Interest Rate Setting by the ECB, 1999–2006: Words and Deeds*

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We estimate empirical reaction functions for the European Central Bank (ECB) with ordered-probit techniques, using the ECB's *Monthly Bulletin* to guide the choice of variables. The results show that policy reacts to the state of the real economy, M3 growth, and exchange rate changes but not to inflation. We develop quantitative indicators of the Governing Council's assessment of economic conditions to understand its interest rate decisions and argue that the ECB has not reacted to inflation shocks because they were seen as temporary. By contrast, policy responses to economic activity are strong because it impacts on the outlook for inflation.

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1. Introduction

A number of authors have studied the interest-rate-setting behavior of the Governing Council of the European Central Bank (ECB) by estimating empirical reaction functions.[1] However, it is unclear

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[1]The literature estimating reaction functions has grown too large to survey here. See Berger, de Haan, and Sturm (2006) and Carstensen (2006) for recent contributions. The working paper version of this paper (Gerlach 2004) contains a review of the early literature on estimating empirical reaction functions on euro-area data.

whether studies that focus solely on the ECB's *deeds*—its policy actions—can be fully informative about the way the Governing Council sets interest rates. Estimates of reaction functions in which policy-controlled interest rates are regressed on macroeconomic variables disregard the fact that policymakers' assessment of these variables may vary over time. For instance, the extent to which central banks react to movements in inflation is likely to depend on whether they expect the movements to be temporary or permanent. To understand the ECB's policy decisions, it is therefore helpful to consider how the Governing Council interprets incoming data by considering its public statements regarding macroeconomic developments—that is, by also studying the *words* of the ECB.

This paper seeks to do so. In particular, it extends the literature on empirical reaction functions for the euro area by using information from the statements made in the ECB's *Monthly Bulletin* to develop indicators capturing the Governing Council's assessment of inflation pressures, developments in real economic activity, and M3 growth. The paper studies how these indicators evolve over time, what factors explain them, and how they are related to decisions to change the repo rate, the ECB's main monetary policy instrument.

The indicators are constructed by reading the editorials in the ECB's *Monthly Bulletin*. Doing so also clarifies what variables the Governing Council does or does not respond to in conducting policy. For instance, empirical reaction functions for the euro area typically use a measure of the output gap constructed using monthly industrial production data to explore how the ECB responds to changes in real activity. However, the editorials never refer to output gaps and suggest instead that the Governing Council attaches great weight to business and consumer confidence and survey measures of expected output growth. For this reason we use measures of economic sentiment, constructed by the European Commission, and of expected real GDP growth, constructed from data reported in *The Economist*. Interestingly, these variables are much more significant in the regressions than output gaps that are traditionally used to capture the state of the economy.

The rest of the paper is organized as follows. Section 2 provides a brief review of the related literature that analyzes the ECB's statements. Section 3 looks at the ECB's deeds by estimating reaction

functions using ordered-probit techniques. Interestingly, we find that while the ECB has not responded to (past) headline or core inflation, it has reacted to the state of the real economy, the rate of growth of M3, and the rate of change of the nominal effective exchange rate of the euro. We also find that a change in the interest rate in the past month *reduces* the likelihood of a change this month. Interest rate changes thus seem to be made in order to "clear the air"—that is, to reduce the need for further changes in the immediate future. There is thus little evidence of interest rate smoothing.

Section 4 turns to the ECB's words. We construct indicators using the editorials in the ECB's *Monthly Bulletin* in order to capture how the Governing Council judges economic developments and the risks to price stability. Moreover, we study how the indicator variables are correlated with economic conditions. We find that the indicator variable for inflation is not correlated with (past) inflation but is correlated with real economic activity, M3 growth, and changes in the nominal effective exchange rate of the euro. This latter finding suggests that the reason inflation is insignificant in the estimated reaction functions is that the Governing Council has interpreted movements in inflation as being temporary and due to price-level shocks.

In section 5 we study how the probabilities of the different policy choices evolve over the sample period. Since M3 growth was significant in the empirical reaction functions, we also investigate how money growth has an impact on the probability of interest rate changes. The results show that while money growth is not an important factor explaining repo-rate changes under normal economic conditions, it plays an important role in situations in which real economic activity is strong.

Finally, section 6 concludes.

2. Related Literature

This paper argues that in seeking to understand the interest-rate-setting behavior of the ECB, it is useful to consider the information about policymakers' assessment of economic conditions that is contained in the ECB's official communications. While the paper is part of the literature on empirical reaction functions for the euro area, in the interest of space, below we focus on papers studying the

information contained in the introductory statements made by the president of the ECB at the monthly press conferences following the meetings of the Governing Council. Some authors analyze the reaction of financial markets to this information. For instance, Rosa and Verga (2005) use a glossary to convert the statements into an ordered scale and find that forward interest rates respond to the introductory statements, even when controlling for changes in repo rates. Musard-Gies (2006) also codes the information in the statements and studies how the term structure of interest rates reacts to it.[2]

Another set of papers uses the information in the press statements to understand the ECB's interest rate setting. Rosa and Verga (2007) extend their earlier analysis and show that the statements contain information useful for forecasting future changes in monetary policy in the euro area, and that this information is not contained in macroeconomic aggregates or market interest rates. Berger, de Haan, and Sturm (2006) also quantify the information in the introductory statements. They distinguish between statements concerning price stability, the real economy, and monetary factors, and study how they account for the Governing Council's interest rate decisions. One finding of importance for the current paper is that monetary factors do not appear to play an important role in the setting of monetary policy. Heinemann and Ullrich (2005) also quantify the information in the introductory statements and find that the resulting variable is significant in an empirical reaction function for the euro area.

While related to the literature reviewed above, this paper uses the information in the ECB's statements to study how the Governing Council's assessment of economic conditions varies with objective measures of those conditions. This is an important question that is likely to shed light on the ECB's thinking about the economy. For instance, in most years since the introduction of the euro, euro-area inflation has exceeded 2 percent, which is the upper limit of the ECB's definition of price stability, and many observers have noted that the ECB appears to react strongly to economic activity

[2]In a related literature, Ehrmann and Fratzscher (2005a, 2005b, 2005c) study the communication of central bank committee members through speeches, testimony, etc., and analyze its impact on interest rates and the predictability of monetary policy.

but not to inflation.[3] While this may be interpreted as the ECB's having been willing to risk overshooting its inflation objective in order to stabilize economic activity, the analysis here suggests that the ECB has viewed movements in inflation as reflecting price-level shocks that have temporary effects on inflation and has therefore not reacted to them. By contrast, it has reacted strongly to economic activity because it sees it as an important determinant of the outlook for inflation.

3. Deeds: What the ECB Does

We start by studying the ECB's interest rate decisions—its deeds—by estimating empirical reaction functions. This section discusses the model estimated, the choice of variables, and the econometric findings.

3.1 The Model

Since the Governing Council leaves the repo rate unchanged in most months and changes it by a discrete amount when it judges it necessary, it is inappropriate to fit the model using OLS. Therefore, below we estimate ordered-probit models using data for the period February 1999 through June 2006.[4] As a first step, we consider the pattern of interest rate changes. Table 1 shows that there was no change in the repo rate in seventy-one of the eighty-nine months in the sample (or 80 percent) and that it was raised ten times and cut eight times. On eleven occasions the change was ± 0.25 percent and on seven occasions it was ± 0.50 percent. Since the size of policy changes varies over time, below we distinguish between "small" and "large" changes in interest rates. Interestingly, the table also shows that while increases tended to be small, cuts tended to be large.

Next we derive the equation estimated below. Let i_t denote the repo rate and i_t^T the Governing Council's "target" for the repo rate. These may differ because the ECB and most other central banks

[3] For instance, see the discussion in Carstensen (2006, footnote 14).

[4] See Ruud (2000) and Greene (2003) for a discussion of ordered probits. See Galí et al. (2004) and Carstensen (2006) for applications to the ECB. Kim, Mizen, and Thanaset (2005) estimate ordered-logit models for the Bank of England.

Table 1. Changes in Repo Rate: February 1999–June 2006 (Eighty-Nine Observations)

	Small Change (±25 Basis Points)	**Large Change (±50 Basis Points)**	**Subtotal**
Increase	8	2	10
Decrease	3	5	8
Subtotal	11	7	Total: 18

set interest rates at discrete levels, typically 0.25 percent apart, and because of interest rate smoothing. Let π_t, y_t, μ_t, and ε_t denote (some measure of) inflation, real economic activity, money growth, and the rate of appreciation of the nominal effective exchange rate. Consider next the following expression for the target level for the interest rate:

$$i_t^T = \alpha_y y_t + \alpha_\pi \pi_t + \alpha_\mu \mu_t + \alpha_\varepsilon \varepsilon_t, \tag{1}$$

where the constant is omitted; α_y, α_π, and α_μ are positive; and α_ε is negative.[5] Next, we allow for gradual adjustment of the actual interest rate as in Judd and Rudebusch (1998):

$$i_t - i_{t-1} = \beta_0\big(i_t^T - i_{t-1}\big) + \beta_1 \Delta i_{t-1} + e_t, \tag{2}$$

where the constant is omitted and e_t is a residual. Equation (2) implies that changes in interest rates should be distributed continuously. However, because the ECB sets interest rates in steps, only discrete changes are observed. Using equations (1) and (2), and incorporating the fact that the ECB sets interest rates in steps, we have

$$i_t^* - i_{t-1} = \tilde{\alpha}_y y_t + \tilde{\alpha}_\pi \pi_t + \tilde{\alpha}_\mu \mu_t + \tilde{\alpha}_\varepsilon \varepsilon_t - \beta_0 i_{t-1} + \beta_1 \Delta i_{t-1} + e_t, \tag{3}$$

[5]Svensson (1997) presents a simple model in which the target interest rate depends on the state of the economy, as measured by the output gap, and the deviation of inflation from the central bank's target or objective.

where $\tilde{\alpha}_i \equiv \alpha_i \beta_0$ and the asterisk, *, indicates that the interest rate should be thought of as an unobserved, or latent, variable.[6] What is observed is the actual change in the interest rate, which depends on where the latent variable is relative to a set of threshold values, γ_i:

$$\begin{array}{ll} \Delta i_t = -0.50\% & \text{if } i_t^* - i_{t-1} \leq \gamma_1 \\ \Delta i_t = -0.25\% & \text{if } \gamma_1 < i_t^* - i_{t-1} \leq \gamma_2 \\ \Delta i_t = 0 & \text{if } \gamma_2 < i_t^* - i_{t-1} \leq \gamma_3 \\ \Delta i_t = +0.25\% & \text{if } \gamma_3 < i_t^* - i_{t-1} \leq \gamma_4 \\ \Delta i_t = +0.50\% & \text{if } \gamma_4 < i_t^* - i_{t-1}. \end{array} \tag{4}$$

Equations (3) and (4) constitute an ordered-response model that says that the Governing Council will adopt one of the policy options depending on the level of inflation, economic activity, money growth, the rate of appreciation, and the lagged level (and the lagged change) of the repo rate.

Below we estimate the model, reporting the parameter estimates, the value of the likelihood function, and the McFadden pseudo-R^2.[7] In addition, we show p-values from tests of the hypothesis of no first-order serial correlation in the residuals, constructed as suggested by Gourieroux, Monfort, and Trognon (1985, 326).

3.2 Data

Next we describe our choice of data, which, unless otherwise noted, was taken from the ECB's web site. As noted above, the lagged level of the repo rate and the change in the repo rate are used as regressors in the equations we estimate. While the *Monthly Bulletin* suggests that money and credit growth both are important in the Governing Council's thinking about policy, the emphasis put on M3 growth in the ECB's public statements suggests that it is the single most important indicator of monetary developments.

[6] This formulation differs from the dynamic-probit models estimated by Eichengreen, Watson, and Grossman (1985) and Davutyan and Parke (1995), who assume that $\Delta i*$ depends on observables.

[7] Greene (2003, 683) discusses the McFadden pseudo-R^2.

We therefore concentrate on this variable in the econometric analysis. Since the editorials suggest that the Governing Council's deliberation focuses on the three-month moving average of the annual rate of M3 growth, this definition is used in the empirical analysis below.

The choice of the inflation variable is less clear cut. It seems natural to use headline inflation computed using the Harmonized Index of Consumer Prices (HICP) in the euro area. However, inflation rates across the world have been subject to large energy-price shocks in recent years, which central banks can presumably disregard since they should arguably be seen as price-level shocks that have a temporary effect on inflation. It is therefore of interest to consider a measure of core inflation in the regressions. While the ECB never uses the term *core inflation*, in discussing inflation pressures it frequently refers to a measure of the HICP excluding fresh-food and energy prices. We consequently use this variable as a measure of core inflation. Finally, since monetary policy is forward looking, another natural possibility would be to use a measure of expected inflation. We therefore construct a measure of expected inflation over the coming twelve months, using data from the polls of forecasters tabulated in *The Economist*.[8]

Following Heinemann and Ullrich (2005), we also explore whether the Governing Council has reacted to the exchange rate by including in the reaction function the percentage change over twelve months in the nominal effective exchange rate of the euro against a basket of forty-three currencies. It should be noted that this variable is defined such that an increase indicates an appreciation of the euro.

The issue of selecting a measure of real economic activity is more complicated and is discussed in the next section.

[8] *The Economist* surveys forecasts of inflation and real output growth for this year and the next made by a number of financial institutions, and publishes the means of these forecasts on a monthly basis. Following Begg et al. (1998) and Alesina et al. (2001), we compute measures of expected inflation and real output growth for the coming twelve months as a weighted average of the two forecasts, with the weights depending on the month in which the forecasts are made. To illustrate, the expected rate of inflation in February is computed as 10/12 of the expected rate of inflation for this year and 2/12 of the expected rate of inflation for next year.

3.3 Measuring Real Economic Activity

Following the seminal paper by Taylor (1993), the empirical literature on monetary-policy reaction functions focuses on the role of the output gap as the measure of real economic activity best able to explain interest rate decisions taken by central banks. However, the national accounts are released with considerable delay and are subject to one or more revisions. Comments in the editorials on the behavior of real GDP therefore typically refer to developments that occurred some time ago. For instance, the March 2004 editorial states, "According to Eurostat's first estimate, in the fourth quarter of 2003 real GDP in the euro area grew by 0.3% quarter on quarter, following growth of 0.4% in the third quarter. These data confirm that a gradual recovery in economic activity in the euro area took place in the second half of 2003. More recent indicators, including those from business and consumer surveys, point to a moderate economic growth also in early 2004."

Since output gaps consequently can only be constructed with long time lags and are highly uncertain, they are never discussed in the editorials and do not appear to play much of a role in the ECB's interest rate setting (although, of course, they may be highly significant in empirical reaction functions).[9,10] By contrast, and as indicated by the quote above, the editorials frequently comment on survey measures of economic conditions, which are typically available with very short lags and are never updated. If subjective measures of economic activity such as these are strongly correlated with estimates of the output gap, it would be sensible for the ECB to rely on them in thinking about the state of the economy and consequently appropriate for applied econometricians to focus on them in modeling interest rate setting in the euro area.

In the econometric analysis below we consider an economic sentiment indicator, which is developed by the European Commission,

[9] Orphanides (2001) shows that estimates of empirical reaction functions for the Federal Reserve that rely on output gaps are highly sensitive to the choice of ex post or real-time data.

[10] As noted earlier, many authors have estimated reaction functions for the ECB using output gaps computed from industrial production data, which are available at a monthly frequency. This approach has the additional problem that industrial production is only a small part of euro-area GDP.

as a subjective indicator of real economic activity.[11] We also construct a measure of expected real GDP growth in the coming twelve months using the information contained in the poll of forecasters reported on a monthly basis in *The Economist*. Since these forecasts are subjective, we think of them as akin to the sentiment indicator.

To explore the information content of these subjective measures of real activity, we compute their cross-correlations with a monthly measure of the output gap using the industrial production index and a quarterly measure of the gap using real GDP, in both cases starting in 1999.[12] Interestingly, in the case of the monthly data, the highest cross-correlations are obtained when sentiment ($\rho = 0.60$) and expected real growth ($\rho = 0.59$) lead by two months the output gap computed using the industrial production data. Redoing these calculations using the quarterly real GDP data, we find that sentiment leads the output gap by two quarters ($\rho = 0.80$) and that expected output growth leads the output gap by one quarter ($\rho = 0.80$). Thus, both subjective indicators of economic activity are strongly correlated with, and lead, data on the state of the real economy. Since the indicators of sentiment and expected real growth are available with much shorter time lags than industrial production and real GDP data, it makes good sense for the Governing Council and applied econometricians alike to rely on subjective measures of economic activity.

3.4 Estimates

Before turning to the estimates, it is important to note that the lags by which the data are available to the ECB need to be taken into account. The Governing Council generally discusses policy at its first

[11]The economic sentiment index pertains to the euro area and is based on a large survey of firms and consumers. For more information about the index, see http://ec.europa.eu/economy_finance/indicators/business_consumer_surveys/userguide_en.pdf.

[12]Since the output gap is measured in percentage points, we define the sentiment as the percentage deviation from its mean in the sample period. The quarterly data on sentiment are obtained by using the data point for the first month of the quarter.

meeting in the month. Since most of the data we use stem from the *Monthly Bulletin*, which has a cutoff date for the data before the policy meeting, it is straightforward to establish what data are available at the time of the interest rate decision. Thus, among the measures of real economic activity, the output gap computed using industrial production is available with a three-month lag, whereas sentiment and expected real GDP growth are available for the previous month. Headline inflation and expected inflation are also available with a one-month lag, but core inflation is only available with a two-month lag. Money growth is available with a two-month lag, and the ECB's preferred measure of M3 growth using a three-month centered moving average is available with a three-month lag. In estimating the reaction functions below, we thus lag the variables appropriately. To avoid simultaneity, we lag the exchange rate change by one month.

The estimates of the model in equations (3) and (4) are presented in columns 1–9 of table 2 (the estimates in column 10 are discussed in section 5). Before drawing conclusions from the estimates, we briefly consider those in the first column. These show that the parameter on sentiment (our proxy for real economic activity) is positive and significant. Thus, stronger sentiment has led the ECB to raise interest rates. The parameter on headline inflation, by contrast, is insignificant, suggesting no reaction to (past) inflation. Interestingly, the parameter on M3 growth is positive and significant, and the parameter on the change in the exchange rate is negative and highly significant. Thus, faster money growth and a depreciation of the euro in effective terms have been associated with a monetary tightening. Finally, the lagged level of the interest rate and the change in the interest rate are significant.

Rather than commenting on the regressions individually, in the interest of brevity we summarize the most interesting aspects of the results in the table. First, the two subjective indicators of economic activity—economic sentiment and expected real growth—are both highly significant, while the output gap is not. Moreover, the pseudo-R^2 is much lower when the output gap is used. This suggests that the common practice of estimating reaction functions for the ECB employing a measure of the output gap computed using industrial production data is problematic. Note also that the t-values on expected real growth are systematically higher than

Table 2. Ordered-Probit Estimates of Reaction Function: February 1999–June 2006

Model	1	2	3	4	5	6	7	8	9	10
Sentiment	20.24***	23.52***	17.08***							
	(3.15)	(3.14)	(2.66)							
Expected Growth				2.84***	2.46***	2.20***				2.28***
				(3.38)	(3.22)	(2.77)				(3.61)
Output Gap							19.88	2.65	31.33	
							(0.82)	(0.12)	(1.33)	
Headline Inflation	0.17			0.52			−0.71			
	(0.34)			(0.95)			(1.44)			
Core Inflation		0.78			0.05			−0.87		
		(0.98)			(0.06)			(1.34)		
Expected Inflation			−0.78			−0.60			−2.14***	
			(0.90)			(0.67)			(2.59)	
M3 Growth	0.77**	0.72**	0.86***	0.80**	0.85**	0.90***	0.46*	0.48*	0.58**	0.61**
	(2.53)	(2.51)	(2.75)	(2.48)	(2.52)	(2.81)	(1.91)	(1.80)	(2.21)	(2.31)
Exchange Rate	−0.19***	−0.18***	−0.22***	−0.21***	−0.22***	−0.24***	−0.27***	−0.25***	−0.32***	−0.16***
	(2.93)	(3.12)	(3.02)	(3.34)	(3.60)	(3.43)	(4.73)	(4.17)	(4.57)	(3.06)
Lagged Change in Repo Rate	−3.90***	−3.91***	−4.15***	−3.96**	−4.06**	−4.24***	−2.87**	−2.85*	−3.66**	−3.23**
	(2.62)	(2.68)	(2.72)	(2.41)	(2.48)	(2.60)	(1.97)	(1.89)	(2.31)	(2.31)
Lagged Level of Repo Rate	−0.70*	−0.77*	−0.46	−1.30**	−0.99**	−0.79*	−0.51	−0.49	−0.42	−1.04***
	(1.69)	(1.93)	(1.20)	(2.28)	(2.40)	(1.74)	(1.44)	(1.37)	(1.22)	(2.83)
Pseudo-R^2	0.44	0.45	0.45	0.46	0.46	0.46	0.36	0.36	0.40	0.38
AR(1), p-val.	0.82	0.72	0.91	0.50	0.56	0.50	0.81	0.77	0.71	0.55

Notes: Absolute value of t-statistics in parentheses. *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent level, respectively. "AR(1), p-val." shows the p-value for a test of the hypothesis of no first-order serial correlation of the residuals (see Gourieroux, Monfort, and Trognon 1985).

those on sentiment, as is the pseudo-R^2 when expected real growth is used.

Second, irrespective of how it is measured, the inflation rate is insignificant, except in the case of expected inflation when the output gap is used, in which case the parameter is negative. While this suggests that the ECB has not reacted to past inflation, it is premature to assess this finding before having reviewed the Governing Council's interpretation of economic conditions.

Third, the parameter on M3 growth is positive and significant in all cases. This suggests that the Governing Council has reacted to money growth. One reason money is significant may be that the models include several rarely used variables (such as lagged changes in interest rates and the exchange rate) that are highly significant. Furthermore, the measures of the state of real economic activity also have higher explanatory power than the output gap. These models arguably fit better than more-standard specifications, which would tend to raise the significance of individual parameters.

Fourth, the change in the nominal effective exchange rate is highly significant in all cases. The negative sign indicates that the Governing Council is likely to reduce interest rates when the currency is appreciating, presumably because this is expected to reduce inflation pressures.

Fifth, the parameter on the lagged change in the interest rate is significant and negative. This result implies that, holding economic conditions constant, if the Governing Council decided to raise interest rates last month, it is less likely to do so again this month. In turn, this suggests that policymakers wait for some time before changing interest rates, and when they do change rates, they do so sufficiently so that they do not expect to have to change them again soon. The Governing Council seems to change rates to "clear the air" rather than to smooth interest rates.

Sixth, and finally, the coefficient on the lagged level of the interest rate is negative but only significant in the cases in which expected GDP growth is used together with headline or core inflation—that is, in the cases of the two best-fitting equations.

The results discussed above raise three sets of questions. First, why does the Governing Council react to real economic activity but not to inflation? In particular, is this because it is more concerned by the state of the real economy than inflation pressures? Furthermore,

why does it react to money growth but not inflation? Second, how well do these models predict the Governing Council's interest rate decisions? Third, how does money growth affect the probability of interest rate changes? Next we turn to these questions.

4. Words: What the ECB Says

As already noted, central banks' responses to macroeconomic news depend critically on how policymakers interpret the incoming data. To understand the ECB's interest rate setting, it is therefore desirable to consider also the Governing Council's judgments about the outlook for inflation and economic activity and its assessment of monetary developments. To do so, we construct indicator variables of the Governing Council's view of the outlook of the economy by reading the editorials of the ECB's *Monthly Bulletin* in the period between January 1999 and July 2006.

The reason for focusing on the editorials, rather than the full report, is as follows. The *Monthly Bulletin* contains an exhaustive analysis of macroeconomic conditions in the euro area. While there is little doubt that the members of the Governing Council are in general agreement with that analysis, it is arguably best interpreted as expressing the views of the ECB's senior staff. By contrast, the editorials contain a short explanation for why interest rates were or were not changed in the previous month and frequently include a summary statement of the Governing Council's view of the economy. For instance, the June 1999 editorial states that "the Governing Council did not consider that recent monetary developments were indicative of future price pressures," and the January 2000 editorial notes that "recent data confirm the Governing Council's previous assessment regarding the outlook." The editorials must thus receive considerable scrutiny by the members of the Governing Council.

4.1 Construction of the Indicator Variables

The discussion of the risks to price stability in the editorials is structured in three parts. First, there is a discussion of real activity, presumably because the Governing Council views this as an important determinant of future inflation. Second, recent inflation trends are reviewed. Finally, monetary developments in the euro area are

commented on. We therefore construct indicator variables that are intended to capture the Governing Council's views of the "risks to price stability" arising from recent developments in economic activity, realized inflation, and M3 growth. Since the ECB has emphasized the importance of M3 growth for its policy decisions and this variable is highly significant in the econometric analysis, it is particularly interesting to explore whether the Governing Council's assessment of inflation risks depends on money growth.

The indicator variables can take five values: -2, -1, 0, 1, and 2.[13] The value of 0 should be interpreted as the editorial's suggesting that the Governing Council believes that *given the current level of the repo rate*, a change in the level of interest rates is not warranted. As an illustration, consider the editorial in the first *Monthly Bulletin*, in January 1999, which states that "on balance, the evidence suggests that there are no indications of significant upward or downward pressures on price development." Since it more generally suggests that the Governing Council viewed inflation as stable at the then-current rate, the assessment of price pressures is coded as 0.

The value -1 indicates that the editorial suggests that the current level of the repo rate is too high. For instance, the April 1999 *Monthly Bulletin* notes that "many projections for inflation rates in the euro area have been revised downward recently." Moreover, the editorial states that "downward pressure on inflation stems from the current economic situation." Since this and the overall reading of the editorial suggest that the Governing Council had become more concerned that inflation might fall too low, the inflation indicator is coded as -1.

The value -2 is used when the Governing Council appears increasingly persuaded that the behavior of the variable in question warrants a cut in interest rates. Consider, for instance, the Governing Council's assessment of real economic activity in early 1999. In January 1999 the editorial discusses "expectations of a slowdown in the growth of economic activity in the short term" (coded as -1), and in February it notes that "while there are indications of a slowdown in real GDP growth, the extent and duration of such

[13] It should be emphasized that the coding was done by reading the full editorials. To illustrate how this is done, appendix 1 contains quotes from the editorials for (in the interest of brevity) 1999. Appendix 2 contains the indicators.

a weakening of economic activity remain a matter of uncertainty" (also coded as −1). By contrast, by the time of the March issue, it was clearer that real economic activity was slowing and that it was doing so more rapidly than had been anticipated earlier. This is indicated by the phrasing "recent information on indicators of economic activity ... provided evidence of a sizeable slowdown in the fourth quarter of 1998" and "the deterioration of confidence has continued into 1999." We code this as −2. The values +1 and +2 are used in cases in which in the Governing Council appears to be somewhat or strongly concerned that developments in inflation, real economic activity, or M3 growth warrant a tightening of policy.

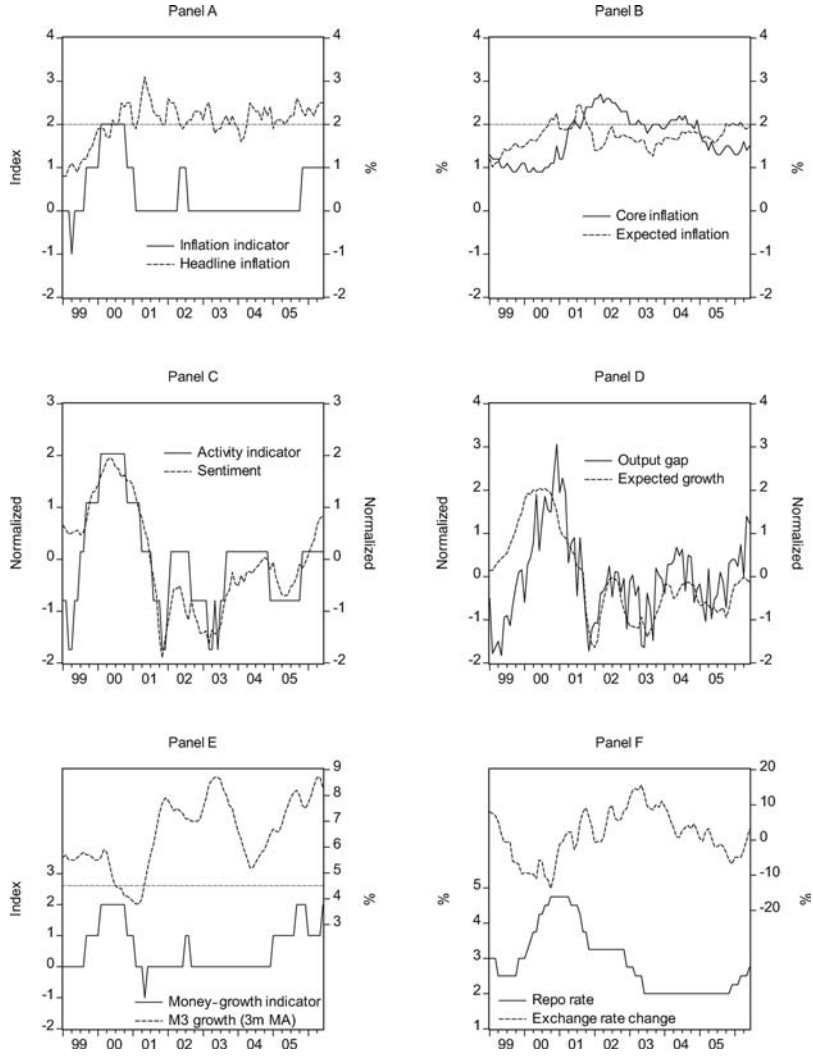
We emphasize that the indicator variables are intended to capture the Governing Council's assessment of whether economic conditions suggest that a change in policy is warranted, which does not necessarily map into the actual behavior of macroeconomic aggregates in this short sample. Indeed, the rationale for using the indicators is that macroeconomic data are not fully informative about the Governing Council's view of the economy.

4.2 Inflation

We start by considering the Governing Council's assessment of inflation. Panel A of figure 1 contains plots of the inflation indicator together with headline inflation, and panel B of the same figure contains plots of core inflation and expected inflation. The 2 percent upper limit of the ECB's definition of price stability is also indicated in these figures.

The editorials suggest that the concerns the Governing Council expressed about declining inflation in the spring of 1999 before the interest rate cut in April soon gave way to worries that inflation risks had increased. This coincided with rising headline and expected future inflation. In late 2000 and in early 2001, the Governing Council viewed inflation risks as having become more balanced, despite the fact that headline inflation was generally above 2 percent. However, that judgment looked appropriate as headline and expected future inflation declined during the later part of 2001. With both rising toward the end of the year and in early 2002, the editorials indicate that the Governing Council became concerned in the middle of 2002 as expected inflation started to rise

Figure 1. The Data



toward the 2 percent level. But with inflation staying just above (and expected inflation just below) 2 percent, the Governing Council soon judged the risks as more balanced and maintained that judgment until late 2005, when it took the view that inflationary pressures had risen.

Exploring more formally the correlations between the inflation indicator and the different measures of inflation, we note the correlations are generally low. The highest correlation is that between the inflation indicator and expected inflation ($\rho = 0.25$), followed by the correlation with current inflation ($\rho = 0.02$). Interestingly, the correlation between the inflation indicator and core inflation is larger in absolute value but negative ($\rho = -0.54$).[14] This suggests that core inflation does not play an important role in the Governing Council's thinking about the economy.

The above analysis of the Governing Council's assessments suggests that *realized* inflation and the ECB's *outlook* for price stability have been quite different. However, since the ECB also reacts to other variables, we postpone a discussion of what to infer from this for the moment.

4.3 Real Economic Activity

While the overriding objective of the ECB is to ensure price stability, the editorials contain frequent statements about developments in real economic activity, presumably because it has an impact on the rate of inflation with a lag. Panel C of figure 1 shows the indicator variable together with the sentiment variable, and panel D shows the output gap and expected real GDP growth.[15] The figure displays a striking correlation between the indicator and sentiment or expected GDP growth (the correlation is 0.79 in the first case and 0.82 in the second case), and a somewhat lower correlation, 0.67, between the indicator and the output gap. The correlation between sentiment and expected output growth is even higher at 0.92, which further supports the view that sentiment captures expected future growth in the economy.

Again we emphasize that actual real GDP growth and the output gap are not included in the econometric analysis, since the editorials suggest that these variables do not play much of a role

[14]These correlations generally rise when future values of the inflation measures are considered, peaking at 0.45 when expected inflation is led by ten months, 0.23 when actual inflation is led by nine months, and 0.43 when core inflation is led by twenty-two months.

[15]To permit easy comparison, the data have been normalized by subtracting the mean and dividing by the standard error.

in the Governing Council's assessment of inflation risks because of reporting lags and data revisions.

4.4 Money Growth

Since the ECB has repeatedly stated that it attaches a prominent role to money in conducting monetary policy, next we turn to its interpretation of M3 growth. Panel E of figure 1 contains a plot of the indicator variable for money together with a three-month average of M3 growth over twelve months. For clarity, the 4.5 percent "reference value" for money growth that the ECB has announced is also indicated. The figure suggests that the Governing Council viewed money growth as indicating risks to price stability between mid-1999 and late 2000. Except during a brief period in 2002, the Governing Council did not view money growth as indicating risks to price stability again until early 2005, despite the fact that money growth had exceeded the reference value since early 2001. As is clear from the editorials, the reason for this was that the rapid increase in money growth between 2001 and 2003 was interpreted as largely reflecting increases in the demand for money that did not generate inflation risks.

4.5 Exchange Rate and Repo Rate

Finally, panel F shows that the euro depreciated in effective terms between 1999 and late 2000, a period during which the repo rate was rising, and that it appreciated between late 2000 and late 2004 as the ECB's repo rate was cut repeatedly and then held constant. The euro subsequently started to depreciate again but then appreciated as monetary policy was tightened from late 2005 onward.

4.6 The Determinants of the Indicators

The indicators are intended to summarize the Governing Council's views of the outlook for inflation and real economic activity and its interpretation of the information on money growth. As is clear from the figures discussed above, the different indicators—in particular, those for inflation and money growth—evolve in similar ways over time. This suggests that they may in fact be driven by the

same factors. To explore this issue in an informal way, we regress the indicator variables on inflation, expected real growth (which was more significant than sentiment or the output gap in table 2), M3 growth, and the rate of appreciation of the effective exchange rate. Since these regressions are subject to serial correlation and heteroskedasticity, we assume first-order autoregressive errors and compute standard errors using the White approach. Overall, the regressions should be thought of as a way to capture the correlations between the indicators and the macroeconomic variables and should not be given any structural interpretation.

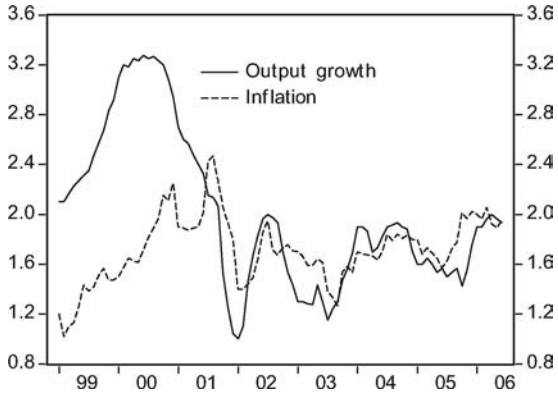
The results in table 3 show that expected real growth is correlated with both the inflation indicator and the output indicator. Thus, the Governing Council may react to the state of real activity because it sees stronger growth as suggesting that inflation risks have risen. This interpretation is supported by figure 2, which demonstrates that there is a strikingly close relationship between

Table 3. OLS Regressions of Indicators on Macroeconomic Variables: January 1999–June 2006

	Dependent Variable		
Regressors	**Inflation Indicator**	**Output Indicator**	**Money-Growth Indicator**
Inflation	−0.00	−0.82	−0.19
	(0.03)	(0.40)	(0.77)
Expected Growth	0.98***	0.88**	0.32
	(5.19)	(2.62)	(1.07)
M3 Growth	0.25***	−0.08	0.01
	(3.72)	(0.81)	(0.04)
Exchange Rate Change	−0.02*	−0.04*	0.01
	(1.95)	(1.91)	(0.60)
ρ	0.56***	0.72***	0.90***
	(4.66)	(8.06)	(15.17)
R^2	0.83	0.85	0.79

Note: Regressions include an unreported constant and allow for first-order autoregressive errors (ρ). t-values are in parentheses. Standard errors are computed using the White correction. *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent level, respectively.

Figure 2. Expected Output Growth and Expected Inflation



expected real growth and expected inflation since the middle of 2001.[16]

The results in table 3 also show that money growth is correlated with the inflation indicator. Faster money growth is thus associated with greater concerns being expressed by the Governing Council about the outlook for inflation. Finally, exchange rate changes are negatively correlated with the inflation and real-growth indicators. Thus, an appreciation of the exchange rate (a positive change in the exchange rate) leads the Governing Council to be less concerned about the outlook for inflation and, perhaps, more concerned about a slowing of the economy. Interestingly, none of the macroeconomic variables are significant in the regression for the indicator variable for money growth.

4.7 Indicators and Economic Conditions

At this stage it is useful to summarize what we can learn from figure 1 and the empirical analysis of the determination of the indicator variables in table 3. Several conclusions appear warranted.

First, there is no close link between headline or core inflation and the Governing Council's outlook for inflation. As suggested earlier, this may be because shocks to inflation largely reflect price-level

[16]The correlation coefficient over the sample June 2001–June 2006 is 0.63.

disturbances that have little implication for future inflation and therefore do not have an impact on the Governing Council's assessment of the risk to price stability. That interpretation is compatible with the finding that headline and core inflation are insignificant in the estimated reaction functions discussed above. More surprising is the finding that expected inflation is insignificant in the reaction function and, as suggested by panel A in figure 1, does not appear correlated with the indicator variable for inflation. We return to this issue in the next paragraph.

Second, there are strong correlations between data on, and the Governing Council's assessment of, real economic activity. Furthermore, real economic activity is also an important determinant of the Governing Council's assessment of the outlook for price stability. This suggests that the reason expected real growth is so strongly significant in the estimated reaction functions is that it is seen as containing information about future inflation pressures.

Third, the relationship between money growth and interest rates appears complex. Since the Governing Council has repeatedly stated that it attaches importance to monetary developments as an indicator of "risks to price stability," one would have expected that high money growth would have been associated with high or rising interest rates. Panel E of figure 1 suggests that the opposite is the case: periods of above-average interest rates are associated with money growth below average and vice versa. However, money growth is significant in the estimated reaction functions and, furthermore, is correlated with the indicator variable capturing the Governing Council's assessment of the risks to price stability. One way of reconciling these findings is to note that the figure captures the bivariate relationship between money growth and the outlook for price stability. By contrast, multivariate reaction functions control for economic activity, past interest rates, and the rate of depreciation of the exchange rate and are therefore more informative about the role of money in the Governing Council's conduct of monetary policy.

5. Assessing the Model

This section considers what can be learned about the interest rate setting of the Governing Council from the econometric model. To that end, we reestimate the model without including actual or

expected inflation since these variables were insignificant in the econometric analysis. The results are provided in column 10 in table 2. All variables are significant at the 5 percent level and have the expected signs. Thus, increases in expected real growth and money growth raise, and faster exchange rate appreciation reduces, the probability of an interest rate increase, given the level of interest rates last month. Furthermore, and as already noted, interest rate changes are of the "clearing the air" variety in that, holding economic fundamentals constant, the Governing Council is less likely to change interest rates this month if it did so last month.

5.1 Estimated Probabilities of Policy Changes

Table 4 presents information regarding the model's ability to account for interest rate changes in the sample. There are eighty-nine observations, of which seventy-one involve no change of the interest rate. Since a model with zero explanatory power would predict these correctly, it is more informative to ask how well the model predicts the eighteen interest rate changes that did occur. Interestingly, it correctly predicts four of the five 0.50 percent cuts in interest rates but none of the three 0.25 percent cuts.[17] Moreover, it predicts four of the eight 0.25 percent increases and one of the two 0.50 percent increases in rates. Overall, the model thus predicts nine of the eighteen policy changes. We also estimated a version of the model that does not distinguish between small and large changes in the repo

Table 4. Actual and Predicted Interest Rate Changes (Using the Model in Column 10 of Table 2)

	Actual	Predicted	Error
Large Cut	5	4	1
Small Cut	3	0	3
No Change	71	80	−9
Small Increase	8	4	4
Large Increase	2	1	1

[17]By "predict" an outcome, we mean that the fitted probability is highest for that outcome.

rate. That simpler model correctly predicts five of the eight cuts in interest rates and eight of the ten increases. It therefore appears that one reason why the model has difficulties in predicting interest rate changes is that it is asked to distinguish between small and large changes. A second reason is no doubt the fact that we use monthly data. Since the explanatory macroeconomic variables evolve slowly over time, the probability of a policy change is likely to be high for an extended period of time. It is difficult to predict exactly when in that period the policy change occurs—in particular, since it may partially depend on factors outside the model.[18]

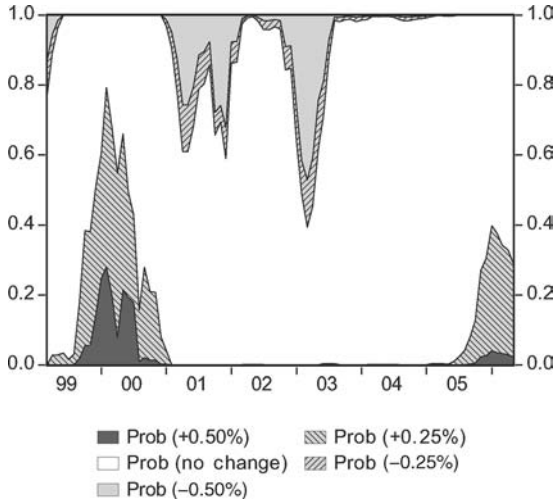
Figure 3 shows the evolution over time of the fitted probabilities of the different outcomes (since the probabilities are somewhat jagged, we plot three-month centered moving averages of the probabilities; the sample period is therefore March 1999–May 2006). The figure indicates that the tightening in monetary policy in 1999–2000 is associated with increases in the predicted probabilities of interest rate increases, and the cuts between 2001 and late 2003 occur in a period when the estimated probabilities of a relaxation of monetary policy are high. The process of monetary policy tightening that started in late 2005 also coincides with an increased probability of increases in interest rates. However, the fitted probabilities are quite low at this time.

To assess whether the estimated probabilities are plausible, we explore how well they are able to account for movements in the short end of the term structure of money-market rates, which were not used in the estimation of the ordered-probit models. More precisely, we regress the spread between three-month and one-month money-market rates ($SLOPE$) on a constant, its own lagged value and the difference between the probability of a 0.25 percentage point increase in interest rates and the probability of a 0.25 percentage point cut in interest rates ($DPROB$). Since money-market rates moved a lot in the final months of 1999, the sample is January 2000 through June 2006.[19] The results are as follows (with t-statistics in parentheses):

[18]For instance, central banks typically avoid changing interest rates when this may be misinterpreted as a response to outside pressure or as evidence that they "follow" another central bank.

[19]In the run-up to the new millennium, widespread concerns about computer malfunctioning on January 1, 2000 ("Y2K"), led to sharp increases in the demand for liquidity, which caused money-market rates to rise significantly.

Figure 3. Smoothed Probabilities of a Change in Monetary Policy



Note: Three-month centered moving averages. Regressors are assumed to be at their means.

$$SLOPE_t = \underset{(0.01)}{0.01} + \underset{(5.39)}{0.48}\, SLOPE_{t-1} + \underset{(5.03)}{0.21}\, DPROB_t + Error_t$$

with $R^2 = 0.73$ and $DW = 2.07$. The fact that *DPROB* is highly significant suggests that the model is useful for predicting the future course of monetary policy.

5.2 Money Growth

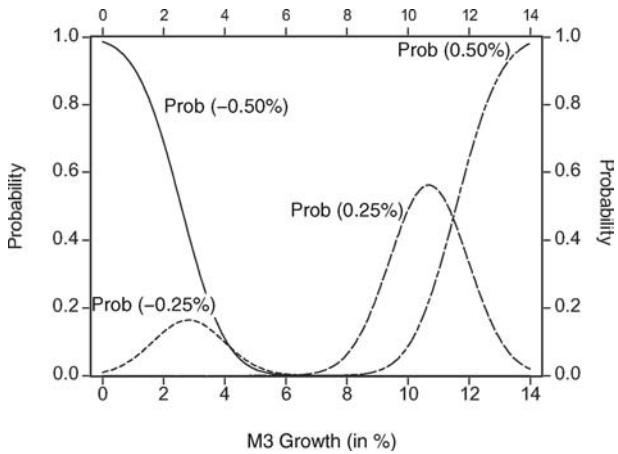
To explore whether and, if so, how the Governing Council has reacted to money growth, we calculate the probabilities of the five possible policy outcomes as a function of the growth rate of M3. Before considering the results, it is important to recall that the fitted probabilities depend on *all* variables and not only on money growth. To construct the plots, values for expected output growth, the lagged repo rate, and the change in the exchange rate must therefore be assumed. Since the results below serve as benchmarks for the subsequent analysis, it is natural to assume that all variables are at

their unconditional sample means and that there was no change in the repo rate last month.[20]

The results are shown in figure 4, which shows that the probability of a policy change is minimized at the average money-growth rate in the sample, which was 6.4 percent. Faster money-growth rates raise relatively quickly the probability of a 0.25 percent increase in the repo rate. As increasingly higher money-growth rates are considered, the probability of a 0.50 percent increase in the repo rate rises rapidly and the probability of a 0.25 percent increase starts to decline. Of course, similar relationships hold for the probability of interest rate cuts if money-growth rates below 6.4 percent are considered.

For comparison purposes, figure 5 contains a plot of the estimated probabilities of an increase in interest rates of 0.25 percent or 0.50 percent shown in figure 4, but it is drawn in such a way as to show the sum of the probabilities. To understand the figure, assume

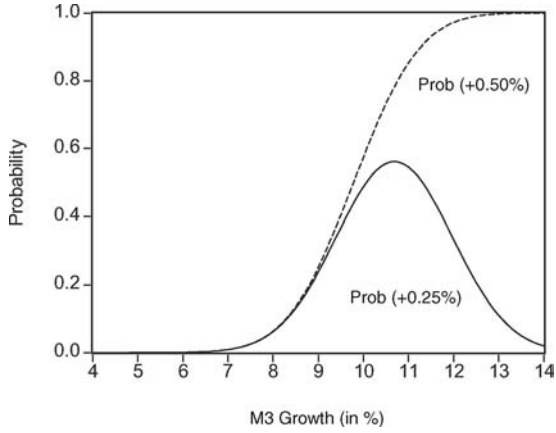
Figure 4. Probability of Policy Choices as a Function of Money Growth



Note: Regressors are assumed to be at their means.

[20]The sample means of the regressors are as follows: repo rate, 2.9 percent; expected output growth, 2.9 percent; and change of the exchange rate, 1.5 percent. For comparison, the average rate of inflation is 2.1 percent.

Figure 5. Probability of an Increase in Interest Rates



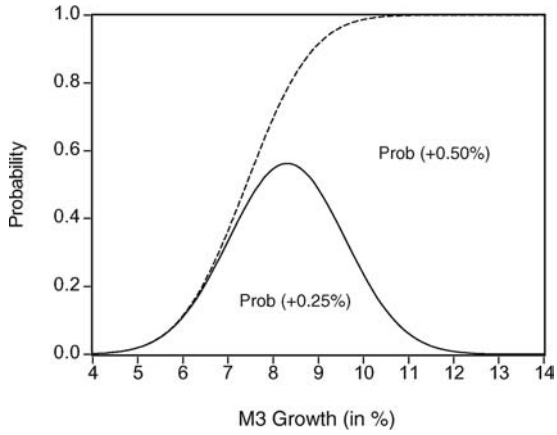
Note: Regressors are assumed to be their means.

that the money-growth rate is 8.7 percent—that is, the highest rate observed in the sample. If so, the estimated overall probability of an increase in interest rates is 18 percent. Decomposing that probability further, the estimated probability of a 0.25 percent increase is 17 percent and the probability of a 0.50 percent increase is 1 percent.

The figure suggests that variations in money-growth rates within the range observed in the sample—that is, annual rates of between 3.8 and 8.7 percent—have essentially no impact on the probability of interest rate changes. However, these estimated probabilities are computed under the assumption that the other variables are at their sample means. Of course, if the business cycle is at neutral, interest rates are at their mean, and the exchange rate is stable, a policy change in response solely to money growth being unusually high or low would be unlikely. Figure 6 shows the impact of money growth on interest rate decisions in an environment in which a policy change is more likely.

The probabilities are in this case constructed under the assumption that expected output growth is one standard deviation above its mean, which would be observed quite commonly in the sample. Furthermore, we assume that the lagged repo rate and the change in the exchange rate are at their means, conditional on expected output growth being one standard deviation above its mean, and

Figure 6. Probability of an Increase in Interest Rates



Note: Expected real output growth is assumed to be one standard deviation above its mean.

that the interest rate was not changed the previous month. Assuming a money-growth rate of 8.7 percent, in this case the estimated probability of a 0.25 percent increase in interest rates is 54 percent and the probability of a 0.50 percent increase is 33 percent, for an overall probability of a tightening of monetary policy of 87 percent.

The conclusion we draw from this analysis is that under "normal" economic conditions, when a change in monetary policy in any case is unlikely, money growth has little impact on the probability of a policy change. When economic conditions are weaker or stronger, however, the role of money growth in interest rate setting is much greater. Furthermore, this analysis suggests an explanation for why it is sometimes claimed that the ECB has disregarded money growth in setting interest rates. In the sample there is a strong, negative correlation ($\rho = -0.71$) between money growth and expected output growth. Thus, when money growth has been high, expected growth has tended to be low, reducing the overall probability of an interest rate increase.[21]

[21]Since the correlation between the repo rate and expected output growth is 0.61, it may be that variations in M3 growth largely reflect changes in the stance

6. Conclusions

The main conclusions of the analysis of the ECB's words and deeds are as follows. First, subjective measures of economic growth play an important role in the ECB's policy decisions. They are frequently referred to in the Governing Council's discussion of the economy in the editorials of the *Monthly Bulletin* and are statistically highly significant in the estimated reaction functions. The use of such subjective measures of economic conditions is sensible since they are strongly correlated with future output gaps. Furthermore, because of publication lags, the Governing Council uses real GDP data largely to assess its past judgment of economic activity. Output gaps appear to play no role in its analysis of current economic conditions.

Second, interest rate changes are more closely tied to economic activity than to inflation. The reason for this appears to be that while economic activity has an impact on the Governing Council's assessment of the outlook for inflation, shocks to actual inflation have been seen as largely temporary, reflecting price-level shocks, and thus as having little implication for future inflation. This has been the case even in situations in which inflation has exceeded the 2 percent level that constitutes the upper limit of the ECB's definition of price stability.

Third, the Governing Council reacts to M3 growth. The extent to which it does so, however, depends also on the other arguments in its reaction function. In "normal" times, the probability of a policy change is not particularly sensitive to variations in money growth. In times in which expected growth is high and the Governing Council perceives a greater risk of inflation, money growth has had a much larger impact on the probability of interest rate changes.

Fourth, and finally, by studying the ECB's statements about its assessment and outlook of economic conditions, we can obtain a better understanding about its conduct of monetary policy than is possible by solely estimating empirical reaction functions.

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of monetary policy. Of course, it would be natural for the ECB not to react to such movements.

Appendix 1. Summary of the Editorials in the ECB's *Monthly Bulletin* (January–December 1999)

This appendix illustrates the coding of the indicators. The coding of indicator variables has been made on the basis of the full editorials. The quotes provided below are intended to give a brief rationale for the coding.

***Monthly Bulletin*, Dates of Meetings, and Interest Rate Decisions**	**Outlook for Prices**	**Outlook for Real Activity**	**Monetary Analysis**
January 1999 (Jan. 7, 3 percent)	"Financial indicators support the view that market participants expect the current climate of price stability to continue." "no indications of significant upward or downward pressure on price developments" "The outlook for price developments ... can be regarded as being broadly balanced."	"negative impact on industrial confidence" "less optimistic view of future growth" "expectations of a slowdown in the growth of economic activity in the short term"	"M3 showed a stable trend in 1998."

February 1999 (Jan. 21 and Feb. 4, no change)	"Recent price developments are consistent with future price stability."	"Industrial output growth slowed down, capacity utilization in manufacturing decreased, and the decline in unemployment appears to have stalled." "Overall, while there are indications of a slowdown in real GDP growth, the extent and duration of such a weakening of economic activity remain a matter of uncertainty."	"Monetary data ... bear witness of the continuation of favorable prospects for price stability." "The 12-month growth rate of M3 ... was 4.7%, ... very close to the reference value."
March 1999 (March 4, no change)	"Recent price developments in the euro area do not appear to signal a threat to future price stability."	"Recent information on indicators of economic activity ... provided evidence of a sizable slowdown in the fourth quarter of 1998."	"Since monthly data for monetary aggregates can be rather volatile, the Governing Council decided to focus ... not on outturns for a single month but instead on the three-month moving average of the 12-month growth rate."

(continued)

***Monthly Bulletin*, Dates of Meetings, and Interest Rate Decisions**	**Outlook for Prices**	**Outlook for Real Activity**	**Monetary Analysis**
March 1999 (continued)	"The pattern of upward and downward risks to price stability has remained broadly unchanged."	"The deterioration in industrial confidence has continued into 1999." "On the downside, there is a slowdown in the ... economy."	"The acceleration of M3 was largely attributable to low levels of short-term and long-term interest rates and the environment of price stability ... as well as to technical factors." "In view of the uncertainty relating to special factors ..., the Governing Council did not consider the acceleration of M3 in January 1999 as a signal of upcoming inflationary pressures."

April 1999 (April 8, cut 50 basis points, to 2.5 percent)	"this stable rate of price increases" "Many projections for inflation rates ... have been revised downward recently."	"Recent data on economic activity ... confirmed a weakening toward the end of last year." "The euro area may need longer than previously expected to recover from the slowdown." "downward revisions in the growth forecasts" "reinforced expectations of somewhat lower inflationary pressure arising from economic activity"	"Money growth should not be seen as signaling upcoming inflationary pressures." "M3 growth ... may have been affected by special factors." "Monetary growth cannot, at the moment, be considered to be a risk to ... price stability."

(continued)

***Monthly Bulletin*, Dates of Meetings, and Interest Rate Decisions**	**Outlook for Prices**	**Outlook for Real Activity**	**Monetary Analysis**
May 1999 (April 22 and May 6, no change)	"The outlook for price stability ... is favorable." "Current monetary developments and other available indicators do not point to risks for price stability."	"Data ... do not yet indicate ... a rebound in economic growth." "The slowdown ... recorded in the last quarter of 1998 continued into early 1999." "Confidence indicators point toward some first signs of improvement.... Preliminary April figures indicate a slight recovery."	"Considering the special circumstances ... and the fact that the three-month moving average of M3 growth still remained close enough to the reference value ... , the Governing Council confirmed the judgment ... that current monetary trends should not be seen as a warning signal with regard to future inflationary pressures."

June 1999 (April 22 and May 6, no change)	"Consumer price developments in the euro area have been affected by higher oil prices. . . . However, this . . . is likely to constitute only a temporary influence on price developments." "Recent surveys and forecasts of inflation in the euro area covering the next one to two years indicate that consumer price increases are expected to remain below 2%."	"Available national data do not yet provide clear evidence of an improvement in the economic situation. . . . This notwithstanding, most forecasts point to a strengthening of activity."	"The latest three-month moving average of M3 growth . . . decreased." "Against this background, and taking into account the specific circumstances . . . , the Governing Council did not consider that recent monetary developments were indicative of future inflationary pressures."

(continued)

***Monthly Bulletin*, Dates of Meetings, and Interest Rate Decisions**	**Outlook for Prices**	**Outlook for Real Activity**	**Monetary Analysis**
July 1999 (June 17 and July 1, no change)	"In the short and in the medium term price developments should continue to be compatible with the Eurosystem's definition of price stability." "The outlook for the maintenance of price stability in the euro area remains favorable." "Downward risks to future price stability have receded." "Some moderate upward pressure on HICP increases still appears to be the most likely outcome."	"New data point to a stabilization of overall output growth in early 1999 and to an economic recovery in the second part of 1999." "The risks to this economic outlook seem to have become more balanced, as it appears that the likelihood of further downward pressures on economic activity is now less than in previous months." "There have been positive indications regarding economic activity ... in recent business and consumer surveys conducted in several euro-area countries."	"The three-month moving average of the annual growth rates of M3 ... increased." "Consequently, M3 growth remained above the reference value." "While this situation is not seen as signaling inflationary pressures at the present juncture, a reassessment may be appropriate once economic growth in the euro area starts to accelerate."

August 1999 (July 15 and July 29, no change)	"The outlook for ... price stability remains favorable. However, careful monitoring of the evolution of monetary and credit aggregates, and of the indicators which are now pointing more firmly toward an acceleration of economic activity in the euro area, will be necessary in the months to come."	"The outlook for the external environment continued to support the view of an acceleration of growth in the euro area." "Recent evidence has confirmed that output growth ... should recover in the second part of 1999." "Overall, the outlook for economic activity ... is more favorable now than it was a month ago."	"M3 growth remained above the reference value." "The annual increase in M3 fell." "The high rate of growth of credit ... and the development of M3 are not seen as signaling inflationary pressures at the present juncture."

(continued)

***Monthly Bulletin*, Dates of Meetings, and Interest Rate Decisions**	**Outlook for Prices**	**Outlook for Real Activity**	**Monetary Analysis**
September 1999 (Aug. 26 and Sept. 9, no change)	"Consumer price increases have been picking up moderately." "Further upward pressures on consumer prices can be expected." "While the prospects for continued price stability are good, it is necessary to remain vigilant with regard to upside risks."	"a number of signs that economic growth ... has started to recover" "The most recent areawide industrial production data support the picture of an ongoing cyclical improvement. Forecasts ... point to a strengthening of overall activity during the course of the year." "The downside risks pertaining to these projections have tended to recede."	"From a forward-looking perspective, upward risks to price stability merit close attention as monetary growth has been moving upward from the reference value." "However, as Monetary Union is still in a very early phase and figures for broad money growth have been subject to a number of revisions in recent months, the short-term monetary developments need to be interpreted with caution and the data need to be analyzed carefully."

October 1999 (Sept. 23 and Oct. 7, no change)	"The balance of risks to price stability remains on an upward trend." "Consumer prices data . . . show a further rise in the annual rate of change of the headline HICP." "This was mainly due to the increase in oil prices. . . . Seen in isolation, the increase in energy prices should only have a temporary effect upon consumer price increases, but it is essential that this effect should not trigger wage claims which prove incompatible with price stability."	"the more favorable expectations for real GDP growth" "There has been an upturn in growth this year." "Data available for the first half of 1999 are consistent with the view that there has been an upturn in growth." "The outlook for a continuing improvement in economic activity therefore remains favorable."	"The rate of growth of . . . M3 has gradually been moving away from the reference value." "Both the rising trend in M3 and high credit growth call for great vigilance on the part of monetary policy at a time of accelerating economic activity."

(continued)

***Monthly Bulletin*, Dates of Meetings, and Interest Rate Decisions**	**Outlook for Prices**	**Outlook for Real Activity**	**Monetary Analysis**
November 1999 (Nov. 4, raised 50 basis points, to 3 percent)	"Inflation rates are expected to increase, mainly as a result of the increase in oil prices earlier this year working its way through to consumer prices." "The annual rate of change in consumer prices ... remained unchanged at 1.2% in September.... But there are still expectations of some overall upward movement in the HICP rate in the short term, mainly connected with energy prices."	"Developments over the past few months indicate expectations of increasing economic growth." "Information available on economic activity continues to support the view that the prospects for the euro-area economy have continued to improve in recent months."	"Both pillars concurred in indicating that the balance of risks to future price stability had gradually been moving toward the upside." "The continued upward deviation of broad monetary growth from the reference value over recent months indicates there is ample liquidity in the euro area."

November 1999 (continued)	"To summarize, the downside risks to price stability which motivated the cut in ECB interest rates in April 1999 are no longer present."	"Real GDP growth increased in the second quarter of 1999, while data on industrial production indicate that the recovery in economic activity progressed further in the third quarter of 1999." "A further strengthening of economic activity can be expected in the near future."	"important to prevent the generous liquidity situation from translating into upward pressures on prices over the medium term" "M3 growth has been on a rising trend." "The deviation from the reference value, which has to be monitored and interpreted with caution, has been growing steadily in 1999." "Overall, the sustained and growing deviation of M3 growth from the reference value implied the existence of a very generous liquidity situation ... which could generate upward risks for price stability in the medium term."

(continued)

***Monthly Bulletin*, Dates of Meetings, and Interest Rate Decisions**	**Outlook for Prices**	**Outlook for Real Activity**	**Monetary Analysis**
December 1999 (Nov. 18 and Dec. 2, no change)	"Consumer price developments ... reflect the impact of higher oil prices." "Overall, the outlook for price developments will very much depend on a number of factors, and in particular on wage developments." "On balance, risks to price stability are on the upside."	"confirmation of a gradual recovery in domestic activity" "Available forecasts indicate a pickup in real GDP growth over the next one to two years." "The general picture is one of an ongoing economic expansion." "Real GDP growth is now widely projected to increase." "cyclical upturn ... clearly established"	"The annual rate of growth of M3 has been rising since the beginning of 1999." "These ... developments appear to have been determined mainly by the low level of interest rates and the pickup in economic activity in the euro area."

Appendix 2. Indicator Variables (January 1999–June 2006)

	1999–2000				2001–2002				2003–2004				2005–2006		
	Inf.	**Act.**	**Mon.**		**Inf.**	**Act.**	**Mon.**		**Inf.**	**Act.**	**Mon.**		**Inf.**	**Act.**	**Mon.**
Jan	0	−1	0	Jan	1	1	1	Jan	0	−1	0	Jan	0	−1	1
Feb	0	−1	0	Feb	0	1	0	Feb	0	−1	0	Feb	0	−1	1
Mar	0	−2	0	Mar	0	1	0	Mar	0	−2	0	Mar	0	−1	1
Apr	−1	−2	0	Apr	0	0	0	Apr	0	−2	0	Apr	0	−1	1
May	0	−1	0	May	0	0	−1	May	0	−1	0	May	0	−1	1
Jun	0	−1	0	Jun	0	0	0	Jun	0	−2	0	Jun	0	−1	1
Jul	0	0	0	Jul	0	0	0	Jul	0	−1	0	Jul	0	−1	1
Aug	0	0	0	Aug	0	−1	0	Aug	0	−1	0	Aug	0	−1	1
Sep	1	1	1	Sep	0	−1	0	Sep	0	0	0	Sep	0	−1	2
Oct	1	1	1	Oct	0	−1	0	Oct	0	0	0	Oct	0	−1	2
Nov	1	1	1	Nov	0	−2	0	Nov	0	0	0	Nov	1	0	2
Dec	1	1	1	Dec	0	−2	0	Dec	0	0	0	Dec	1	0	2
Jan	1	1	1	Jan	0	−1	0	Jan	0	0	0	Jan	1	0	1
Feb	2	2	2	Feb	0	0	0	Feb	0	0	0	Feb	1	0	1
Mar	2	2	2	Mar	0	0	0	Mar	0	0	0	Mar	1	0	1
Apr	2	2	2	Apr	0	0	0	Apr	0	0	0	Apr	1	0	1
May	2	2	2	May	1	0	0	May	0	0	0	May	1	0	1
Jun	2	2	2	Jun	1	0	0	Jun	0	0	0	Jun	1	0	2
Jul	2	2	2	Jul	1	0	1	Jul	0	0	0				
Aug	2	2	2	Aug	0	0	1	Aug	0	0	0				
Sep	2	2	2	Sep	0	−1	0	Sep	0	0	0				
Oct	2	2	2	Oct	0	−1	0	Oct	0	0	0				
Nov	1	1	1	Nov	0	−1	0	Nov	0	0	0				
Dec	1	1	1	Dec	0	−1	0	Dec	0	−1	0				

Note: Inf. = Inflation, Act. = Real Economic Activity, and Mon. = Money Growth.

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