystem can explain its case more convincingly, and the critics are forced to be more specific. Do they want to change the targets; if so, do they understand the consequences? Do they believe that their own analysis and forecasts are better? Do they realize that exchange rate management could jeopardize the inflation target? Do they realize that flexible inflation targeting, to some extent, takes the stability of the output gap into account? More transparency would seem to help the Eurosystem win the debate and maintain its professional reputation and political legitimacy.[49]

Criticism of the Eurosystem and demands for a more expansionary policy can cause two unfortunate deviations from the appropriate policy. The Eurosystem may pursue a more restrictive policy to demonstrate its independence and attempt to gain or not to loose credibility. Or the Eurosystem may pursue a more expansionary policy than appropriate, in order to deflect criticism and avoid more substantial consequences. In both cases, it seems that high transparency would make it easier for the Eurosystem to stay the course and defend the appropriateness of its policy. Furthermore, high transparency would increase the incentive to stay the course, since deviations from the appropriate policy would be more easily discovered and the costs of associated losses of credibility would be higher.

5.2 Exchange-rate management under inflation targeting

Leaving the possibility of government interference in exchange-rate policy aside, what is the role of exchange-rate management under inflation targeting in a relatively closed economy like the EMU? In an open economy, the exchange rate channel is an essential part of the transmission mechanism for monetary policy. The exchange rate affects the target variables of monetary policy, inflation and the output gap, in different subchannels. There is a direct exchange rate channel via import prices to CPI inflation, with, normally, a relatively short lag. There are also indirect exchange rate channels. The real exchange rate affects aggregate demand, with a lag, which affects the output gap and, with another lag, inflation. The exchange rate also affects aggregate supply with a lag, since costs of production are affected by the costs of imported intermediate inputs, and wage compensation is affected by CPI changes caused by exchange rate changes.

The exchange rate is, in turn, affected by interest-rate differentials, foreign-exchange risk

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[49] I interpret the Swedish experience of the last few years as an example of how an open and transparent central bank essentially has won a similar debate with its critics.

premia, various foreign disturbances, including the credibility of the inflation target and related expectations of future exchange rates. Therefore, the exchange rate is important under inflation targeting in an open economy, both in transmitting the effects of interest setting and in transmitting various disturbances. Since some foreign disturbances are transmitted through the exchange rate, and the exchange rate affects CPI inflation, there is some element of stabilizing exchange rates under CPI-inflation targeting.[50] [51]

In a more closed economy, the importance of the exchange rate and the exchange rate channel is obviously smaller. Intuition suggest that exchange-rate variability is likely to be larger under inflation targeting in a relatively closed economy compared to a relatively open one, since the impact on the CPI will be less and the need to stabilize the exchange rate to stabilize CPI inflation will be less.[52]

Variable real exchange rates can, of course, also cause problems in a relatively closed economy, for instance, by causing variability in the relative size of the tradable and nontradable sectors. In principle, flexible inflation targeting need not be inconsistent with some weight on real exchange rate stability. In the same way as we can consider an output gap as in (3.2), we can consider a real exchange-rate gap, $q_t - q_t^n$, where q_t is the log real exchange rate in period t and q_t^n is a log "natural" real exchange rate, although estimating a natural real exchange rate may be more difficult than estimating a natural output level, for instance because it may be more variable. Given an appropriately estimated real exchange rate, flexible inflation targeting can be consistent with a period loss function of the form

$$L_t = \frac{1}{2}[(\pi_t - \pi^*)^2 + \lambda x_t^2 + \lambda_q(q_t - q_t^n)^2], \tag{5.1}$$

with some weight λ_q on stabilizing the real exchange rate. Of course, any bias in estimates of the natural real exchange rate, as for estimates of the natural output level, would potentially

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[50] More specifically, from results in Svensson [82] there seem to be a considerable amount of inherent exchange-rate stabilization under *flexible* CPI-inflation targeting. In contrast, under *strict* CPI-inflation targeting, when CPI inflation is the only target variable in the central bank's loss function, the loss function is minimized if CPI inflation is stabilized at the shortest possible horizon. Since the direct exchange rate channel seems to be the channel with the shortest transmission lag, this implies considerable reliance on exchange rate movements to stabilize CPI-inflation via compensating movements of import prices. This seems to result in high variability not only of nominal and real exchange rates but also the output gap and other variables than CPI inflation. Thus, with some weight on stability of other variables other than CPI inflation, strict inflation targeting appears to be an unsuitable policy. Flexible CPI-inflation targeting, with some weight on output-gap stability, implies targeting inflation at a longer horizon and seems to achieve a good compromise between stabilizing CPI inflation the output gap and the real exchange rate.

[51] A fixed exchange rate towards a foreign currency with low and stable inflation nevertheless appears to be an inefficient intermediate target for achieving low and stable inflation in relatively open economies, cf. Svensson [76], and probably more so in relatively closed economies. As mentioned, EMI [35] declares that a fixed exchange rate would be inconsistent with price stability for as a large an economy as the EMU.

[52] Still, as examined in Martin [59] and discussed in Begg, Giavazzi and Wyplosz [5] and Begg [3], the relation need not necessarily be monotonic.

result in a (positive or negative) inflation bias. A loss function like (5.1) could be equivalent to a loss function with some weight on stabilizing the output gaps in the tradable and nontradable sectors separately. The result of (5.1) would generally be some stabilization of the real exchange rate at the cost of some increased variability of inflation, the output gap, or both.

Although such inclusion of real exchange rate stability is not inconsistent with flexible inflation targeting, several difficulties are associated with it. The problem of estimating the natural real exchange rate and corresponding risks for average inflation bias has already been mentioned. Another is the transparency of the regime. Generally, transparency would tend to be smaller, and the amount of discretion larger, the more target variables there are in the loss function. It seems that the Eurosystem should probably avoid considering the real exchange rate too much (beyond its effect on EMU-wide inflation and the output gap), except perhaps if serious misalignment seem to result (to the extent that these can be identified and verified). This, of course, means that the real exchange rate still enters the loss function, although in some more complicated, nonlinear way, that need not affect monetary policy in normal times.

That flexible inflation targeting can, to some extent, incorporate some weight on real exchange rate stabilization does, of course, not make the problem with the control of exchange rate policy in the EMU less serious. For one thing, "stabilizing the exchange rate" is likely to mean either "preventing a real appreciation" or "achieving a real depreciation," for the finance ministers concerned in EMU, with all the accompanying inflation-bias consequences.

6 Transparency

6.1 The general role of transparency in monetary policy

What is the role of transparency in monetary policy? Consider the following three-part scheme for efficient delegation of monetary policy in a democratic society: (1) society (the collective of the citizens) announces goals for monetary policy, (2) the central bank receives instrument independence to pursue the goals without short-term political inference, and (3) the central bank is accountable to society for fulfilling the goals. Transparency of the goals and of the policy is then crucial for the accountability of the central bank, that is, for society's monitoring and evaluation of monetary policy. Transparency thus improves the central bank's incentives to pursue the announced goals. Transparency may also facilitate public understanding of monetary policy and make monetary policy more predictive, which may stabilize inflation expectations and increase

credibility of monetary policy. Improved public understanding and increased credibility is likely to facilitate the implementation of monetary policy and thereby contribute to the achievement of the goals.[53]

This view of the role of transparency is supported in recent work by Faust and Svensson [37]. Building on a previous work by Cukierman and Meltzer [25], Faust and Svensson examine the role of transparency in a model with a central bank that is tempted to deviate from an announced inflation target due to fluctuations in an idiosyncratic component of the bank's goals, exemplified by an employment target. The employment target is private information to the central bank and unobservable to the private sector. For instance, it represents changes in the composition of the Board, or the response of the bank to external pressure from various special interests. The private sector observes the macroeconomic outcome and imperfectly infers the central bank's employment target, which inference affects the bank's reputation in the private sector and corresponding private-sector inflation expectations.

Increased transparency allows the private sector to infer the bank's employment target with greater precision, which makes the bank's reputation and corresponding private-sector inflation expectations more sensitive to the bank's actions. This, in turn, increases the cost for the bank of deviating from the announced inflation target and pursuing its idiosyncratic employment target. Consequently, increased transparency induces the bank to follow the announced policy more closely. It simply provides an implicit commitment mechanism that reduces the bank's discretion to deviate from the announced policy.[54]

Faust and Svensson show that society almost always prefers more transparency to less, whereas the central bank often prefers less transparency to more, since this gives the bank more discretion to pursue its idiosyncratic goals with less cost to its reputation. An obvious conclusion from this finding is that society, rather than the central bank, should decide on the degree of transparency.

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[53] See section 4 on the benefits of increased credibility.

[54] McCallum [60] has expressed doubts about the relevance of discretion equilibria and argued that central banks can achieve the commitment equilibrium and "just do it," although without specifying a mechanism which would make such behavior consistent with an equilibrium. The results of Faust and Svensson [37] can be interpreted as suggesting such a mechanism.

6.2 Transparency of Eurosystem monetary policy

To what extent is the Eurosystem accountable, and how transparent should it be?[55] Article 105(1) in the Maastricht Treaty announces the goal for monetary policy. This corresponds to part (1) of the three-part delegation of monetary policy referred to above, if the Maastricht Treaty is interpreted as reflecting the European society. The Maastricht Treaty also specifies the Eurosystem's independence, corresponding to part (2) of the delegation. Since the announcement of the goal in article 105(1) is not sufficiently specific to be operational, the independence of the Eurosystem also includes its formulating operational goals consistent with the general goal. Whereas the Maastricht Treaty hence takes care of part (1) and part (2), it is unfortunately rather weak on part (3), the accountability of the Eurosystem. Article 109b(3) only specifies that the ECB shall present an annual report of the activities of the Eurosystem to the European Parliament (EP), the Council of the European Union and the European Commission, and that the members of the Executive Board may be heard by committees of the European Parliament, at the EP's or at their own initiative. Article 15 of the Protocol (No 3) on the Statute of the European System of Central Banks and of the European Central Bank in addition mandates an at least quarterly report on the activities of the Eurosystem (the Eurosystem has in effect announced the publication of a monthly bulletin). The Treaty imposes no specific transparency requirement on the Eurosystem *with regard to the contents* of the reports, and even includes a clause that can be used in order to reduce the transparency and accountability of the Eurosystem.[56] Thus, nothing prevents the Eurosystem from publishing voluminous reports with little actual content, a practice which is not unheard of among central banks. The Treaty leaves the impression that its drafters and signers have not understood, or not accepted, the role of transparency and accountability for creating the best incentives towards fulfilling society's goals. In contrast, New Zealand's Reserve Bank Act of 1989 contains detailed instructions for the mandatory 6-monthly *Monetary Policy Statements* by the Reserve Bank (Section 15), and the new Bank of England Bill mandates publication of minutes and voting records of the Monetary Policy Committee and a quarterly report, the *Inflation Report*. The Act and the Bill

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[55] For more discussion of accountability and transparency of the ESCB, see Begg [3], Begg, De Grauwe, Giavazzi, Uhlig and Wyplosz [4] and Bini Smaghi [9]. The forthcoming report by Blanchard, Gros, Emerson, Mayer, Saint-Paul, Sinn and Tabellini organized by CEPS, see the previous press release [46], is likely to deal with ESCB transparency and accountability. Buiter [17] and [16] has critized the ESCB with regard to its accountability and transparency and compared it unfavorably with Bank of England; Issing [51] and Duisenberg [28] had defended the ESCB.

[56] Article 10.4 in the Protocol No. 3 annexed to the Mastricht Treaty states: "The proceedings of the meetings [of the Governing Council] shall be confidential. The Governing Council may decide to make the outcome of its deliberations public."

are, of course, very explicit on the accountability of the banks.

The EP would seem to be the natural institution to which the Eurosystem should be accountable. The Maastricht Treaty already gives the EP the right to arrange hearings with the president and the other members of the Eurosystem's Executive Board. Tabellini [84] has provide a complete scheme according to which the EP could take the initiative and hold the Eurosystem accountable in an effective way, and in this way, organize the third part of the three-part delegation scheme more satisfactorily. Tabellini suggests that the EP should insist on the Eurosystem publicly announcing an inflation target and then hold the Eurosystem accountable for achieving that inflation target. After the Eurosystem's recent announcement of its definition of price stability, the 0 to 2 percent range and the 1 percent point inflation target can serve as this inflation target. Tabellini also suggests that the EP should discard any announcement of any intermediate monetary targets, which is obviously supported by the above criticism of the Eurosystem's proposed reference value. The EP should insist on receiving a periodic *Inflation Report*, similar to those produced by the inflation-targeting central banks. This report should explain and motivate policy decisions, describe current inflation trends, and include quantitative inflation forecasts. The EP should then evaluate monetary policy decisions by comparing the inflation forecasts with the inflation target. If current inflation deviates sufficiently from the inflation target in either direction, the EP should request a specific explanation from the Eurosystem and obtain assurances about the appropriate action. The reporting procedure could fruitfully be institutionalized through an agreement between the Eurosystem and the EP.

Tabellini's suggestion seems to be a very effective way of improving the accountability of the Eurosystem. The EP could thus establish a practice of close scrutiny of the Eurosystem, for instance with a committee of appointed experts that holds hearings with members of the Executive Board and the Governing Council, demands access to all information, and writes thorough regular reports evaluating the performance of the Eurosystem, including the appropriateness of its targets, framework for policy decisions and communication with outsiders and the general public. This could establish the accountability part of the three-part delegation in a satisfactory way. A great advantage with Tabellini's suggestion is that it could be done at the initiative and insistence of the EP, which should have an incentive in raising its profile and establishing itself as an effective surveillor of the Eurosystem.

What degree of transparency is required for efficient external monitoring and evaluations of Eurosystem policy? Minimum requirements seem to include (i) transparent targets and frame-

work for policy decisions, (ii) transparent motivations of policy decisions, and (iii) transparent explanations and discussion by the Eurosystem of outcomes relative to targets. With regard to (i), the Eurosystem has, especially after Duisenberg's [28] clarification, announced a clear definition of price stability, but it could be more transparent about the role of the output gap. With regard to the framework for policy decisions, the emphasis on the reference value for monetary growth is misleading and designed to reduce transparency. Instead, the Eurosystem should be explicit about the crucial role of conditional forecasts of inflation and the output gap. With regard to (ii), given the crucial role of conditional forecasts in forward-looking medium-term monetary policy, the best motivation of interest changes or the absence thereof is with reference to conditional forecasts, especially an unchanged-interest-rate inflation forecasts. Thus, the Eurosystem should publish their forecasts, and use them to motivate their policy. Motivations with reference to deviations between monetary growth and the reference value are likely to be misleading and reduce transparency. With regard to (iii), the most relevant deviation is the one between actual inflation and previous forecasts and the reasons for such deviations, whether they are due to unanticipated shocks or errors in data, models or judgement. Again, such deviations cannot be discussed without published forecasts. Transparency of Eurosystem monetary policy would seem to be well served by a regular publication, a *Price Stability Report,* modeled on the high-quality *Monetary Policy Statements* and *Inflation Reports* issued by the Reserve Bank of New Zealand, Bank of England and Sveriges Riksbank.

Increased transparency and published forecasts will reduce the discretion of the Eurosystem, more clearly reveal any errors and mistakes, and prompt its staff, Executive Board and Governing Council to work harder and better. This may be perceived as demanding and disadvantageous by the Eurosystem (but, of course, not by society). Still, there are some direct benefits from transparency for the Eurosystem. For instance, the debate on monetary policy may improve. Criticism of monetary policy may have to specify whether it refers to the numerical inflation target, the quality and the potential bias of Eurosystem forecasts, or something else. Respectable requests for lower interest rates must be accompanied by an argument why Eurosystem forecasts are biased, or why targets should be changed. The Eurosystem's target becoming widely accepted and its analysis becoming widely respected, should provide the best protection from short-run political pressure. In particular, the Eurosystem may more easily defend itself against the current onslaught of political interference on interest-rate setting and exchange-rate policy, see the discussion in section 5.1.

Should minutes be published? Effective monitoring and evaluation of monetary policy decisions requires knowledge about the amount and quality of information available for those decisions and the quality of the analysis and discussion preceding the decisions. This is a strong argument for the publication of the material available to the Governing Council and the minutes from its discussions. Only then can outsiders make sure that the analysis, discussion and decisions are of appropriate quality. Published minutes would also provide the best information about the decision procedure and the information taken into account, and this way make monetary policy more predictable.

An argument used against publishing minutes is that it might deter honest and frank discussion and possibly move such discussion outside the meetings. Non-attributed minutes should reduce or remove such deterrence. Sufficient personal integrity of and peer pressure among Governing Council members should prevent discussions from moving elsewhere.

Should voting records be published? Without voting records, it will be impossible for less informed outsiders to evaluate the quality of decisions by individual Governing Council members. Thus, to get incentives for good decisions, it seems that voting records should be published. Conspicuous deviations from the analysis and inflation forecasts will then not go unnoticed.

An argument used against publishing voting records is that they might increase national political pressure on national governors to adopt a national rather than an EMU-wide perspective. As noted by Buiter [17] and [16], however, national governments are likely to know the voting record in any case, so not publishing voting records would not protect national governors from secret pressure from national governments. Published voting records would then make it more difficult for such pressure to go unnoticed, in that conspicuous deviations from the message of received analyses and forecasts would be more easily spotted. Furthermore, transparent targets, analyses and forecasts together with published voting records should actually make it easier for national governors to defend their vote and resist pressure and therefore provide the best protection against national pressure.

Could there be too much transparency? From the point of view of the Eurosystem, transparency would more easily reveal mistakes in data, models or judgements, including imperfections in the Eurosystem understanding of the transmission mechanism. Although this may cause the Eurosystem some embarrassment at times, at the same time, it provides strong incentives for the Eurosystem to improve the quality of its analysis and its understanding. This is certainly a benefit for society. Could too much transparency give an exaggerated impression of

the precision in Eurosystem's forecast and its degree of control of inflation? Hardly, since the Eurosystem has very strong incentives to always emphasize the size of potential forecast errors and the limited degree of control, in order to avoid future embarrassment. It seems that too much transparency could only be counterproductive if it inhibits honest and frank discussions. Still, nonattributed minutes and honest reports of uncertainty and likely forecast errors need not inhibit such discussion.[57]

One might wish that central banks in general, and the Eurosystem in particular, would choose openness and transparency as the default case, and only resort to secrecy and obfuscation when the arguments for this are strong. Unfortunately, central-bank tradition is usually the other way around, with the few inflation-targeting central banks being very recent exceptions. In case the Eurosystem should chose secrecy and obfuscation rather than transparency and accountability, which, given the prominent role for the reference value, and the insistence on secret inflation forecast cannot be excluded, the best solution for outside monitoring, as suggested by Tabellini [84], is that the European Parliament, the general public and other outsiders evaluate monetary policy performance as if the ECB has an explicit inflation target. With unpublished conditional inflation forecasts, monetary policy can still be monitored by comparing reputable outside forecasters' forecasts with the inflation target. For instance, if the Eurosystem refuses to cooperate, the European Parliament can organize their own committee of forecasters as part of the evaluation of the Eurosystem. In any case, independent bodies of experts will play a crucial part in scrutinizing and evaluating ECB monetary policy, and fortunately, several such bodies have already been formed.[58]

7 Conclusions

After clarifications by the Eurosystem and the announcement of the reference value, only little ambiguity remains with regard to the definition of price stability. Still, it is strange that observers should have to piece together the definition from different statements, including the announcement of the reference value. Any remaining ambiguity with regard to the definition serves no purpose and should be eliminated. Instead of the ambiguous and asymmetric state-

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[57] It has been suggested that the time input required by a central bank's most qualified officials would be a significant cost of transparency. Still, the cost of hiring additional information officials for the necessary external contacts would be neglible compared to the tens of thousands of staff already employed by the ESCB. Besides, the top officials give many speeches and interviews already; the difference may be more in the substance than in the number of engagements.

[58] Three such independent bodies have been announced to date, organized by CEPR [4] in London, CEPS [46] in Brussels, and ZEI [92] in Bonn.

ment "below 2 percent", the Eurosystem should state as its inflation target the unambiguous and symmetric 1.5 percent, or the interval 1–2 percent, possibly with the addendum that this definition may be slightly modified when more evidence about the quality of the MUICP becomes available. Regardless of what the Eurosystem states, it seems that observers should currently interpret the Eurosystem as having an inflation target of 1.5 percent.

For successful policy, the Eurosystem needs to develop its capacity to make the "broadly based assessments of the outlook for future price developments," that is, to construct conditional inflation forecasts. It also needs to be able to construct output-gap forecasts, in order to evaluate consequences of its policy for output-gap stability and to find the appropriate gradualist and measured response to disturbances. If its conditional inflation forecast for unchanged interest rates overshoots or undershoots the inflation target at the relevant horizon, probably 1.5–2.5 years, the Eurosystem normally needs to adjust its repo rate.

The weights given to different indicators should be derived from their predictive power in the broadly based assessment of the outlook for future price development, that is, the conditional inflation forecast, as well as in the conditional output-gap forecast. There is no convincing case for giving money a primary role beyond that motivated by its weight in the broadly based assessment. Indeed, the deviation of money growth from the reference value is likely to be a redundant or even misleading indicator. Clarity and transparency of Eurosystem monetary policy is likely to be best served by letting the reference value fade into oblivion, unless new surprising evidence to the contrary is found. Observers should probably just disregard statements about the reference value.

Whether new information warrants an adjustment of the repo rate depends on whether the new information has effects on the conditional inflation and output-gap forecasts. That is, new information should be "filtered through the forecasts."

Thus, the conditional inflation and output-gap forecasts, including how they are affected by new information and disturbances, will be the decisive input in Eurosystem decisions about the repo rate. Therefore, clarity and transparency is best served if the Eurosystem in its announcements uses the conditional forecasts to motivate its policy. This in turn requires the forecasts to be published, with the corresponding assumptions and analysis. Otherwise, outside observers' evaluation of Eurosystem policy is made unnecessarily difficult. Without such publication, the information made available by the Eurosystem, in spite of its amount and frequency, will in effect have much less content. Observers will then to a large extent have to rely on outside

forecasts to evaluate policy. Publishing the forecasts also provides the best incentive for the Eurosystem to improve its understanding of the transmission mechanism and the quality of the forecasts, and this way to improve the quality of its policy.

Transparency and accountability would be best served by publishing non-attributed minutes of the General Council, including voting records, as is currently done by Bank of England and the Federal Reserve System (and will soon be done by Sveriges Riksbank).

Generally, it should be obvious that the Eurosystem should not set lower standards with regard to intellectual coherence, analysis and transparence than the best practice of current inflation-targeting central banks. Also, the European Parliament should have lots to gain from making its monitoring and evaluation of the Eurosystem current best practice.

[To be extended.]

A ECB Press Release, October 13, 1998

A STABILITY-ORIENTED MONETARY POLICY STRATEGY FOR THE ESCB

1. At its meeting on 13 October 1998 the Governing Council of the ECB agreed on the main elements of the stability-oriented monetary policy strategy of the ESCB. These elements concern:

   - the quantitative definition of the primary objective of the single monetary policy, price stability;
   - a prominent role for money with a reference value for the growth of a monetary aggregate; and
   - a broadly-based assessment of the outlook for future price developments.

2. As mandated by the Treaty establishing the European Community, the maintenance of price stability will be the primary objective of the ESCB. Therefore, the ESCB's monetary policy strategy will focus strictly on this objective. In this context, the Governing Council of the ECB has adopted the following definition: *"Price stability shall be defined as a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%."*

   Price stability is to be maintained over the medium term.

   The current rate of HICP inflation in the euro area is in line with this objective.

   Three features of this definition should be highlighted:

   - The HICP is the most appropriate price measure for the ESCB's definition of price stability. It is the only price index that will be sufficiently harmonised across the euro area at the start of Stage Three;

- by focusing on the HICP "for the euro area", the Governing Council of the ECB makes it clear that it will base its decisions on monetary, economic and financial developments in the euro area as a whole. The single monetary policy will adopt a euro area-wide perspective; it will not react to specific regional or national developments;

- an "increase (...) of below 2%" is very much in line with most current definitions adopted by national central banks in the euro area.

Furthermore, the statement that "price stability is to be maintained over the medium term" reflects the need for monetary policy to have a forward-looking, medium-term orientation. It also acknowledges the existence of short-term volatility in prices which cannot be controlled by monetary policy.

3. In order to maintain price stability, the Governing Council of the ECB agreed to adopt a monetary policy strategy which will consist of two key elements:

   - money will be assigned a prominent role. This role will be signalled by the announcement of a quantitative reference value for the growth of a broad monetary aggregate. The reference value will be derived in a manner which is consistent with - and will serve to achieve - price stability.

     Deviations of current monetary growth from the reference value would, under normal circumstances, signal risks to price stability. The concept of a reference value does not imply a commitment to mechanistically correct deviations over the short term.

     The relationship between actual monetary growth and the pre-announced reference value will be regularly and thoroughly analysed by the Governing Council of the ECB; the result of this analysis and its impact on monetary policy decisions will be explained to the public. The precise definition of the reference aggregate and the specific value of the quantitative reference value for monetary growth will be announced by the Governing Council of the ECB in December 1998;

   - in parallel with the analysis of monetary growth in relation to the reference value, a broadly-based assessment of the outlook for price developments and the risks to price stability in the euro area will play a major role in the ESCB's strategy. This assessment will be made using a wide range of economic and financial variables as indicators for future price developments.

4. This strategy underlines the strong commitment of the Governing Council of the ECB to its primary objective and should facilitate the achievement of this overriding goal. It will also ensure the transparency of the ESCB's decision-making and its accountability. Based on its strategy, the Governing Council of the ECB will inform the public regularly and in detail about its assessment of the monetary, economic and financial situation in the euro area and the reasoning behind its specific policy decisions.

B A conditional reference value

By (3.7) and (3.12), the optimal interest-rate adjustment for strict inflation targeting fulfills

$$i_t^* - i_{t-1} = \frac{1}{\alpha_x \beta_r} I_t^\pi. \tag{B.1}$$

Let $\Delta m_{t+1|t}^*$ denote the conditional forecast of money growth, conditional upon the optimal interest-rate adjustment (B.1). By (3.15) it is given by

$$
\begin{aligned}
\Delta m_{t+1|t}^* &\equiv \pi_{t+1|t} + \kappa_y \Delta y_t - \kappa_i (i_t^* - i_{t-1}) + \kappa_z \Delta z_t - \nu_t \\
&= \pi_{t+1|t} + \kappa_y \Delta y_t - \frac{\kappa_i}{\alpha_x \beta_r} I_t^\pi + \kappa_z \Delta z_t - \nu_t.
\end{aligned} \tag{B.2}
$$

We can trivially interpret $\Delta m_{t+1|t}^*$ as a *conditional* reference value, a conditional money-growth target. More precisely, suppose the interest rate is set such that the conditional money-growth forecast

$$\Delta m_{t+1|t} = \pi_{t+1|t} + \kappa_y \Delta y_t - \kappa_i \Delta i_t + \kappa_z \Delta z_t - \nu_t \tag{B.3}$$

equals the conditional reference value,

$$\Delta m_{t+1|t} = \Delta m_{t+1|t}^*.$$

Then the interest rate will obviously fulfill $i_t = i_t^*$, and the optimal policy is achieved.

This seems to be a round-about and nontransparent way of reaching the optimal reaction function (3.7), since the conditional money-growth target is simply defined as the money-growth forecast resulting from the optimal reaction function.

Let us also consider the corresponding current-money-growth indicator,

$$I_t^{mc} \equiv \Delta m_t - \Delta m_{t|t-1}^*. \tag{B.4}$$

From (3.15) and (B.2), we get

$$I_t^{mc} = \pi_t - \pi_{t|t-1} - \kappa_i [\Delta i_{t-1} - (i_{t-1}^* - i_{t-1})] + \nu_t = \varepsilon_t + \nu_t - \kappa_i (i_{t-1} - i_{t-1}^*). \tag{B.5}$$

This is just a noisy indicator of the deviation between last year's interest-rate setting and the optimal interest-rate setting. It is not a direct indicator of this year's optimal interest rate adjustment.

An appropriate indicator would be the deviation between the conditional unchanged-interest-rate forecast of money-growth ((B.3) with $\Delta i_t = 0$),

$$\Delta m_{t+1|t}^{**} \equiv \pi_{t+1|t} + \kappa_y \Delta y_t + \kappa_z \Delta z_t - \nu_t, \tag{B.6}$$

and the conditional money-growth reference value,

$$I_t^{m*} \equiv \Delta m_{t+1|t}^{**} - \Delta m_{t+1|t}^*.$$

By (B.2) and (B.6), this conditional money-growth-forecast indicator fulfills

$$I_t^{m*} = \frac{\kappa_i}{\alpha_x \beta_r} I_t^\pi,$$

and is hence proportional to the inflation-forecast indicator. By (3.12), the optimal interest-rate adjustment then fulfills

$$\Delta i_t = \frac{1}{\kappa_i} I_t^{m*}.$$

Still, it is apparent that this conditional money-growth-forecast indicator is redundant and that there is no reason to go beyond the inflation-forecast indicator (3.10) and (3.12).

C A more realistic money-demand function

Suppose we consider a more realistic money-demand function. Let me take the following empirical quarterly money-growth demand equation for the western German M3 (equation (4) in Gerlach [43], sample period 1971:1-1989:4),

$$
\begin{aligned}
\Delta m_t &= \kappa_0 + \kappa_y \Delta y_t - \kappa_i(i_{t-2}^{\mathrm{L}} - i_{t-2}) - \kappa_m(m_{t-1} - p_{t-1} - y_{t-1}) + v_t \qquad (\mathrm{C.1})\\
&= \underset{(10.40)}{0.09} + \underset{(2.78)}{0.17}\ \Delta y_t - \underset{(4.02)}{0.045}\ \kappa_i(i_{t-2}^{\mathrm{L}} - i_{t-2}) - \underset{(8.28)}{0.07}\ (m_{t-1} - p_{t-1} - y_{t-1}) + v_t,
\end{aligned}
$$

where m_t is the log money stock, y_t is log real GDP, i_t^{L} is the yield on long bonds, i_t is the yield on M3, p_t is the log GDP deflator, t-values are within parenthesis, and standard statistics fulfill $\bar{R}^2 = 0.54$, DW = 1.78, SEE = 0.0060. This equation has a two-quarter reaction lag to changes in the yield of M3.

What monetary indicator would Gerlach's money-demand function imply? First, we note that we can relate κ_0 to the reference value. Assume that average money-growth during the sample period has been consistent with the inflation target and hence equals the reference value. From (C.1) then follows

$$
\mathrm{E}[\Delta m_t] = \kappa_0 + \kappa_y \mathrm{E}[\Delta y_t] - \kappa_i \mathrm{E}[i_t^{\mathrm{L}} - i_t] = \Delta m^*, \qquad (\mathrm{C.2})
$$

where $\mathrm{E}[i_t^{\mathrm{L}} - i_t]$ is the average spread between the long bond rate and the yield on M3. Then we can form the money-growth indicator,

$$
\begin{aligned}
I_t^m &\equiv \Delta m_t - \Delta m^* \\
&= \kappa_0 + \kappa_y \Delta y_t - \kappa_i(i_{t-2}^{\mathrm{L}} - i_{t-2}) - \kappa_m(m_{t-1} - p_{t-1} - y_{t-1}) + \nu_t - \Delta m^* \\
&= \mathrm{E}[\Delta y_t] - \kappa_i\{(i_{t-2}^{\mathrm{L}} - i_{t-2}) - \mathrm{E}[i_t^{\mathrm{L}} - i_t]\} - \kappa_m(m_{t-1} - p_{t-1} - y_{t-1}) + \nu_t,
\end{aligned}
$$

where I have used (C.2). There seems to be no reason to believe that this indicator would be a good indicator of inflationary or deflationary pressure. The burden of proof should be on those promoting such money-growth indicators.

What reaction function would strict monetary targeting result in, with this money demand? Assume, for the sake of the argument, that conditions are favorable to monetary targeting, in that (1) the coefficients of the demand function are known with perfect certainty and remain fixed and stable, and (2) the yield of M3 can be completely controlled by the Bundesbank. Consider setting the yield of M3 such that a two-quarter money-growth forecast equals the money-growth target Δm^*,

$$
\Delta m^* = \Delta m_{t+2|t} = \kappa_0 + \kappa_y \Delta y_{t+2|t} - \kappa_i(i_t^{\mathrm{L}} - i_t) - \kappa_m(m_{t+1|t} - p_{t+1|t} - y_{t+1|t}).
$$

This results in the following equilibrium condition for the yield on M3 (this is an equilibrium condition rather than a reaction function, since definitely i_t^{L} and possibly $\Delta y_{t+2|t}$ on the right side are endogenous variables rather than predetermined ones)

$$
\begin{aligned}
i_t &= i_t^{\mathrm{L}} - \frac{1}{\kappa_i}\left[\kappa_0 - \Delta m^* + \kappa_y \Delta y_{t+2|t} - \kappa_m(m_{t+1|t} - p_{t+1|t} - y_{t+1|t})\right] \\
&= i_t^{\mathrm{L}} - \frac{1}{0.045}\left[0.09 - \Delta m^* + 0.17 \Delta y_{t+2|t} - 0.07(m_{t+1|t} - p_{t+1|t} - y_{t+1|t})\right].
\end{aligned}
$$

There seems to be no reason why this equilibrium condition should be desirable. It certainly looks very different from the reaction functions usually contemplated for stabilizing inflation and from the ones estimated for central banks, including the Bundesbank.

D EMU Monitor: Arguments in favor of monetary targeting

The EMU Monitor is a panel of European macro economists, currently Patrick Artus, Eward Bomhoff, Manfred Neumann, Alessandro Penati and Jürgen von Hagen. Its press release [92] of July 9, 1998, advocated monetary targeting rather than inflation targeting (or a mix between the two) for the ESCB. It presented five main arguments, which are scrutinized below.

1. *Monetary targeting means targeting trend inflation, whereas inflation targeting means targeting actual inflation. The the latter is overly ambitious.*

   This argument seems wrong, in that whether inflation targeting means targeting actual inflation or trend inflation depends on what index is targeted. Nothing prevents an index of trend inflation from being used. In fact, several inflation-targeting central banks use indexes of underlying inflation, which corresponds to trend inflation. In practice, inflation forecasts of actual inflation and trend inflation do not differ much.

2. *Monetary targeting requires less information input than inflation targeting.*

   This argument is wrong. Monetary targeting in practice means *pragmatic* monetary targeting. This requires the same amount of information as inflation targeting, since the framework for policy decisions is essentially the same as for inflation targeting.

3. *Monetary targeting provides a higher degree of transparency, since it is easier for ECB watchers to check monetary targets than inflation forecasts.*

   This argument also seems wrong. It is certainly easier to check Bundesbank's formula for calculating monetary targets than to check the validity of Bank of England's inflation forecast. But the difficulty with monetary targeting is that monetary targets are essentially irrelevant for monetary policy. Monetary policy decisions under pragmatic inflation targeting must take inflation forecasts into account; indeed, an inflation forecast in line with the inflation target is the reason why monetary targets are deliberately missed. Checking the reasons for misses of monetary targets then implicitly involves checking inflation forecasts. Since these are not published under monetary targeting, monetary targeting is inherently less transparent.

4. *Monetary targeting earns credibility by signalling continuity.*

   This argument also seems wrong. Bundesbank's credibility is due to its record of fulfilling its inflation target, and the credibility is *in spite of* its misses of monetary targets. Then it does not follow that announcing monetary targets, which will inevitably be missed, without first having a good inflation record, will gain credibility.

5. *Mixed strategies create confusion and weaken accountability.*

   This argument appears right. It is therefore somewhat ironic that ESCB has indeed announced a mixed strategy. However, pragmatic monetary targeting is, in fact, also a mixed strategy: inflation targeting in actions and monetary targeting in words.

E Article 109 of the Maastricht Treaty

1. By way of derogation from Article 228, the Council may, acting *unanimously* on a recommendation from the ECB or from the Commission, and *after consulting the ECB in*

an endeavour to reach a consensus consistent with the objective of price stability [emphasis added], after consulting the European Parliament, in accordance with the procedure in paragraph 3 for determining the arrangements, conclude formal agreements on an exchange rate system for the ECU in relation to non Community currencies. The Council may, acting by a *qualified* majority on a recommendation from the ECB or from the Commission, and *after consulting the ECB in an endeavour to reach a consensus consistent with the objective of price stability* [emphasis added], adopt, adjust or abandon the central rates of the ECU within the exchange rate system. The President of the Council shall inform the European Parliament of the adoption, adjustment or abandonment of the ECU central rates.

2. In the absence of an exchange rate system in relation to one or more non Community currencies as referred to in paragraph 1, the Council, acting by a *qualified* majority either on a recommendation from the Commission and after consulting the ECB or on a recommendation from the ECB, may formulate general orientations for exchange rate policy in relation to these currencies. *These general orientations shall be without prejudice to the primary objective of the ESCB to maintain price stability* [emphasis added].

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