Monetary Policy in the Early Years of EMU [*]

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1. INTRODUCTION

The goal of the present chapter is to provide an overview of the monetary policy framework of EMU and its operation during its first years of existence. Its overall assessment of the ECB's track record during this period is quite positive, in spite of the persistent overshooting of the inflation target range since mid-2000, and the large depreciation of the euro since its birth.

That good record notwithstanding, the chapter points out several aspects of the ECB strategy and the way it is communicated to the public that could be improved significantly and at little cost. The existing flaws in the strategy and its communication have not caused major damage so far, but there is no guarantee that such a lucky state of affairs may prevail in the future.

Two issues pertaining to the nature of the chapter are worth mentioning at the outset. The first has to do with its overlap with some of the existing literature on the ECB. Over the past two years, several papers and reports with an aim similar to this one have been published and widely debated.[1] As a result some of the points made in the present chapter may be found in the existing literature. Though the existence of some overlap on the issues

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[1] Prominent examples include the reports sponsored by the CEPR (Begg et al. (1998), Favero et al. (2000), and Alesina et al. (2001)), CEPS (2000), the European Commission (Buti and Sapir (1998)), and the ECB itself (Issing et al. (2001)). Svensson (1999) also constitutes a most valuable reference.

discussed and, quite often, on the viewpoint and diagnoses might be unavoidable, I have tried to provide whenever possible some complementary perspective or some additional evidence.

Second, the chapter is far from covering all the issues that the reader might expect. In addition to the usual time and space constraints, that feature reflects partly my own personal view regarding the issues that are really central and those that are not, independently of the attention that they may have drawn. Some of the issues left out include a discussion of the behaviour of the exchange rate for the euro, its role in international monetary and financial systems, EMU enlargement, and the suitability of the current formal accountability scheme. Fortunately, other chapters in the present volume focus on some of those issues.

The chapter is organized as follows. Section 2 reviews the mandate of price stability given by the Maastricht Treaty, discusses the attempts by the ECB to turn that mandate into an operational objective, and assesses the degree of success in meeting the latter during the first two years of EMU. Section 3 describes the ECB's two-pillar strategy, and discusses its empirical and theoretical underpinnings. Section 4 tries to uncover some of the factors behind the interest rate changes decided by the ECB, and the consistency of those decisions with the price stability objective. Section 5 summarizes and concludes.

2. THE PRICE STABILITY OBJECTIVE

In its article 105, the Treaty establishing the European Community (commonly known as the Maastricht Treaty) states that "the primary objective of the ESCB shall be to maintain price stability." The Treaty thus assigns a clear mandate to the newly created central bank, while leaving to the latter the formulation of a more precise and operational definition of the price stability objective, as well as the design of the strategy to be adopted to fulfil that objective. In the present section I review the ECB's operational definition and assess its potential usefulness and remaining ambiguities. The last subsection provides an evaluation of the ECB's degree of success or failure in meeting those objectives during the first two years of existence.

2.1. The ECB's Definition of Price Stability

Making use of its independence to decide how to fulfil that mandate, and in the context of the announcement of its "stability-oriented monetary policy strategy" in October 1998, the Governing Council tried to define precisely how it intended to interpret and make operational the price-stability mandate given by the Treaty.[2] Several elements of that announcement are worth reviewing and discussing here. First, the Governing Council stated that "…the ECB's monetary policy strategy will focus *strictly* on this objective [of price stability]" (emphasis added). By making that statement, the Council appeared to downplay the provision of the Treaty which requires that, "without prejudice to the objective of price stability" the ECB shall support the Community's general economic policies and its objectives. Among the latter, Article 2 of the Treaty mentions the objective of "a high level

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[2] See "A stability-oriented monetary policy strategy for the ESCB," ECB press release, 13 October 1998.

of employment and of social protection", an objective which could potentially come into conflict with that of price stability. But no reference whatsoever to any secondary objective of monetary policy was included in that strategy announcement.

In addition, a quantitative definition of price-stability was given as part of the announcement: "…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 %", with price stability according to that definition having to be maintained "over the medium term". This was accompanied by an explicit recognition of the "the existence of short-term volatility in prices which cannot be controlled by monetary policy".

The announcement of an explicit, quantitative definition of price stability --which the Fed, among other central banks, does not have– should certainly be welcome. It can only help improve accountability and anchor agents' expectations, especially given the lack of a track record on which to rely.   In addition to the quantitative specification of its inflation objective, the ECB formulation makes it very clear that its strategy and decisions will aim at stabilizing inflation in the euro area as a whole, irrespective of inflation developments in any of its constituent members.

Implicit in the ECB's definition of its objective there is a choice of a desired average of inflation of about 1 per cent (at least this is how most analysts have interpreted that announcement; but more on this below). To what extent does that represent an optimal decision in the context of the euro area? As is well known, the issue of the optimal steady-state rate of inflation is the subject of never-ending controversies among academics. The

factors that are invoked as potentially relevant for the determination of the optimal inflation rate are more numerous than one would desire. Some of those factors call for a positive rate of inflation; among them we have the possible existence of a long-run Phillips curve, the downward rigidity of nominal wages, optimal seignorage considerations, and the risks of a liquidity trap. On the other hand, the distortion caused by the existence of non-zero nominal interest rates and the resulting call for a policy that implements the Friedman rule, imply that a (moderate) rate of deflation may be socially optimal in the long run. Finally, the recent academic literature on monetary policy has focused on the presence of nominal rigidities in goods markets as the main distortion that monetary policy should aim to offset; in that context, it generally concludes that zero inflation (or even price level constancy) is optimal. It is not my intention to dig into this issue (and even less to suggest a definitive answer) in the present chapter. This is a complex issue, with the sign and magnitude of the welfare consequences of alternative choices depending on too many assumptions. A rather general implication of that literature, however, is that the welfare effects of small variations in steady-state inflation (in a neighbourhood of zero inflation) are likely to be small under most circumstances. Furthermore, several authors have used model simulation methods to show that, given a plausible magnitude of the shocks impinging on the economy as well as the steady-state real rate, the constraints imposed by the zero lower bound on nominal interest rates appear to be non-binding for steady-state levels of inflation at or above 1 per cent, that is, the one implicit in the ECB's price stability definition.[3] Finally, the choice made by the ECB in this particular dimension seems to accord with the practice of a large number of central banks in industrialized economies, and there seems to be no reason why it should

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[3] See, for example, Orphanides and Wieland (1998), King (1999) and Viñals (2000).

warrant a special scrutiny in the Euro area.[4] As discussed in the next subsection, there are other aspects of the ECB's definition of price stability which are likely to be more controversial.

2.2 Ambiguities and Questionable Choices

2.2.1 The Targeted Variable and the Horizon

The choice of the HICP as the price index in terms of which price stability is defined makes sense on several grounds. First, it is largely harmonized across countries in the euro area. Second, it is available on a monthly frequency and published in a (relatively) timely manner. Finally, it is a key input in many decisions by economic agents (for example, wage negotiations). Its main weakness as an indicator lies in the high short-term volatility of several of its components. Most importantly, the variation of some of those components falls clearly outside the scope of control by the monetary authority. This is the case, for instance, for components which may be strongly influenced by commodity prices set in global markets, weather conditions, or (as seen most recently) public health panics. In addition, the volatility in the price of imported goods reflects, to a large extent, fluctuations in the exchange rate that cannot be mitigated by the monetary authority without endangering the stability of domestic prices. Some of these considerations have led several central banks to define their inflation targets in terms of a measure of core or underlying inflation, or to

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[4] The midpoint of the target inflation interval (or the point inflation target, when it applies), ranges between 1 per cent and 2 per cent for most industrialized countries with explicit inflation targets. See Mishkin and Schmidt-Hebbel (2000)).

build in formal escape clauses that allow for misses of the inflation target range under particular circumstances (large exogenous supply shocks, typically).[5]

In spite of the medium-term orientation of its policy, the ECB does not appear to attach any significant value to core inflation or analogous measures for the euro area. Thus, for instance, the statistics section of its *Monthly Bulletin*, while quite comprehensive, does not list explicitly information on any core measure of inflation (even though that measure is constructed and reported monthly by Eurostat).[6] On the other hand, and as illustrated below, it appears that some information akin to core inflation is playing a role in the actual interest rate decisions made by the ECB. If that is the case, it is not clear why that role is not explicitly incorporated in the definition of price stability and the associated inflation target. Hence, the announcement of an explicit interval within which some year-on-year measure of core inflation should fall at all times (as opposed to a vague reference to some medium term) would improve accountability and facilitate communication of policy decisions.[7] In any case, I believe that the ECB should adopt a more transparent policy regarding the role assigned to core inflation or similar measures as input in their policy decision process.

The high (and largely exogenous) volatility of some components of the HICP, together with the time lag with which monetary policy is able to influence prices, have made it necessary for the ECB to emphasize that the inflation target is not intended to be met on a monthly or quarterly basis but, instead, "over the medium term". Furthermore, the ECB has often

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[5] The Bank of Canada and the Bank of Australia provide two examples of central banks that emphasize measures of underlying inflation as operational targets. The Reserve Bank of New Zealand is the only major central bank that has incorporated a formal escape clause into its regime. See, for example, Mishkin and Schmidt-Hebbel (2000)).

[6] By way of contrast, the discussion in the text has included a growing number of references to a measure: HICP inflation excluding unprocessed food and energy components.

justified such a gradualist approach to price stability as a way to avoid the high volatility of interest rates or output that would be necessary to keep inflation within target at all times, especially in the face of supply shocks, even though that motivation appears to be at odds with the announcement of a "strict focus" on price stability.[8] Unfortunately, no operational definition of what is meant by "the medium term" seems to have been provided by the ECB; on the other hand it is not clear that such a definition can be devised in a meaningful way and, if so, whether it would be desirable. In particular, it is not obvious how, under the current framework, one could verify whether the medium-term objective is being satisfied or not, given that the economy will unavoidably be subject to continual shocks which may recurrently pull it away from the chosen inflation target range.

A possible solution could involve extending the horizon over which HICP inflation is computed for accountability purposes beyond one year - perhaps up to the three previous years - and requiring that the resulting "moving average" measure remains within the pre-announced range *at all times*. An alternative way of making the medium-term orientation operational would involve the adoption of an explicit *inflation forecast targeting* scheme, along the lines of that in place at the Bank of England or at Sweden's Riksbank. Under that regime the forecast of year-on-year inflation is required to converge to the medium-term inflation target at a pre-determined speed or, alternatively, the inflation forecast at a given horizon of choice (for example, two years ahead) is required to remain at all times within the target range.[9] Of course, the implementation of an explicit inflation forecast targeting regime

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[7] A similar point is made in CEPS (2000).
[8] See Issing et al. (2001), chapter 3.
[9] See, e.g., Svensson (1999) for a description of inflation forecast targeting regimes and its intellectual underpinnings. Smets (2000) analyzes the properties of a regime where forecast inflation for a pre-specified horizon is constrained to hit the target at all times.

requires the periodic publication of the inflation forecasts, and an open discussion of the methodology, assumptions, and uncertainty associated with the latter. The publication of the "staff projections", beginning in December 2000, seems to be a move in that direction, despite the ECB's attempts to downplay their role in its decision-making and communication processes. Unfortunately, and as discussed in section 5, the presence of multiple shortcomings in the projections and their presentation suggests that there is still a long way to travel in that regard.

2.2.2. The Target Range

While the quantitative definition of price stability adopted by the ECB does not establish an explicit lower bound for the acceptable range of inflation, several ECB statements have suggested that the use of the term "increase" should be interpreted as signaling "…that prolonged declines in the level of the HICP index would not be deemed consistent with price stability".[10] As a result, most analysts and commentators have interpreted the ECB's inflation target range as being represented by the 0 – 2 per cent interval.

The reluctance by the ECB to state explicitly (and clearly) the lower bound for its inflation target range contrasts with the (implicit) choice of one such lower bound in the calculation of the 4.5 per cent reference value for M3 growth. In the communication of that reference value, the ECB has always emphasized its *consistency with the ECB's definition price stability.* Given the *explicit* assumptions of a trend real GDP growth between 2 and 2.5 per cent, and a trend decline in M3 velocity between 0.5 and 1 per cent, together with the 4.5 per cent reference value for M3 growth, it follows that *the inflation range deemed consistent with price*

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[10] See ECB Monthly Bulletin, January 1999.

stability is given by the interval between 1 per cent and 2 per cent. Under symmetry, the latter suggests a point inflation target of 1.5 per cent (as opposed to the 1 per cent midpoint target that one would associate with the widely accepted 0 – 2 per cent target range).[11] While the initial reference value for monetary growth and its underlying assumptions have already been confirmed several times, one cannot find in the ECB's discussions of the derivation of that reference value any explicit reference to the *implied quantitative definition of price stability*.[12] While it can be argued that no inconsistency is present since the ECB has never confirmed explicitly the zero lower bound for the inflation target, it is just very hard to understand why the ECB would fall short of clarifying this issue once and for all, given the clear contradiction between their operational definition and the conventional view. As far as I can tell, a logical way to proceed would be to announce that, given the current estimates of the likely measurement bias in HICP inflation, the floor in the definition of price stability will be (tentatively) specified to be 1 per cent, and that further revision of that bias may lead to a re-adjustment of that floor (and, presumably, of the ceiling as well!). That approach would be consistent with the derivation of the reference value for monetary growth, and would dispel at once the uncertainty about the true target range.

2.3. Price Stability: the Record in the Early Years

Any assessment of the performance of the ECB must necessarily focus on its success (or lack thereof) in fulfilling the mandate it was given by the Maastricht Treaty ("to maintain

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[11] See Svensson (1999) for an early criticism of that inconsistency.
[12] See ECB Monthly Bulletin of January 1999, December 1999, and December 2000, as well as a lengthy discussion in Issing et al. (2001).

price stability") and, more precisely, in meeting the quantitative specification of that mandate announced by the ECB ("a year-on-year increase in the HICP for the euro area of below 2% to be maintained over the medium term").

Figure 2.1 plots the annual rate of HICP inflation for the euro area over the period January 1999 - April 2002. The facts are well known by now. At the outset of EMU and until the summer of 1999, headline inflation in the euro area was quite stable around a value of 1 per cent. The last few months of 1999 saw a rapid increase in inflation, which exceeded its 2 per cent ceiling level for the first time in March 2000. After stabilizing for a couple of months a bit below that ceiling, it accelerated again in June 2000, and kept an upward (albeit somewhat erratic) trend until it reached its highest level so far (3.4 per cent) in May 2001. After that, it experienced a gradual decline until December 2001 (when the upper limit of 2 per cent was hit). Subsequently, and coinciding with the introduction of the euro changeover, inflation regained some ground again, remaining well above the upper limit of 2 per cent up to the final revision of the present chapter (May 2002).

[insert Figure 2.1 near here]

What does that inflation performance tell us about the ECB's success or failure in meeting its price-stability objective? In my opinion, the experience of the past two years provides a clear illustration of the shortcomings in the ECB's current definition of its objective, and which was discussed in the previous subsection. It is just impossible to answer unambiguously whether the objective has been met or not. On the one hand, year-on-year HICP inflation has overshot the upper bound of its target range in 9 out of 12 months during year 2000, 11 out of 12 in 2001. At the end of 2000, the ECB itself

acknowledged that HICP inflation was likely to remain above the 2 per cent ceiling for the next few months, in spite of the decline in oil prices and the appreciation of the euro. But sixteen months later inflation had not been tamed, and the ECB was warning about dangerous inflationary pressures again. But who is to decide whether that performance constitutes a violation of the ECB's commitment to maintain price-stability over the medium term? What is the medium term anyway? Indeed, one cannot find a statement by the ECB that may be interpreted as an acknowledgement of a possible failure in meeting its price stability objective. The persistent price increases above the 2 per cent ceiling are attributed to the impact of oil price developments on the energy component of the HICP, combined with the effects of unrelenting depreciation of the euro on the price of imported goods. Such (legitimate) hand waving is generally accompanied by calls on economic agents to see the recent inflation developments as temporary, and thus to avoid the likely second-round effects that would ensue if wages deviated from their moderate tendencies of recent years. But if the ECB is not to blame for the excess inflation of years 2000 and 2001, *what would have to happen in order to conclude that the price-stability objective that the ECB set for itself has not been attained?* What if the second-round effects lead to a protracted overshooting of the inflation target in year 2002 and beyond? Will such a development be dismissed by the ECB as falling outside its control?

The lack of an obvious answer to those questions must be viewed as a reflection of a less-than-perfect precision in the definition of the price stability objectives. If the ECB had defined its target inflation range in terms of a measure of core inflation that excludes the energy and unprocessed food components from the HICP, inflation would have remained

within target up to October 2001. After that date, and at least up to April 2002, the ECB would have failed to meet its objective. This is illustrated in Figure 2.2, which plots a measure of core inflation (HICP minus energy, food, alcohol and tobacco), alongside headline (HICP) inflation.

[insert Figure 2.2 near here]

3. The Two Pillar Strategy

3.1 The Two Pillars and its Critics

In October 1998, the ECB announced its "stability-oriented monetary policy strategy". In addition to the quantitative definition of the price stability objective (discussed in the previous section), the announcement contained a description of the strategy proper. The latter consists of two key elements, the famous two pillars. Thus, under the first pillar, "money will be assigned a prominent role…signaled by the announcement of a quantitative reference value for the growth of a broad monetary aggregate". In addition, and in parallel with that analysis of monetary growth, a major role is assigned to "…a broadly-based assessment of the outlook for price developments and the risks to price stability in the euro area…"; this is the second pillar.

The two-pillar strategy of the ECB and, in particular, the questionable rationale behind the first pillar, has been the subject of much controversy since its announcement. That debate has been strongly polarized. On one side, most academic researchers have criticized the two-

pillar strategy, while simultaneously pointing to its seeming practical irrelevance.[13] On the other side, the ECB has been on the defensive, trying hard to fend the criticisms and to make a case for the maintenance of its current strategy formulation (at least at the rhetorical level). The key points made by the critics can be summarized as follows.

- The short-run empirical link between money growth and inflation is weak, and is likely to change over time. There is no reason to assign a status to monetary aggregates above the one assigned to other indicators of inflationary pressures. All of them should be subsumed in the same pillar.

- Targeting monetary growth may lead to unnecessary fluctuations in output and inflation, especially (though not exclusively) in an environment with potentially large shocks to money demand.

- The coexistence of two pillars, yielding potentially conflicting signals, can only introduce noise to the monetary policy process, making the communication of policy decisions less transparent, and leading to confusion among the public.

- A strategy that aimed directly at targeting inflation (or its forecast) has proved successful in many countries, and is being adopted by more and more industrialized economies. Such inflation targeting schemes are easier to understand for the public, and policy decisions under them are easier to communicate. Under the price stability mandate given to the ECB, an inflation targeting regime would be the natural one to adopt.

- The first pillar seems to be neglected by the ECB itself when making its policy decisions. Why not just dump it, instead of keeping all the expensive rhetoric and unnecessary

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[13] The academics' view on the ECB strategy (as well as other aspects of its operation) can be found, among other places, in the annual report series "Monitoring the European Central Bank" published by the CEPR. The 2000 and 2001 issues (together with their midyear updates) provide a critical appraisal of the ECB strategy. Other reports or papers where a rather critical view of the ECB strategy is put forward include CEPS (2000) and Svensson (1999).

communication rituals, as well as the sizeable real resources that go into scrutinizing monetary aggregates and writing reports on those?

3.2 The ECB's Rationale for the First Pillar

It goes without saying that the ECB has taken note of those criticisms, and has tried hard to address them through different means. Yet, it does not appear to be much convinced of their value, and has not said or done anything that could signal a (presumably gradual) change of heart. The only exception may have been the publication of the staff projections - the efforts to downplay them notwithstanding. To the ECB's credit, it is only fair to acknowledge that some of the criticisms have tended to oversimplify the nature of the first pillar, and have often ignored the efforts by the ECB to explain what it means and - most importantly - what it does not. In particular, the ECB has repeated on several occasion that the first pillar should not be interpreted as implying a monetary targeting regime, that is, a commitment to respond mechanistically to any deviations of money growth from its reference value.

The ECB Monthly Bulletin of November 2000 contains, as far as I know, the most elaborate attempt so far to justify the two-pillar strategy, or what amounts to the same thing, the existence of the first pillar.[14] Some of the arguments appear to be new or, at least, so seems to be the emphasis placed on them.

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[14] I am not aware of many criticisms from the academic community of the second pillar and its pragmatic formulation adopted by the ECB. The only exception, often cited by the ECB itself, is University of Bonn's ZEI 's EMU Monitor group.

The ECB's case for the two-pillar approach may be summarized as follows.[15] Monetary policy decisions have to be made in an environment characterized by uncertainty which is multidimensional: it affects data, parameter values, sources of shocks, and most importantly, the way in which the economy functions (i.e., the "true model"). It is thus important that the framework reflects that uncertainty, and hence that it does not rely on a single paradigm. The two pillars represent two alternative paradigms. In the ECB's words "the first pillar can be seen as representing a group of models which embody a view of price level determination that accords an important role to money". The emphasis on those models would be justified by "the general consensus that inflation is ultimately a monetary phenomenon". In that context, the second pillar would reflect a range of alternative models which "emphasise the interplay between supply and demand and/or cost pressures." The ECB also recognizes the difficulties of combining both paradigms into a single analytical tool; in particular, it takes account of the difficulties "[in integrating] an active role for money into conventional real economic models". Instead, "the information and analyses produced on the basis of one methodological perspective are always cross-checked against information and analyses produced on the basis of the other perspective". That dual approach, argues the ECB, is also reflected in the way monetary policy decisions are presented to the public, thus making the communication process correspond closely to the framework used to organize the analysis underlying the monetary policy decisions. That close correspondence between analysis and presentation makes the ECB's communication policy highly transparent: in its own words, possibly "one of the most transparent in the world".

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[15] All quotes taken from ECB Monthly Bulletin, November 2000.

In the next subsections I try to argue that the ECB's case for preserving the first pillar is a weak one, on both theoretical and empirical grounds. In addition, I discuss some empirical evidence that suggests monetary aggregates may not even deserve a significant role on the basis of their informational content (and, hence, as second pillar indicators). Consequently, their potential role in a hypothetical single-pillar strategy that would result from an eventual merger of the two pillars - a solution proposed by many critics - might very well be small.

3.3 Inflation as a Monetary Phenomenon: what it means and what it does not

At the root of the prominent role assigned to money in the ECB strategy, there is the deeply held and often repeated belief that *inflation is, fundamentally, a phenomenon of monetary origins.*[16] In addition to being well rooted in economic theory, the long run relationship between money and prices is, according to the ECB, "one of the most remarkable empirical regularities in macroeconomics," and "the subject of widespread consensus in the economics profession."[17]

It is hard to disagree with the previous observation, and very few economists would. The theoretical underpinnings of the long run relationship between money and inflation can be easily summarized using a simple specification of money demand and the corresponding money market clearing condition.

$$m_t - p_t = \sigma y_t - \eta i_t \qquad\qquad (2.1)$$

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[16] See, e.g., ECB Monthly Bulletin, November 2000, and Issing et al. (2001), chapter 4.
[17] ECB Monthly Bulletin, November 2000.

where m_t is the (log) money supply, p_t is the (log) price level, y_t is (log) output and i_t is the nominal interest rate. A condition like (2.1), possibly augmented with an exogenous shock to money demand, holds in most monetary models (at least in the long run).

Consider next a steady state (or balanced growth path) in which output grows at a constant rate Δy^* and where the real interest rate and inflation π (and, hence the nominal rate) are constant. Taking first differences on (1) we have:

$$\pi = \Delta m - \sigma \, \Delta y^* \qquad\qquad (2.2)$$

Hence, and as long as one takes the trend growth of output Δy^* as being determined by non-monetary factors (a plausible hypothesis), inflation should respond one-for-one in the long run to exogenous changes in money growth. That prediction appears to have a rather strong empirical support, especially from cross-country analyses in which steady-state values of inflation and money growth are approximated by their long-term averages.[18]

But the robustness of the long-run link between money growth and inflation and the consensus around it (both of which I take to be large) do *not* justify, I would like to argue, assigning a monetary aggregate a special status in the monetary policy strategy of a central bank, not even one that has price stability as a primary goal. The reason is simple: condition (2.2) is a long-run equilibrium relationship, which will hold *independently* of the monetary regime in place. In other words, achieving the desired inflation objective does not require paying special attention to the evolution of monetary aggregates. What is really important is that the monetary policy framework is designed in a way consistent with the attainment of a given average inflation. Given that, the specific rule or strategy may be chosen on the basis

of other considerations (for example, minimization of inflation volatility) among the large range of options consistent with the long-run objective.

In order to convey that point more clearly, let me use two key macroeconomic identities linking real and nominal variables. Let the (log) real exchange rate be defined, following convention, as $q_t \equiv e_t + p_{w,t} - p_t$ where e_t is the nominal exchange rate and $p_{w,t}$ is the price level in the rest of the world, both expressed in logs. Taking first differences, and assuming exogenous steady state values π^*_w and Δq^* for world inflation and the real exchange rate trend we have:

$$\pi = \Delta e + \pi^*_w - \Delta q^* \tag{2.3}$$

which implies a one-to-one relationship between inflation and the rate of depreciation of the exchange rate. Hence, an interpretation of relationship (2.3) analogous to the one given to (2.2) would warrant the assignment of a prominent role to exchange rate variations, as well as the need to monitor its deviations from some reference path.

A similar argument applies to the well known identity $r_t \equiv i_t - \pi^e_{t+1}$ defining the expected real rate r_t as the difference between the nominal rate and expected inflation π^e_{t+1}. In a long-run steady state with a constant real rate r^* (determined by non monetary factors) the relationship

$$\pi = i - r^* \tag{2.4}$$

would hold, implying a one-to-one relationship between inflation and the nominal interest rate. Since that relationship is certainly not less robust than (2.2), why not assign a prominent

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[18] See McCandless and Weber (1995).

role to the nominal interest rate, and subject its deviations from a publicly known reference value to careful analysis?

The previous examples are just meant to recall the existence of a number of relationships between nominal variables that are likely to hold in the long run, at least in the very broad class of models whose equilibrium steady state exhibits the classical dichotomy between nominal and real variables. But the existence of such relationships does not seem to provide, in itself, a rationale for using one variable over another as a nominal anchor, paying special attention to the evolution of one of them, or choosing a particular monetary policy rule.

The empirical evidence does not seem to signal a special status for money either. In order to illustrate this, I look at simple correlations among average inflation, money growth, exchange rate depreciation (against the US dollar), and nominal interest rates over the nine-year period 1989-97 for a large set of OECD countries.[19] Figures 2.3, 2.4, and 2.5 display a scatterplot of average inflation against the average value of each of the three other nominal variables for the sample of countries considered. The data span (nine years) arguably corresponds better to the medium-term horizon for monetary policy emphasized by the ECB than the longer span used in most other cross-country studies.

[insert Figure 2.3 near here]

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Not surprisingly, the relationship between the three variables across industrialized economies over the nine-year period considered is positive and strong. The R-squared statistic is quite high in the three cases. But nothing in the graphs or the associated statistical analysis suggests a particularly strong link between inflation and money growth, as opposed to inflation and either of the two other variables considered. In fact, the R-squared for the inflation-money growth regression is considerably smaller than that in the two other regressions, and its regression coefficient displays the largest deviation from unity.

Again, it is important to emphasize that there is no pretence of giving any causal interpretation to the previous evidence; it is shown only to illustrate the strength of the link among those variables in the medium run. From that viewpoint, the statistical relationship between money growth and inflation seems weaker than is often claimed, even over a horizon that goes beyond what the ECB (presumably) thinks of as the medium term.

3.4 On the Theoretical Underpinnings for the First Pillar

The various criticisms aimed at the two pillar strategy have led to a significant effort by the ECB to explain more carefully the rationale behind its heterodox strategy.[20] As a result of that clarification process it has become clear that the two pillars correspond to what the ECB views as two competing paradigms of the inflation process. Under that view, the first pillar "[represents] a group of models which embody a view of the price level determination

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[19] The data were obtained from OECD Historical Statistics (1999) publication. Each graph includes all countries for which data are available, except Turkey.
[20] See ECB Monthly Bulletin, November 2000.

that accords an important role to money." The second pillar (the broadly based assessment), on the other hand, encompasses the range of models "which emphasise the interplay between supply and demand and/or cost pressures." Unfortunately, the ECB is not very explicit when it comes to providing specific examples of models that would fall in either category. From the discussion of ECB documents, one feels pretty confident in relating the "second pillar paradigm" to models in the literature which emphasize imperfect competition in goods and/or labour markets as well as nominal rigidities. Independently of the extent to which they are built on rigorous microfoundations, changes in the aggregate nominal variables result from the desire by firms and/or workers to adjust their wages/prices in response to changes in cost or demand conditions in goods and/or labour markets. In their reduced form, those forces can generally be summarized by means of some sort of Phillips curve equation, which links inflation to some indicator of excess demand or deviations of output from potential. The vast majority of large macroeconometric models as well as dynamic optimizing models with nominal rigidities developed in recent years - and which have proved extremely useful as tools for the evaluation of alternative monetary policies - fall within that category.[21]

It is much harder, however, to think of a class of models that would attribute a more direct role to money in the determination of inflation and which central bankers could view as useful. Classical monetary models, in which the aggregate price level adjusts continually in order to clear the money market given a money supply (exogenously determined by the central bank) and the equilibrium values of other relevant real variables (determined, at least to a first approximation, independently of monetary considerations) would certainly qualify

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[21] See the models used in the contributions to Taylor (1999).

as first pillar models. But one finds it hard to believe that any such "frictionless" models would be part of a central banker's toolkit, since the near-irrelevance of monetary policy is one among their key properties.

In their recent monograph, Issing et al. (1999) point to the version of the P-star model analysed in Gerlach and Svensson (2000) and Trecroci and Vega (2000) as an example of a framework that allows for a direct link between money and inflation, and hence one that may provide a rationale for the emphasis on monetary aggregates and inflation. The inflation equation in that framework can be written as

$$\pi_t = \pi_{t-1}^e + \alpha_m (\widetilde{m}_{t-1} - \widetilde{m}_{t-1}^*) + \alpha_z z_t + \varepsilon_t$$

where z_t iis a vector of exogenous variables,

$$\widetilde{m}_t - \widetilde{m}_t^* \equiv (m_t - p_t) - (m_t - p_t^*) \equiv -(p_t - p_t^*)$$

is the "real money gap" and $p_t^* \equiv m_t + v_t^* - y_t^*$ represents the price level that would be observed given the current money stock, conditional on output being at its current potential level y_t^* and velocity at its long run equilibrium level v_t^*. Both the Gerlach-Svensson and Trecroci-Vega papers find evidence, using quarterly euro area data and alternative assumptions on inflation expectations, of significant explanatory power of the real money gap for euro area inflation, though they show it is by no means a sufficient statistic.

Do those results provide much support for the first pillar? None, as far as I can tell. The expression "real money gap" happens to share one word with the "deviations of money growth from a reference value" emphasized by the ECB's strategy, but it is conceptually very

different. One is a real variable, expressed in levels; the other a nominal variable, in growth rates.[22]

Most strikingly, as emphasized in Gerlach and Svensson (2000) and confirmed in the analysis of Trecroci and Vega (2000), M3 growth for the euro area does not seem to have any marginal forecasting power for future inflation. That result appears to be robust to the particular information set used, and contrasts with the evidence of Granger causality from both the real money gap and the output gap to inflation.[23]

The latter evidence would seem to call into question even a more limited role for monetary aggregates than the one currently envisioned in the ECB's strategy, and which would consist in being *one among several* indicators used in the context of the second pillar to assess the outlook for inflation. In other words, the existing evidence even seems to question the "informational content" of monetary aggregates.[24]

This is certainly a stronger conclusion, which may deserve further careful scrutiny in the future, especially when sufficient data generated under the EMU regime becomes available. We don't know what the final verdict will be on the usefulness of monetary aggregates to help predict inflation in the euro area. Furthermore, it may very well be the case that some of the components and counterparts of M3 (in particular some components of financial

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[22] The previous point can be made more explicit by using the definition of *P*-star, and the simple money demand specification (2.1) to rewrite the inflation equation as:

$$\pi_t = \pi_{t-1}^e + \alpha_m \left(y_{t-1} - y_{t-1}^* \right) - \alpha_m \eta (i_{t-1} - i^*) + \alpha_z \, z_t + \varepsilon_t$$

which is just a conventional Phillips curve augmented with an interest rate term, with no explicit role left for any monetary aggregate.

intermediaries' balance sheets) may eventually prove helpful in anticipating inflation developments, as suggested by Altimari (2001). But one thing is clear: in spite of the prominent role attributed to money in the ECB's strategy, its predictive power for inflation had not been firmly established empirically at the onset of EMU.

In contrast with the lack of empirical support on the information content of monetary aggregates for inflation, empirical money demand models for the euro area seem to point to the existence of a relatively stable, well behaved long-run money demand function for M3. According to the ECB, that evidence can be seen as providing additional support for the role that M3 plays in the monetary policy strategy. It is well understood by now, however, that even in an ideal world lacking any short-run money demand disturbances, there is no reason why a policy that attempted to stabilize money growth around the level consistent with the desired steady-state inflation target would dominate other policies in terms of its inflation stabilization or other desirable properties, as well as more general welfare considerations. That view is supported by the findings in the recent monetary economics literature based on calibrated dynamic optimizing models with nominal rigidities, which provide very little support for anything that may come close to monetary targeting. Among the large number of recent papers devoted to the evaluation of the welfare consequences of alternative monetary policy rules in the context of those models, simple rules à la Taylor in which the monetary policy instrument - the short term interest rate - responds in a systematic way to deviations in inflation (and possibly other variables) from its target value tend to dominate rules that stabilize monetary aggregates or the nominal interest rate, of which strict monetary

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[23] Altimari (2001) questions that conclusion on the basis of econometric estimates which suggest that growth rates of monetary aggregates may have some independent predictive power for horizons beyond two years.

targeting and the Friedman rules are limiting cases. [25]   The logic behind that result is straightforward: the changes in interest rates that may be needed in order to support a desired path for output and the aggregate price level will generally require variations, possibly persistent, in the growth of monetary aggregates. The stability of money demand should thus not be seen as a guarantee for the desirability of monetary policies that focus on monetary aggregates.

3.5 Second Pillar News: the Publication of Staff Projections

The publication of the "staff projections" on inflation and other macroeconomic variables, beginning in December 2000, has probably been the only development over the first two years in the ECB's life that may be interpreted as signalling, however faintly, a slight change of direction that might lead eventually to a transition to the fully-fledged inflation targeting regime.

The ECB's staff projections should be interpreted as *conditional* forecasts, that is, forecasts conditional on certain assumptions regarding the path of interest rates, exchange rates, oil prices, and so on. In particular, they assume that the interest rate remains unchanged over the projection horizon at its current level. It is clear, as stressed by the ECB on multiple occasions, that such a projection is likely to differ from an optimal forecast, since the latter will take into account the anticipated changes in interest rates, among other variables, that

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[24] A similar result was obtained using US data in Estrella and Mishkin (1997).
[25] See, e.g., Gali (2000), Galí, López-Salido, and Vallés (2000), Ireland (2000), and Rudebusch and Svensson (1999).

might result from the ECB's evaluation of the current economic conditions and the ensuing policy actions.

As emphasized by many authors, the construction and publication of conditional inflation forecasts may play a central role in an inflation targeting regime and, in particular, in versions of that regime that use inflation forecasts as an intermediate target.[26] For those who would favor the transition to such a regime, the news about the publication of the projections has been clearly welcome. Yet, there are several aspects in that policy that remain unsatisfactory and that raise some concerns. Let me briefly summarize them.

First, the ECB itself does not seem to assign much value to those projections and has clearly tried to downplay them publicly. To begin with, the projections are only available every six months, a frequency that would seem to be too low for them to be useful input in the monetary policy decision-making process. That paucity is explained by the relatively complicated procedure followed to obtain them (the "projection exercises", carried out in the Spring and Autumn), involving an ECB working group and NCB experts operating under the supervision of the ECB's Monetary Policy Committee. The projections combine information from a variety of models, including NCB individual country models, the ECB's multi-country models and area-wide models, as well as well as other non-model-based information. While the desire to incorporate such a wealth of information is understandable, it is clear that the resulting low frequency of the projections renders them of little use for decision-making purposes. Almost surely, the Governing Council must have access to more frequent internal projections that somehow summarize in a few statistics all the relevant

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[26] See Svensson (1999) for a careful description of the logic behind inflation forecast targeting regimes.

second pillar information on which to base their bi-weekly interest rate decisions. In fact, the ECB has developed its own Survey of Professional Forecasters, carried out at a quarterly frequency. That survey combines the forecasts of a large number of commercial forecasters regarding evolution of inflation (and other variables) in the euro area. Unfortunately, the ECB is not currently making available in a systematic manner the content of those surveys; only a few glimpses can be found and discussed in some issues of the Monthly Bulletin.

A second aspect of the newly published projections, though somewhat technical, must be added to the (big) basket of non-transparent elements in the ECB policies and their communication to the public.[27] Given the degree of uncertainty associated with any projection, "ranges" are used to present each variable. Hence, for instance, the projection range for HICP inflation coming out of the November 2000 exercise was 1.8 - 2.8 percent for 2001 and 1.3 - 2.5 percent for 2002. But what is the value of a projection range if it does not have a probability (a confidence level, in the statistical jargon) associated with it? Currently no reference is made to that confidence level, not even to the (presumable) symmetry or not of the range given around a "point projection". In the manner of a "technical footnote", we learn that the width of the range corresponds to twice *the average absolute error* from previous forecasting exercises. It turns out that, under the assumption of normality in the error term (a plausible one under ordinary circumstances), the reported range can be shown correspond to ± 0.8 standard errors, instead of the conventional ± 2

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[27] See Alesina *et al.* (2001) for an early discussion of that shortcoming.

standard errors.[28] Hence the confidence level associated with the reported range would be of only about 57 percent (instead of the usual 95 percent).

It is hard to understand why the ECB has not been more forthcoming in pointing out the extreme uncertainty associated with the projections being reported, and the factors behind that uncertainty. Clearly, given the way the ranges have been constructed, the errors in the forecasting exercises conducted so far must have been quite large (though once again it is impossible for the public to have access to that information at this point, as far as I can tell). Should that be interpreted as a symptom of the inadequacy of the models currently used by the ECB? Doesn't the ECB have access to projections (or forecasts) that are more accurate as the basis for their policy decisions? Unfortunately, the ECB has not been particularly open in providing information to the public in that regard, so we do not know the answer to those questions.

4. The ECB at Work: Interest Rate Decisions

4.1 Key Interest Rate Decisions

While the previous two sections have tried to assess the coherence of the ECB's objective definition and strategy formulation, the present section puts words aside and focuses on deeds. In particular I try to understand the logic behind the interest rate changes decided by

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[28] For a general distribution, the mean deviation is always bounded above by the standard deviation. Hence, the reported ranges would correspond, at most, to ± 1 standard errors. See, e.g., Stuart and Ord (1973) for a discussion.

the ECB, and the consistency with its primary objective, namely, the achievement of price stability as defined by the ECB at the beginning of its operations.[29]

The first two columns in Table 2.1 show the dates at which the ECB decided to change the key policy rate, as well as the value set for the latter.[30] The third column reports the cumulative change in that interest rate since the onset of EMU. The fourth column shows the annual HICP inflation rate for the euro area corresponding to the month preceding the decision (and, hence, one that is likely to be available at the date of the meeting), with the final column displaying its cumulative change.

[insert Table 2.1 near here]

Until May 2001, and with the exception of the 50 basis point rate cut in April 1999, all the decisions on interest rates have taken the form of an *increase* of 25 or 50 basis point in that variable. By the end of EMU's second year, the interest rate has risen by 170 basis points, matching almost exactly the corresponding cumulative change in inflation. The cumulative decline in interest rates since May 2001 since the last interest rate change in November 2001, amounted to 150 basis points, and was accompanied by an observed reduction in HICP inflation of no more than 50 basis points.

4.2 A Benchmark Rule

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[29] Some of the evidence and conclusions presented in this section update the analysis in Chapter 4 of Alesina et al. (2001).

[30] Interest rate applied to weekly main refinancing operations. Starting on 28 June 2000 that rate corresponds to the minimum bid rate in a variable rate tender.

In order to interpret the joint comovement of interest rates and inflation, and to assess its consistency with the objective of inflation stabilization we put forward a simple benchmark model for the setting of interest rates by a central bank concerned with stabilization of inflation around a certain target.

$$i_t^* = \rho + \pi^* + \phi(\pi_t - \pi^*) \tag{2.5}$$

where i_t^* denotes the nominal interest rate implied by the rule for period t given a rate of inflation π_t over the previous 12 months. The rule is defined by three parameters: ρ is the long-run equilibrium (or steady state) real rate, π^* is the (long run) inflation target, and ϕ measures the strength of the interest rate response to changes in inflation.

The previous rule can be viewed as a version of the so-called Taylor rule; with the output gap term, which is also usually found in the latter, being omitted. That simple specification would seem to be more tightly connected with the ECB's single objective, that is, the maintenance of price stability, than a more conventional Taylor rule.[31]

Two of the parameters of the benchmark rule are calibrated in a way consistent with some of the ECB's statements, as well as independent evidence. Hence, the inflation target π^* is set to 1.5 per cent. As noted in section 2, that value is the midpoint in the range of inflation rates consistent with the ECB's derivation of the reference value for M3 growth. The steady

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[31] This is not necessarily true in models where inflation is predetermined, and responds to the output gap only with a lag, as in Rudebusch and Svensson (1999).

state real rate ρ is set to 2.5 per cent. That value is not far from the average short-term real interest rate observed in pre-EMU Germany, which was 2.8 % over the period 60-98.[32]

Parameter ϕ measures the strength of the interest rate response to changes in inflation. The analysis of the properties of interest rate rules like (2.5) in the literature generally implies that inflation coefficient ϕ must be greater than one in order for the rule to stabilize inflation, and to prevent expectations-driven fluctuations. I choose a baseline value of 1.5 for ϕ, which is consistent with many of the empirical interest rules for Germany and Europe estimated using pre-EMU data;[33] it also corresponds to the inflation coefficient in Taylor's original rule describing Fed policy under Greenspan. As discussed in Alesina *et al.* (2001), the previous calibration is (approximately) consistent with the choice of a 3 per cent interest rate at the onset of EMU, in the face of a stable inflation rate about 0.8 per cent in the second half of 1998.

Figure 2.6 represents graphically the pattern of interest rates and HICP inflation in the euro area over the period January 1999 – April 2002. In the same graph I have plotted the interest rate implied by the calibrated benchmark rule as a function of the inflation level. Notice that with the exception of the very early part of the sample the interest rate set by the ECB has remained substantially below the level implied by the benchmark rule. That gap begins to emerge with the decision by the ECB to cut interest rates in April 99, in spite of an incipient rise in inflation. Early in 2001 the gap begins to close briefly, as a result of a spell of inflation reductions which are not matched by interest rate cuts. After that brief spell, the

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[32] Source: ECB Monthly Bulletin, March 1999.
[33] See, e.g., Clarida,, Galí and Gertler (1998), and Gerlach and Schnabel (2000) and Doménech, Ledo, and Taguas (2000).

interest rate gap grows again persistently until the end of the sample period. The large gap between the interest rate predicted by the rule and the one actually observed is a consequence of the observation that, on average, cumulative interest rate adjustments have hardly matched the cumulative increases in inflation when inflation goes up, while overshooting its cumulative declines when the latter variable is going down.

[insert Figure 2.6 near here]

Hence, the previous evidence suggests that ECB policy over the period considered may have violated the so-called Taylor principle. According to the latter, changes in inflation should be met with larger than one-for-one increases in the nominal rate in order for policy to stabilize inflation, for only in that case will inflationary pressures be counteracted with the necessary rise in *real* interest rates.[34]

Alesina *et al.* (2001) explore a number of alternative hypotheses that may account for the discrepancy during the first two years of the ECB experience. They note, for instance, that concern by the ECB over the output gap (as in the original Taylor rule) is unlikely to explain the apparent excess looseness illustrated by Figure 2.6. The reason is simple: ECB measures of the output gap had increased monotonically over the two year period considered by those authors: hence, if anything, they should have called for a more restrictive policy than the one implied by the benchmark rule based exclusively on inflation.

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[34] See Woodford (2000) for a detailed discussion.

A second hypothesis considered by Alesina *et al.* (2001) is motivated by the substantial dispersion of inflation rates across countries within the EMU. In that context, and under the assumption of (majority) voting by NCB Governors on the basis of economic conditions at home (rather than euro-wide conditions), one might expect interest rate decisions to reflect the preferences of the median country, that is, to be related to the *median* rate of inflation across EMU members. But, again, that hypothesis can also be easily discarded: nationalistic voting would have introduced, if anything, a contractionary bias in ECB policy, for median inflation had been systematically above euro-wide inflation over the sample period considered. The reason is quite intuitive: small countries (Ireland, Portugal, Luxembourg) happen to have experienced higher inflation, on average, than the euro area as a whole.

4.3 Interest Rates and Core Inflation

The failure of the ECB to respond with sufficient strength to the rise in inflation may be associated with the perceived transitory nature of that rise, which has been largely caused by the increase in oil prices in world markets, combined with the persistent depreciation of the euro relative to the US dollar.

To what extent can the apparent looseness of monetary policy over the first two years of EMU can be accounted for by the discrepancy between headline and core inflation? Figure 2.7 displays the pattern of interest rate changes against core inflation, where the latter is constructed by removing from HICP inflation its energy, food, tobacco and alcohol

components. Again, the straight line represents the interest rate implied by the calibrated benchmark rule.[35]

[insert Figure 2.7 near here]

The interpretation of ECB policy changes significantly when core inflation is used as an indicator of inflationary pressures. In that case policy appears to be a bit on the loose side at the start of EMU, but falls gradually into place during 1999. That pattern of convergence-to-the-rule occurs largely through a decline in core inflation which, with the exception of the April 1999 episode, is not met with matching interest rate cuts. By November 1999, however, the interest rate initiates an upward path, which is not backed by an increase in core inflation. As a result, interest rates at the end of 2000 were well above the level that would be warranted by a benchmark rule based on core inflation. That stance was more than undone during 2001 and early 2002: interest rates *declined* 150 basis points since January 2001, even in the face of a simultaneous *increase* in core inflation of about 100 basis points!. Put differently, the evolution of core inflation *by itself* does not seem to account for the interest rate decisions during the first three years of EMU.

4.4 Interest Rates and Inflation Forecasts

The emphasis by the ECB on the need for a forward looking orientation of monetary policy suggests that perhaps a measure of expected inflation may help explain the pattern of interest rate decisions. Figure 2.8 displays the evolution policy rate against a proxy for the

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[35] Here I deviate from Alesina et al. (2001) in that they re-calibrate the steady state real rate so that the

forecast of future HICP inflation, constructed on the basis of The Economist's poll of forecasters.[36] Now the initial interest rate seems close to the one implied by the benchmark rule at the onset of EMU, but the gap between the two widens during 1999, with a significant rise in forecast inflation since May of that year not being counteracted with a policy tightening. Things appear to change dramatically after November of 1999, with the ECB deciding a series of interest rate increases that are unbacked by any significant rise in expected inflation. As a result, by mid-2000 the policy stance had caught up with that implied by the inflation forecast-based rule. Yet, and starting with the cut decided in May 2001, the interest rate level has remained systematically below the one implied by the forward-looking rule, thus suggesting again an expansionary bias in ECB policy.

[insert Figure 2.8 near here]

4.5 Interest Rates and a Hybrid Inflation Measure

Alesina *et al.* (2001) suggest that some of the discrepancies described above may be accounted for by allowing the ECB to pay attention to both core and expected inflation, since those measures have not always sent the same signal. They propose a hybrid rule,

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interest rate at the onset of EMU matches that implied by the rule based on core inflation.

[36] Unfortunately, as well as other sources, The Economist publishes forecasts for average inflation rates in a the current and next calendar year, This is different from, say, the inflation rate over the next 6 or 12 months, which would be a much more relevant variable for our purposes. Hence, for example, part of the published forecast of 2000 inflation as of June 2000 includes a component of past inflation. As in Alesina et al. (2001) I partly correct for that distortion by subtracting from the forecast the sum of realized inflation rates from Jan 2000 to June 2000, and then computing a weighted average of (a) the remaining component for 2000 and (b) the forecast for 2001, with the weight on the first proportional to the number of months left until the end of 2000.

which has the ECB respond to an average of core and expected inflation. The co-evolution of the rate implied by that rule and the actual interest rate is plotted in Figure 2.9.[37]

[insert Figure 9 here]

As pointed out by Alesina *et al.* (2001), over the first two years of EMU part of the discrepancy between the actual interest rate and the one implied by the hybrid rule is significantly smaller than the one obtained for any of the single variable based rules discussed above. Hence, the interest rate cut of April 1999 can be justified under this multiple-indicators approach by the reduction in core inflation happening at about that time. On the other hand, the rise in interest rates after November 1998 and throughout year 2000 may be explained by the acceleration of inflation forecasts that took place during that period. But the simple link between interest rates and a hybrid measure of inflation appears to break down around mid-2001, when interest rates start declining even though no improvement can be observed in the average of core and forecast inflation.

The availability of further data in the next few years will undoubtedly increase our ability to learn how the ECB operates. In particular, that analysis may help us evaluate the weight that the ECB may be giving to core inflation and inflation forecasts in their interest rate decisions. From that point of view the publication since November 2000 of the inflation projections is highly welcome, since they may constitute a useful input of such an exercise in spite of their paucity (every six months). That evaluation would surely be facilitated by the

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[37] In contrast with Alesina *et al.* (2001), I do not re-calibrate any aspect of the rule.

publication of the rolling inflation forecasts from the ECB's own Survey of Professional Forecasters.

5. Summary and Conclusions

The present chapter has provided an overview of the monetary policy framework of EMU and its operation during its early years. The overall assessment of the ECB's track record during this period is quite positive, as it has shown good judgement in most of its actions, especially during the first two years. That verdict stands in spite of the persistent overshooting of the inflation target range since mid-2000, and the much publicized large depreciation of the euro. The factors underlying those problems are largely outside the ECB's control; if the ECB had decided to counteract them decisively it might have endangered the attainment of its objective of price stability in the medium term or caused unnecessary volatility in real variables.

That good record notwithstanding, I have argued that there is plenty of room for improvement in both the design of the monetary policy strategy and, perhaps most importantly, the way it is communicated to the public. The existing flaws in the strategy and its communication have not caused major damage so far, but there is no guarantee that such a lucky state of affairs may prevail in the future.

A number of problems emphasized in the chapter relate to the ECB's definition of its price stability objective. The following are worth mentioning.

- The derivation of the reference value for money growth implies a target range for inflation between 1 per cent and 2 per cent. The latter value contrasts with a widely accepted interpretation of the quantitative definition of price stability announced by the ECB. The ECB has not made any attempt to dispel the confusion that such a discrepancy may generate. It is hard to understand why such ambiguity should persist.

- While the ECB has announced clearly that price stability is to be attained *in the medium term*, it has not provided any operational definition of what is meant by "the medium term". That ambiguity necessarily limits the accountability of the ECB.

- The two-pillar strategy of the ECB has been the subject of heavy criticism from the academic community; in particular, the assignment of a prominent role for money in its analysis and communication of policy decisions, and the announcement of a reference value for money growth are perceived to be largely redundant, and potentially dangerous if ever taken seriously. In the present chapter I have argued that, despite the claims to the contrary made by the ECB in several documents, the theoretical and empirical underpinnings of that first pillar are very weak. In particular, the existence of a tight long run relationship between nominal variables (money growth, nominal interest rate, inflation, exchange rate variation, and so on) that is common to a broad family of models does *not* provide, in itself, a rationale for using one variable over another as a nominal anchor, paying

special attention to the evolution or one of them (for example, money growth), or choosing a particular monetary policy rule.

The empirical evidence does not seem to signal a special status for money either. The evidence on the marginal predictive power of monetary aggregates for inflation in the euro area is far from conclusive. Hence it is not even clear whether monetary aggregates may deserve a significant role as leading indicators in the context of the second pillar.

I have also provided an analysis of the pattern of interest rate changes over the first two years of existence of the ECB, and its relationship to the evolution of different measures of inflation and other indicators, in an attempt to learn how the ECB actually sets interest rates. The exercise suggests that both core inflation and inflation forecasts seem to have played an important role in interest rate decisions until early 2001, but can hardly account for the sequence of interest rate cuts since May 2001. The ECB should adopt a more transparent policy regarding the role assigned to such variables as an input in their policy decision process, and to provide detailed information about them. Surprisingly, the ECB does not currently publish any measure of core inflation nor does it make available in a systematic way the forecasts from its own Survey of Professional Forecasters. While the publication of the ECB's staff projections for inflation and other variables should be welcome (and long overdue), their limited frequency, the lack of transparency regarding the underlying models, and the deficiencies in the presentation of the associated uncertainty make them of limited value.

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Table 2.1 Interest Rate Changes and HICP Inflation

	Interest Rate	Cumulative change	Inflation	Cumulative Change
22 December 1998	3	---	0.8	---
8 April 1999	2.5	-0.5	1	0.2
4 November 1999	3	0	1.4	0.6
3 February 2000	3.25	0.25	1.9	1.1
16 March 2000	3.5	0.5	2	1.2
27 April 2000	3.75	0.75	2.1	1.3
8 June 2000	4.25	1.25	1.9	1.1
31 August 2000	4.5	1.5	2.4	1.6
5 October 2000	4.75	1.75	2.8	2
10 May 2001	4.5	1.5	2.9	2.1
30 August 2001	4.25	1.25	2.6	1.8
17 September 2001	3.75	0.75	2.4	1.6
8 November 2001	3.25	0.25	2.4	1.6

Figure 2.1 HICP inflation in the Euro Area
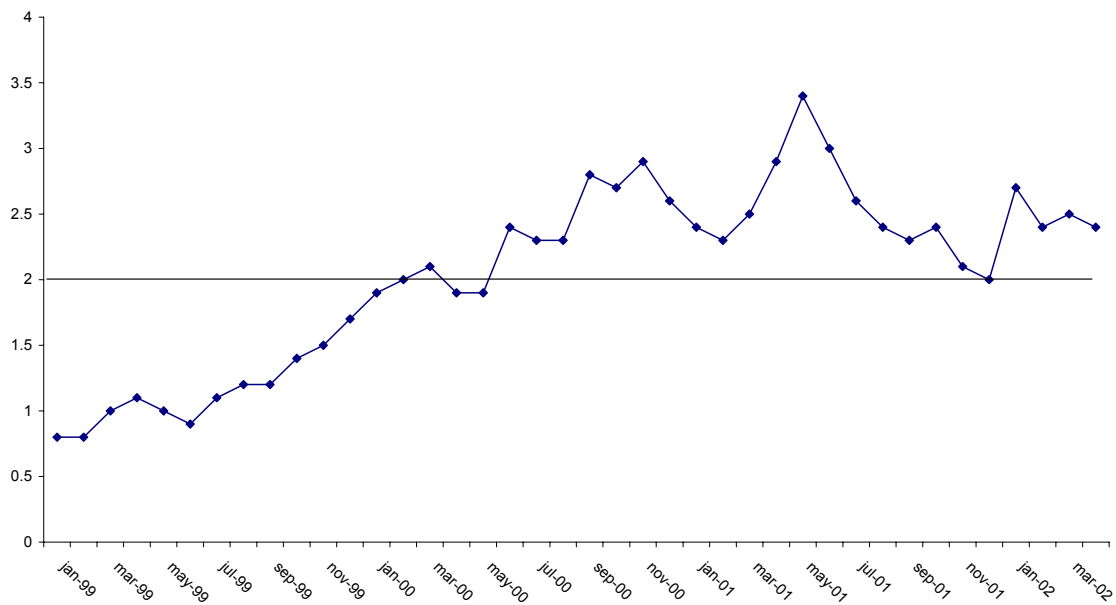
Figure 2.2   Headline vs. Core Inflation

Legend: Headline Inflation, Core Inflation
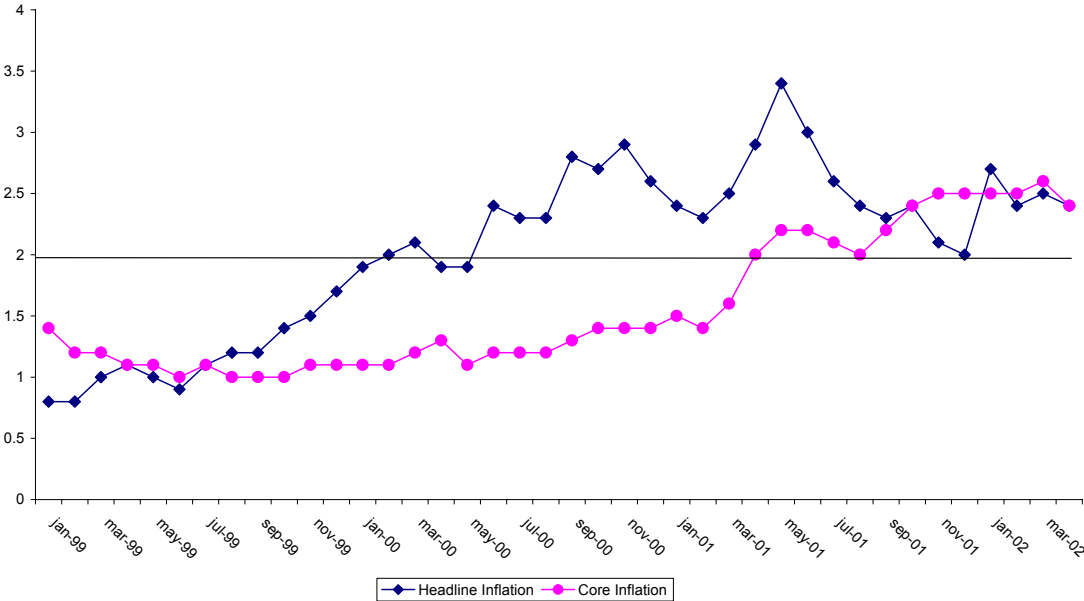
Figure 2.3 Inflation and Money Growth

$y = 0.546x + 0.006$
$R^2 = 0.6763$
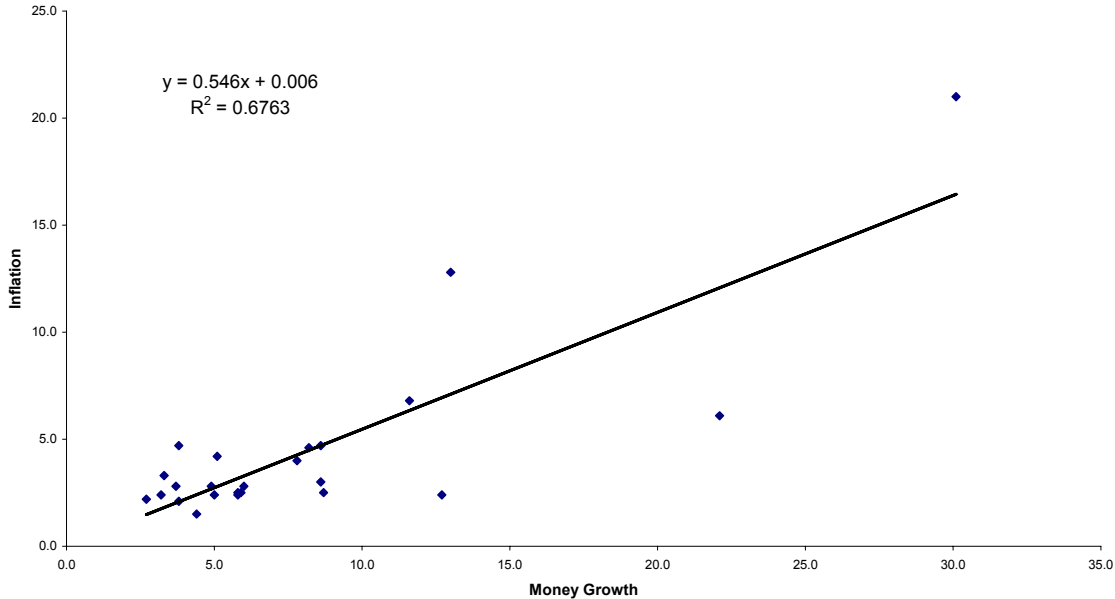
Figure 2.4   Inflation and Exchange Rate Variation
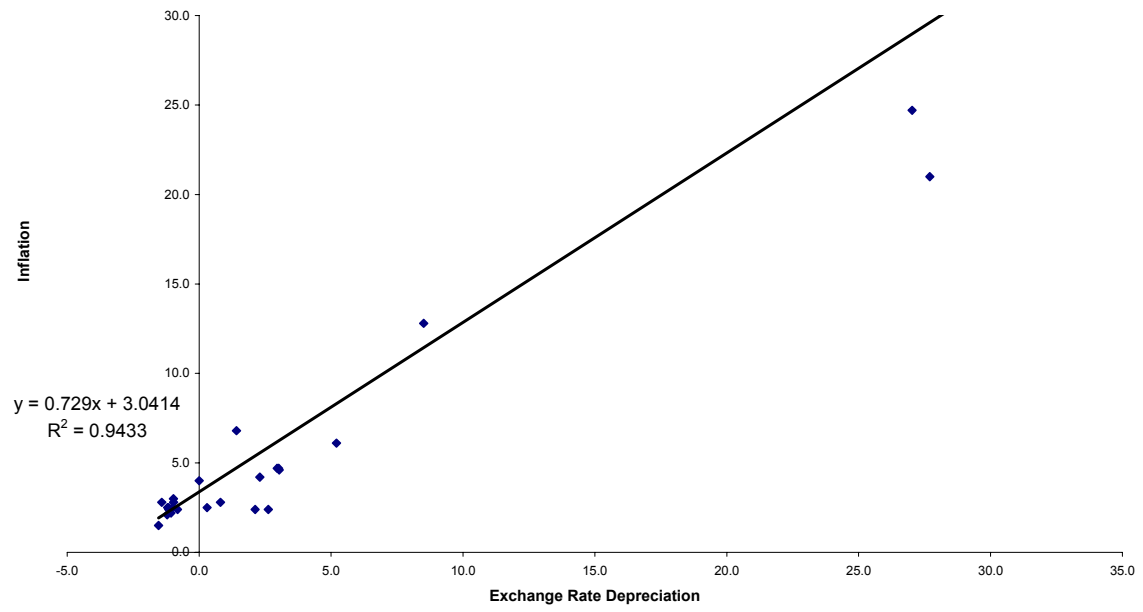
Figure 2.5   Inflation and Nominal Interest Rates

$y = 1.0437x - 4.5642$
$R^2 = 0.8522$
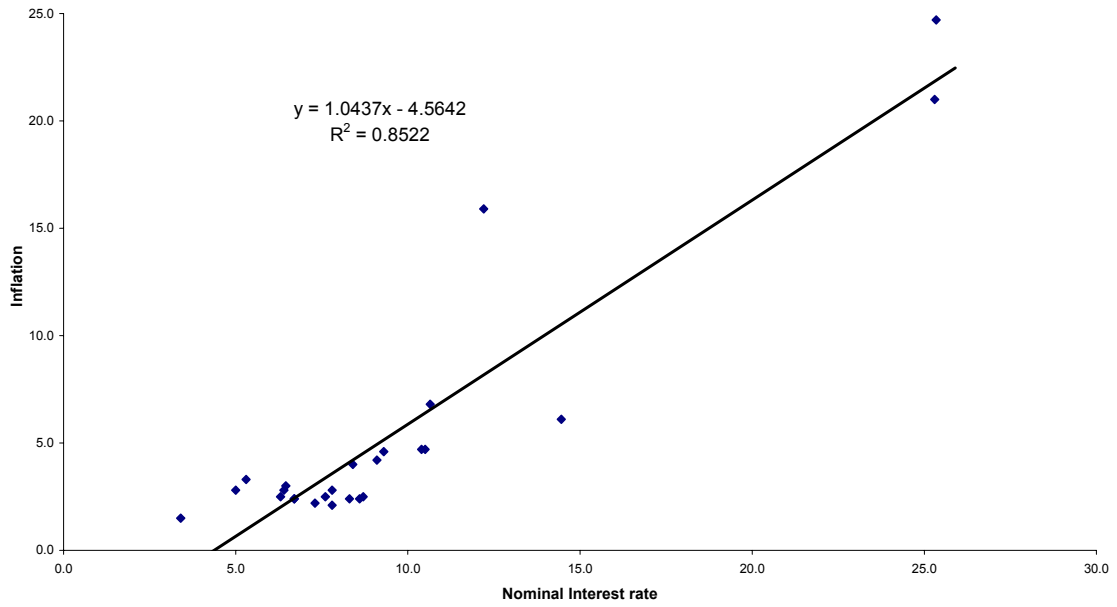
Figure 2. 6   Interest Rates and HICP Inflation
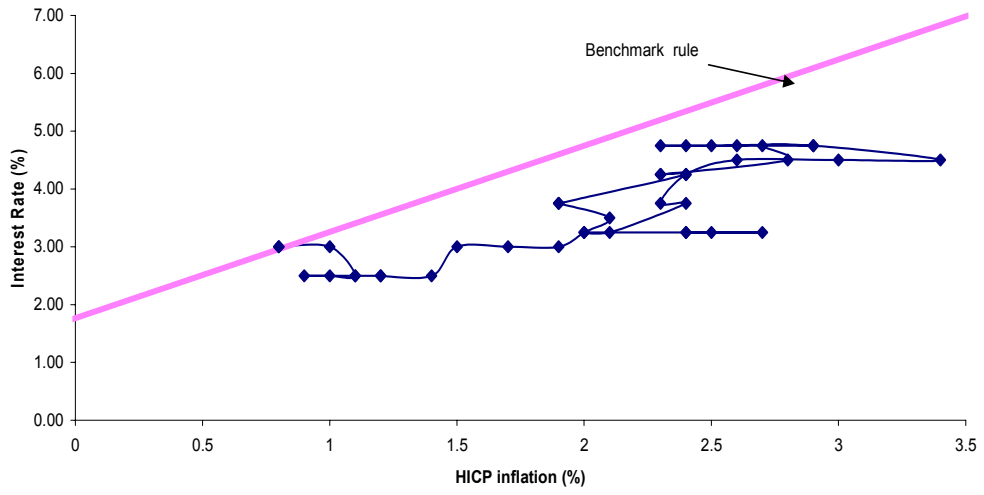
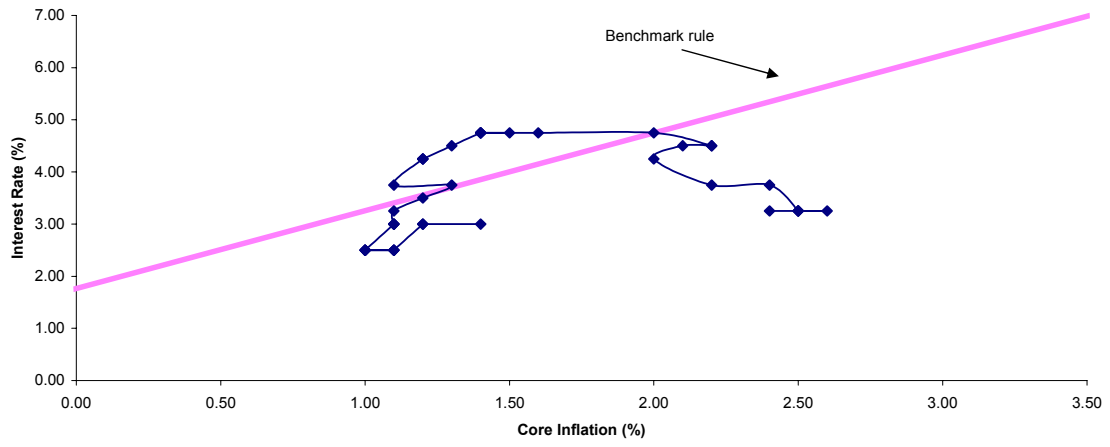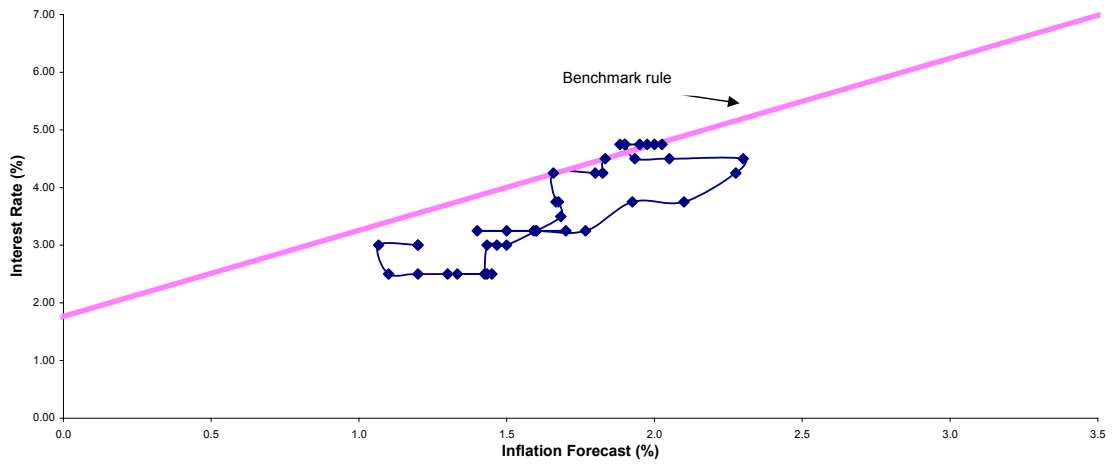**Figure 2.7   Interest Rates and Core Inflation**

Figure 2.8 Interest Rates and Inflation Forecasts

Figure 2.9   Interest Rates and Hybrid Inflation