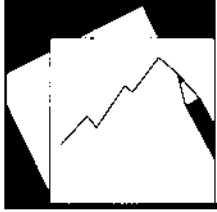


Working Paper

INTERNATIONAL MONETARY FUND



WP/08/252

IMF Working Paper

Writing Clearly: ECB's Monetary Policy Communication

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IMF Working Paper

IMF Institute and European Department

Writing Clearly: ECB's Monetary Policy Communication

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Authorized for distribution by Enrica Detragiache and Luc Everaert

October 2008

Abstract

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The paper presents a methodology for measuring the clarity of central bank communication, illustrating it with the case of the European Central Bank (ECB) in 1999–2007. The analysis identifies the ECB's written communication as clear about 95 percent of instances, which is comparable to, or even better than, other central banks for which a similar analysis is available. We also find that the additional information contained in the ECB's Monthly Bulletins helps to improve communication clarity compared to ECB's press releases. In particular, the Bulletins contain useful clarifying information on individual inflation factors and the overall forecast risk; in contrast, the bulletin's communication on monetary shocks has a negative, albeit small, impact on clarity.

JEL Classification Numbers: E31, E43, E47, E58

Keywords: Monetary policy, Communication, European Central Bank

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¹ Bulíř and Čihák are Senior Economists at the IMF; Šmídková is Head of Research at the Czech National Bank (CNB). Her contribution is in private capacity, and does not necessarily represent the views of the CNB. The authors would like to thank Helge Berger, Michael Ehrmann, Wolfgang Gerke, Felix Hammermann, Alex Mourmouras, Emil Stavrev, and Bernhard Winkler for useful discussions, and participants in an IMF seminar for insightful comments, and Michael Lamla for sharing the KOF data. Research assistance by Radu Păun is gratefully acknowledged. All remaining errors are those of the authors.

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I. INTRODUCTION

In this paper, we present an approach to measuring the clarity of the monetary policy message, using the European Central Bank (ECB) as an example. Central banks put much more emphasis on monetary policy communication now than they did only a couple of decades ago. Monetary policy transparency has been accompanied by a rapid growth of literature on monetary policy communication and benefits of policy transparency. Most of the empirical literature on central bank communication has focused on quantitative measures of monetary policy transparency: the volume of information being disclosed and the timeliness of its delivery, with much less attention paid to the clarity of the communication. We argue, however, that extensive and real-time disclosures are of little use if they have the potential to confuse the intended recipients. We see clarity as a crucial dimension of central banks' communication.

To analyze the clarity of the ECB's monetary policy messages, we use a methodology recently introduced by Šmídková and Bulíř (2007) and Bulíř, Šmídková, Kotlán, and Navrátil (2008). The methodology is based on analyzing the various measures of forecast risk that the public can obtain from central bank communication. The basic idea is that it is much easier for the public to understand monetary policy if all communications send the same message, pointing to the same type of forecast risk. We apply this methodology by comparing the signals from the various communication tools by the ECB, namely inflation forecasts, inflation targets, and verbal assessments of the inflation risks contained in the ECB's press releases and monthly bulletins.

Why focusing on the ECB and why now? First, the ECB is one of the world's premier central banks, whose monetary policy is subject to considerable media scrutiny and analytical interest. The literature on ECB monetary policy making has grown exponentially, and "ECB watching" has become an industry in itself.² Second, the ECB sees communication as an important part of its toolkit (ECB, 2004), and is committed to openness and transparency. It publishes an array of data, providing a fertile ground for empirical analysis. Indeed, the ECB's own staff has done interesting work on communication clarity (e.g., Winkler, 2000). Third, the ECB's monetary policy regime is unique in having a two-pillar approach to setting monetary policy: in the first ("economic") pillar, it monitors a wide range of data and uses econometric models to forecast inflation in the euro area; in the second ("monetary") pillar, it pays specific attention to monetary developments, which, in its view, play a crucial role in determining inflation in medium to long term (ECB, 2000 and 2004). Fourth, as the ECB celebrates its 10th anniversary in 2008, the recent financial turbulence has turned the spotlight on the challenges involved in communicating ECB's monetary policy stance.

² An illustration of this is the "ECB Watchers' Conference," organized annually since 1999 by the Center for Financial Studies in Frankfurt, and bringing together academics, market economists, and policymakers together to discuss Euro Area monetary policy (see <http://www.ifk-cfs.de>).

So, how clear is ECB's monetary policy communication? Our main finding is that during 1999–2007, the ECB's communication was clear in about 95 percent of cases and that the clarity improved in 2003–2007 as compared to 1999–2002. This compares favorably with communication clarity in other central banks using the same methodology (Šmídková and Bulíř, 2007 and Bulíř, Šmídková, Kotlán, and Navrátil, 2008). Furthermore, our findings suggest that some additional information is good for clarity—the detailed message from the ECB's monthly bulletins helps improve message clarity compared to relying just on the ECB's press releases. Specifically, it is useful to read the ECB's bulletins and look for information both on individual inflation factors (demand, supply, and external) and on the overall forecast risk as such information improves clarity. The usefulness of the bulletin's discussion of monetary developments is less clear; in fact, it seems to reduce somewhat the clarity of the communicated message, even though this negative impact is not large.

Our empirical findings have clear policy implications, indicating that the ECB's communication policy is generally appropriate, but also highlighting some areas for possible improvement. For example, putting more emphasis in the press releases and monthly bulletins on overall forecast risk and less emphasis on the monetary pillar may improve understanding of the monetary stance. The overall forecast risk, which already proved to be a valuable piece of information, could be enriched with a description of diversity of views within the Governing Council during the policy debate.

The outline of the paper is the following. Section II provides a motivation and an overview of the relevant literature. Section III explains the methodology and data being used. Section IV presents the results. Section V concludes.

II. MOTIVATION AND LITERATURE OVERVIEW

A. Communicating Clearly

Clear communication requires that the various communication tools send signals that are mutually consistent and well coordinated. With a variety of communication tools available and used in regular intervals, coordination of the message across these tools is crucial. For example, if a central bank report dwells on upward forecast risks and simultaneously the published inflation forecast indicates that inflation is expected to stay below the target, the public may become confused as to the course of future monetary policy. Such confusion is likely even if additional information supporting both messages is disclosed. In other words, sometimes less can be more (Dennis and Williams, 2007).

Clarity means that the various communication tools are well coordinated and that the central message is not polluted by contradictions. We are not arguing that central banks should suppress differences about, say, the measures of forecast risks in their communication. These differences may reflect disagreements within the staff, between the staff and policymakers, or they may simply reflect forecast uncertainty. However, unsorted diversity of views is likely to come at the expense of communication clarity. If the messages appear to contradict each

other without an explanation, the public cannot easily understand the central bank's decisions, harming the credibility of monetary policy.

We stress that message contradictions are different from policy or forecast uncertainty. The policymakers should avoid the former, while communicating the latter as clearly as possible. Details about policy and forecast uncertainty can be disseminated through press statements, monetary policy reports and other documents, or the board's voting pattern (if available).

We distinguish the following three sets of events that can occur in practice as regards clarity of a central bank's monetary policy communication:

1. *Clarity, no shocks.* The central bank consistently communicates economic developments and its policy response. No significant shocks occur. Consequently, the public correctly anticipates the eventual inflation outcome. This is obviously the most favorable outcome.
2. *Clarity and shocks.* The central bank provides a consistent explanation of the economic developments and its policies. However, unanticipated shock(s) push inflation significantly above or below the forecast. As a result, the public is surprised by the eventual inflation outcome. This is obviously a less favorable outcome. However, the public is likely to understand—owing to the central bank's consistent communication—that the deviation from the target is only temporary, and caused by unanticipated shocks. The central bank's credibility will not be damaged.
3. *Confusion.* The least favorable outcome is when the central bank's inflation forecasts, policy moves, and verbal explanations or other information provided by the central bank are mutually inconsistent. As a result, the public is likely to be confused throughout the process. One does not have to ask whether the public is surprised or not by the eventual inflation outcome: with inconsistent communication, it will not establish meaningful expectations of future inflation developments.

The distinction between surprise (the second event) and confusion (the third event) is important. The public is unlikely to worry about inflation surprises if these remain infrequent, distributed on both sides of the inflation forecast,³ and well explained ex post by the central bank.⁴ However, the public would almost certainly be concerned about confusing communication, because such communication makes it difficult to form meaningful inflation expectations. Long-lasting confusing communication would force the public to decouple its inflation expectations from the inflation target, and the public would cease to believe that the central bank follows a clear policy rule.

³ We ignore the possibility of an asymmetric inflation objective of the policymaker, whereby the policymaker is only concerned about overshooting the target and willingly ignores any undershooting.

⁴ See, for example, the formal letters prescribed for the Bank of England or Banco Central do Brasil in case of missing the target or periodical assessments of past forecasts in the Czech National Bank inflation reports.

B. Literature on Monetary Policy Communication

Modern central banks communicate more than they did only a couple of decades ago. The consensus among central bankers is “that transparency is not only an obligation for a public entity, but also a real benefit to the institution and its policies,” (Issing, 2005). The importance of transparent communication is mirrored by a rapid growth in the academic literature (for a survey see, for example, Geraats, 2002, Hahn, 2002, or Čihák, 2007).

The theoretical literature has stressed that much of the information communicated by central banks is noisy or imperfect. Dale, Orphanides, and Österholm (2008) explore the potential benefits and limitations of central bank communication in a model of imperfect knowledge and learning, suggesting that the value of communicating detailed, yet imperfect information is ambiguous. Rather than distracting the public with its imperfect understanding of things, the central bank may prefer to focus its communication on the information it knows most about. Conveying a “more certain” information may improve the public’s understanding of monetary policy to the extent that clear communication “crowds out” noise generated by imperfect information. See also the discussion in Woodford (2005).

Quantity of Communication

There is a substantial and growing body of empirical literature on the quantity and timeliness of central bank communication. Numerous empirical studies have addressed the economic consequences of greater transparency using recently developed indexes. An example of this approach is the research by Chortareas, et al. (2002) finding that transparency is negatively related to average inflation.

Substantial work in this area has been undertaken by the ECB staff. The ECB has evaluated its monetary policy strategy, indicating that one of the key issues was communication, “an area where the institutional and multilingual context of the euro area poses particular challenges,” and noting that one of the main purposes was to address “certain misunderstandings that had emerged in [the ECB’s] communication with the public” (ECB, 2003). It has reviewed its communications to the financial markets, concluding that the ECB’s open and timely communication on its objectives, strategy and assessment of the economic outlook has been reflected in a high level of predictability for its monetary policy decisions, comparable with other major central banks (ECB, 2006).

Quality of Communication

Communication quality is more challenging to measure than its quantity; consequently, far less empirical research is available on the quality of central bank communication. Some studies have attempted to gauge communication quality indirectly by analyzing whether central bank communication helps in predicting future monetary policy. For the ECB, Jansen and de Haan (2006a) study whether ECB’s communication helps in predicting its interest rate decisions, finding no statistically significant impact of communication (specifically, they find that communication-based models of policy rates do not outperform models based on

macroeconomic data in predicting decisions). Rosa and Verga (2005) examine whether the ECB's communication is effective, focusing on the monthly press conferences by the ECB president, and finding that the public generally understands and believes the ECB's signals. Along similar lines, the ECB (2007) cites a trend towards lower market volatility on the short-term money market as an indication that the understanding of the ECB's monetary policy framework and its communication has improved over time. Brand, Buncic, and Tutunen (2006), analyze high-frequency changes in the euro area money market yield curve, finding that ECB's communication results in significant changes in market expectations regarding future monetary policy developments, and that these changes have a sizeable impact on medium- to long-term interest rates. Jansen and de Haan (2007) find some, but not very robust, evidence of a negative relationship between ECB communication about risks to price stability (measured by the frequency and strength of the keyword "vigilance") and changes in euro area break-even inflation.

This line of empirical research points to a scope for improvements in ECB communication. Jansen and de Haan (2006b) find that comments by individual central bankers on interest rates, inflation, and economic growth in the Eurozone have often been contradictory. Berger, Ehrmann, and Fratzscher (2006) find that Euro area financial markets have yet to converge on a homogeneous view of the ECB, to overcome locational and national biases, and to adopt a common expectation-formation process. They suggest that there is a scope for the ECB to guide this convergence process by a careful and targeted communication policy.

A more direct approach to assessing the quality of central bank communication has been pioneered by Fracasso, Genberg, and Wyplosz (2003), who proposed basic criteria for good central bank communication. Specifically, they identified the following three criteria: clarity, consistency, and coverage of key issues (policy objectives, decision-making, analytical framework, input data, presentation of forecasts, evaluation of past forecast and policy). The authors examined 19 inflation-targeting central banks, other than the ECB, finding a positive link between report quality and policy predictability. The most closely aligned with this approach are the recent papers by Šmídková and Bulíř (2007) and Bulíř, Šmídková, Kotlán, and Navrátil (2008), which introduced a comprehensive methodology for measuring clarity of monetary policy communication. The methodology, which is based on analyzing measures of forecast risk that the public can obtain from various sources of central bank communication, is described in detail in the following section.

Focus of Communication

The ECB is still undergoing transition from an institution stressing the information content of monetary aggregates to one that focuses primarily on inflation forecasts. Berger, de Haan, and Sturm (2006) concluded that the ECB has been paying diminishing attention to monetary analysis and its statements became more correlated with the banks inflation-forecast analysis. Lamla and Rupperecht (2006) argue—based on the analysis of high-frequency interest-rate data—that financial markets have stopped paying attention to Governing Council communication regarding the monetary pillar altogether and react either to price news or

economic analyses. Conrad and Lamla (2007) show that, based on the high-frequency response of the euro-U.S. dollar exchange rate, ECB information on price developments are considered news by foreign exchange market participants, but that the ECB's assessments of developments in the monetary sector are not. ECB's Coffinet and Gouteron (2007) report that long-term market rates reacted significantly to M3 growth surprises, but short-term rates failed to react. Moreover, the impact of M3 news has dramatically declined over time, essentially becoming insignificant around the time of the ECB's monetary strategy clarification in 2003.

III. METHODOLOGY AND DATA

It is easier for the public to understand monetary policy if all communications are coordinated to provide the same message, pointing to the same type of forecast risk. We analyze the clarity of ECB monetary policy communication by comparing the signals from the inflation forecasts, inflation targets, and verbal assessments of the inflation risks contained in the ECB monthly bulletins, and the press releases.

A. Methodology (“Central Bank Watching for Dummies”)

Our methodology for central bank watching can be divided into three steps. A central role in this methodology is given to inflation forecasts and inflation targets, which play an important role even in central banks that do not employ an explicit inflation targeting framework, such as the ECB. We reconcile observed policy actions with inflation targets, official inflation forecasts, and verbal assessments of the economic environment. If the central bank presents an inflation forecast above/below the inflation target, it is expected either to adjust its policy stance to bring inflation closer to the target, or to explain its inactivity (Svensson, 1997).

Technically, the ECB inflation forecast is a conditional forecast—it is based on the technical assumptions that the future interest rates path will follow the existing market expectations, bilateral exchange rates remain unchanged over the projection horizon, and fiscal policy follows national budget plans in the individual euro area countries (ECB, 2004). Of course, if the central bank were to follow blindly the guidance the market, or if the markets were to perfectly anticipate all future policy rate changes, one would need to look only at the market expectations of future interest rates. In practice, the market expectations are those for three-month interbank interest rates, that is, a different maturity than the policy rates. Moreover, the evidence suggests that short-term market expectations are not particularly good predictors of policy rate changes and that central banks do not feel obliged to follow them (Podpiera, 2008).

The inflation forecast directly affects public behavior as long as the central bank is expected to act on this forecast according to some strategy or policy rule it laid out earlier. For example, if the central bank let it be known that it would follow a forward-looking strategy, the public would try to reconcile the published forecasts with monetary policy decisions

using a policy rule approximating such a strategy.⁵ Naturally, if the central bank “watchers” do not understand the central bank’s policy decisions from squaring the inflation forecast with targets, they are likely to look into the detailed assessments and explanations contained in the central bank’s monetary policy reports (or, in the ECB’s case, its monthly bulletins).

The ECB is not an inflation targeting central bank, but it has an explicit definition of price stability closely resembling an inflation target, and it regularly publishes inflation forecasts, which play an important role in its communication with the public. The existence of an explicit definition of price stability (which we can use as a substitute for the inflation target), and the explicit inflation forecasts are sufficient for the purpose of this analysis.

First step: inflation forecast and target

We first scrutinize the inflation forecast for the suggested direction of monetary policy. The key consideration is that forecasts projecting inflation above/below the target signal a possible monetary tightening/loosening, respectively, in the period ahead (which is equivalent to four quarters in our analysis). In other words, it should be possible to deduce the likely direction and extent of the upcoming change in monetary policy stance from the sign and absolute size of the difference between the inflation forecast and the target. The literature offers alternative ways of estimating the extent of potential tightening or loosening. In line with King (2005), we argue for a policy rule that is (i) simple, (ii) forward-looking, and (iii) enables subsequent inclusion of verbal information by the central bank. To this end, we choose a rule suggested by Batini and Haldane (1999), in which the policy rate reacts only to the inflation forecast deviating from the target. The advantage of this rule is that it is centered on variables that are observable in real time, and perhaps even more importantly, variables that central banks such as the ECB consider crucial for indicating policy stance. The public is more likely to use this type of a simple rule rather than a complex rule with hard-to-estimate unobservable variables, such as an output gap or equilibrium exchange rate gap. Our main results do not actually change materially if we use a Taylor rule instead of the forward-looking rule.

Information on inflation forecasts and targets is a natural starting point for evaluating the ECB’s communication, given that in the words of the ECB president, “inflation [...] is the only needle in the ECB’s compass.” (Trichet, 2008). We reiterate that the use of inflation forecasts and targets in this rule does not require that the central bank under study be an explicit inflation targeter (which the ECB is not). All that is needed is the presence of publicly available data on inflation forecasts and targets. The policy rule that we assume the public uses for central bank watching can be written down as follows:

$$i_t = \gamma i_{t-1} + (1 - \gamma) \left(\delta \left(\pi_{t+j}^{F,CB} - \pi^* \right) + i^n \right), \quad (1)$$

⁵ The rules used by the public to understand the policymakers are likely to be much simpler than the actual rules used by the latter (King, 2005).

where i_t is the policy instrument (the short-term nominal interest rate) expected by the public based on the rule; $\pi_{t+j}^{F,CB}$ denotes the inflation forecast formulated by the central bank at time t at quarterly frequency (we use $j=4$, that is, expectations for 1 year ahead); π^* is the inflation target; and i^n is a policy-neutral interest rate, equal to the sum of an equilibrium real interest rate and the inflation target. The policy-neutral real rate is assumed to be 2 percent, a typical number used in the literature on industrial countries, and recommended by several authors for the euro area (for a survey of the literature on the policy-neutral real rate, see e.g., Bernhardsen, 2005). Parameters γ and δ , an interest rate-smoothing coefficient, and the weight put on deviations of inflation from the target (capturing the “aggressiveness” of the response to deviations), respectively, are behavioral constants that the public extracts from policymakers’ decisions.

Rule parameterization

We approached the parameterization of the rule from several angles: indirectly, through calibration to obtain the “best fit” of actually observed interest rate changes, directly, by estimating a GARCH version of the rule, and also by taking into account previous estimations. The first two approaches provided values of γ and δ that are significantly different from those in Batini and Haldane (1999), who set the values of γ and δ equal to 0.3 and 2.0, respectively, a calibration that is notable for its lack of interest rate smoothing.⁶ However, that parameterization was chosen for the United Kingdom, and may not be relevant for the Euro Area in 1999–2007, a larger economy with lower and less variable inflation.

We started the indirect parameterization approach by examining correlation between predicted and actual interest rate changes (for the actual 1999–2007 data) as a function of δ (the aggressiveness parameter) in Figure 1. It is an upward-sloping function, suggesting that it would be reasonable to set a higher value of δ than used in Batini and Haldane (1999). Although the correlation coefficients are independent of γ , the values of γ influence the absolute values of the predicted interest rate changes. This can be seen from observing the estimated slope coefficient in a simple OLS regression of actual changes in policy rates on the predicted ones and a constant. The public bent on using the rule (1) will “guesstimate” such equation and look for a set of sensible coefficients that would give it, first, a reasonable overall fit and, second, a good predictor of turning points in the interest rate path. Regarding the latter, the public would look for a slope coefficient that is close, but not necessarily equal to, 1. We illustrate these choices in the slope coefficients for various combinations of γ and δ in Table 1. Mechanically, using these correlations, the ECB policymakers would seem to be fairly aggressive, with the parameter (δ) close to 5, but also reluctant to change the rate

⁶ The original calibration implies that the central bank would react to a 1-percentage point deviation of the 1-year-ahead inflation forecast from the target by increasing the policy rate by 2 percentage points. However, only 70 percent ($1 - 0.3$) of this increase would be effected instantaneously, bringing the rate adjustment to 1.4 percentage points.

quickly, as the smoothing parameter (γ) is as high as 0.95.⁷ Such calibration implies a small instantaneous adjustment: $0.5 = (1 - 0.9) \cdot 5$. This may violate the so-called Taylor principle, which stipulates that, to ensure convergence to the inflation target, the policy rate adjustment need to be larger than the forecast-to-target differential. To know whether the Taylor principle is indeed violated we would need to know the extent to which price setters and consumers are forward-looking, that is, the rule itself provides insufficient information. In a forward-looking economy, market participants understand that the central bank will do what is needed to bring back inflation to the target, and therefore, there is no need for the central bank to react as aggressively (Woodford, 2001).

Figure 1. Correlation of Actual and Forecasted Policy Rate Changes

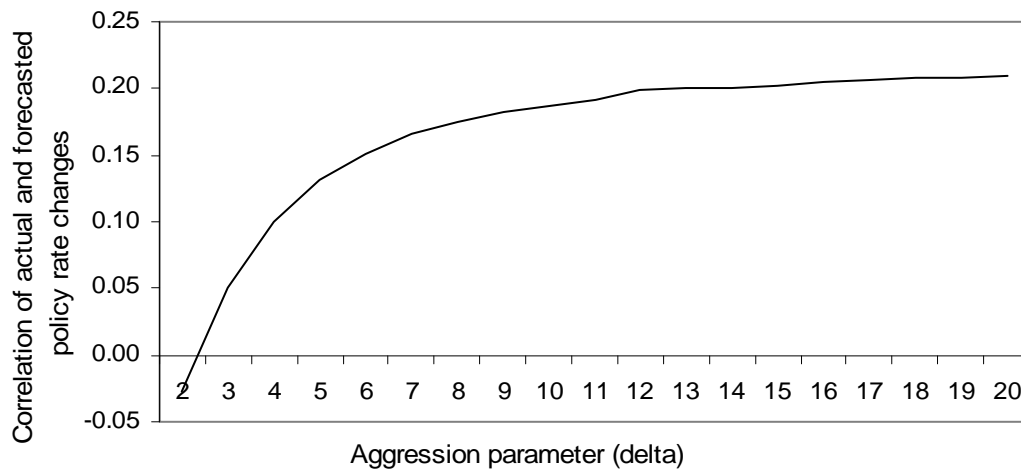


Table 1. Slope Coefficient in a Regression of Actual and Forecasted Policy Rate Changes

Smoothing (γ)	Aggression (δ)				
	10	5	4	3	2
0.10	0.05	0.07	0.07	0.04	-0.03
0.20	0.06	0.08	0.07	0.05	-0.03
0.30	0.06	0.09	0.10	0.05	-0.03
0.40	0.08	0.11	0.12	0.06	-0.04
0.50	0.09	0.13	0.15	0.07	-0.05
0.60	0.11	0.16	0.20	0.09	-0.06
0.70	0.15	0.21	0.29	0.12	-0.08
0.80	0.23	0.32	0.59	0.18	-0.12
0.90	0.45	0.63	0.59	0.36	-0.23
0.95	0.90	1.27	1.18	0.73	-0.46

⁷ It has been shown, however, that high estimated policy inertia may result from rule misspecification—excessive inertia makes distant future policy rates unpredictable as such a policy become close to random walk (Söderlind, Söderström, and Vredin, 2005).

The direct approach involved estimating the rule econometrically (Table 2). We employed the generalized autoregressive conditional heteroscedasticity (GARCH) estimator, which has been used in modeling time series with time-varying volatility clustering. It seems appropriate also in this case, because ECB's monetary policy has been characterized by a combination of periods with stable interest rates and periods characterized by substantial and persistent interest rate adjustments. The overall tests are satisfactory—the estimates explain about 86 percent of the variation in the policy rate—and estimated parameters are statistically significant and fairly close to those obtained from the indirect approach above.

Table 2. GARCH (1,1) Estimate of the Policy Rule for the ECB, 2000–2007

Notes: Following equation (1), the ECB's Policy Rate is regressed on a constant, its lagged value, and the forecast-to-target difference; the conditional variance of the error term is $\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \sigma_{t-1}^2$, where the error term is $\varepsilon_t = \sigma_t^{1/2} \eta_t$ and $\eta_t \sim iid(0,1)$, $N=20$. * and ** denote significance at the 90 percent and 95 percent significance level, respectively.

Empirical equation

	Coefficient	Std. Error
Constant	0.080	(0.089)
Smoothing	0.937**	(0.061)
Aggressiveness	5.963*	(3.317)

Variance equation

Constant	4.49E-05	(0.003)
ε_{t-1}^2	-0.228	(0.172)
σ_{t-1}^2	1.122**	(0.273)

Summary statistics

Adjusted R ²	= 0.809
F-statistic	= 17.1
DW statistics	= 1.903180

Finally, we decided to adjust the simulation and regression results for the biases in policy rules with serially correlated shocks. As shown by Rudebusch (2002) and Carare and Tchaidze (2005), a policy rule with interest rate smoothing is difficult to distinguish from a rule with serially correlated policy shocks. While in the former persistent deviations from the output gap and inflation response occur because policymakers are deliberately slow to react, in the latter these deviations reflect policymakers' response to other persistent factors. As we show later in the Data section, inflation shocks in the eurozone have been indeed serially correlated. This makes us believe that the GARCH estimate of smoothing, γ , is biased upward: it implies that only 7 percent of the otherwise robust policy rate reaction will be translated into an actual increase. In other words, the contemporaneous policy rate adjustment of only 0.4 percent with respect to an inflation forecast exceeding the target by 1 percentage point is hard to believe.

Based on the above considerations, we set $\gamma=5$ and $\delta=0.7$ in the benchmark version of the rule, and test the robustness of our results with alternative parameterizations of γ . While these parameterizations are different from those in the original Batini-Haldane paper, they seem to reflect better the situation in the Euro area economy and the ECB's more cautious policy approach, and yet uphold the Taylor principle. Moreover, these values are closer to the various estimates of γ and δ obtained by Aurelio (2005) for a sample of countries. Numerically, the instantaneous rate adjustment to 1 percentage point forecast-to-target deviation is set to equal to 1.5.

Our results are, of course, rule-, target-, and calibration-dependent and we did extensive robustness checks vis-à-vis all three factors. Regarding the inflation target, we set $\pi^* = 2$ percent. The exact wording of ECB's target is to keep inflation "below, but close to, 2 percent," that is, an asymmetric target with the 2 percent as a ceiling (rather than a midpoint), and a floor that is unspecified, but close to 2 percent. Setting $\pi^* = 2$ percent is therefore an approximation, but it is one that seems to fit reasonably well actual ECB behavior. An alternative is to derive the target directly from the ECB's two-year-ahead inflation forecasts, assuming that the forecasting model is set to converge to a specific medium-term value, that is, an inflation target.⁸ Averaging all available two-year inflation forecasts yields $\pi^* = 1.8$ percent. While the target changes matter, our model is robust to these changes, because we require inflation forecast to be *substantially* different from the target to trigger expectations of a hike. To this end, we try different thresholds for defining the when a difference becomes substantial—see the discussion of Table 3 below.

Second step: subsequent policy steps

Next, subsequent policy rate changes either validate or contradict the understanding of monetary policy provided in the first-step communication of the inflation forecast. If the observed monetary policy decisions correspond to the suggested direction of monetary policy, the public's expectations about the rule-based policymaking are validated, and the public's expectations of inflation will presumably converge toward the official inflation target (King, 2005). If, however, the observed policy changes contradict the direction suggested by the forecast, the public will look for clarification of the monetary policy surprise.

The public knows, of course, that the policymakers do not follow any rule blindly and that the public's rule is an approximation anyway. When will the public start being concerned about the departure from the rule and start looking for the additional information that the central bank used in its policy decision? The public may want to compare the forecast implied by the policy-rate changes and a simple policy rule ($\pi^{F,P}$) to the officially

⁸ This is, indeed, the typical approach used in most central bank forecasting models.

published, model-based inflation forecast ($\pi^{F,CB}$). The rule-based inflation forecast can be obtained by rearranging (1):

$$\pi_{t+j}^{F,P} = \frac{\Delta i_t}{(1-\gamma)\delta} + \frac{i_{t-1} - i^n}{\delta} + \pi^* \quad (2)$$

Thus, $\pi^{F,P}$ measures what the public thinks inflation will be, given the structure of the rule and the policy rate changes effected by the central bank during the period under consideration. By subtracting $\pi^{F,CB}$ from both sides we obtain our measure of the departure from the rule:

$$\pi_{t+j}^{F,P} - \pi_{t+j}^{F,CB} = \frac{\Delta i_t}{(1-\gamma)\delta} + \frac{i_{t-1} - i^n}{\delta} - (\pi_{t+j}^{F,CB} - \pi^*) \quad (3)$$

A substantial difference between the simple rule-based forecast ($\pi^{F,P}$) and the central bank's official, model-based forecast ($\pi^{F,CB}$) indicates that the policymakers found some additional information modifying the policy implications of the published, model-based forecast and their policy rate decision deviated from that suggested by the staff. For example, a positive, that is, “inflationary,” forecast update $\pi_{t+j}^{F,P} - \pi_{t+j}^{F,CB}$ could be explained by an unexpected depreciation of the domestic currency, implying that the policymaker attached greater weight to these inflation factors than the operators of the model-based inflation forecast.

When is a shock or a deviation from a target “substantial”? Previous studies for emerging market economies (Šmídková and Bulř, 2007; Bulř, Šmídková, Kotlán, and Navrátil, 2008) have used 1 percentage point as a substantial deviation. Given that this study covers a large advanced economy, with a more stable macroeconomic environment, the threshold for “substantial” deviations from the target is set lower, namely 0.5 percentage points, in the benchmark calibration. Another difference is that the equilibrium real interest rate was assumed to be lower, namely 2 percent, compared to 3 percent.

To assess the robustness of our calculations, we present the results for alternative parameterizations of the rule. These include a higher smoothing parameter (0.8 instead of 0.7), a higher aggressiveness parameter (7 instead of 5), a higher sensitivity to shocks (lowering the threshold for “substantial” shocks to 0.25 percentage points), and less emphasis on the target (increasing the threshold for substantial deviations to 0.75 percentage points). Table 3 provides an overview of the alternative parameterizations

Table 3. Parameterization Overview

	Policy Rule Parameters			Substantial?	
	gama (smoothing)	delta (agression)	real equilibrium interest rate	shocks	deviations from target
(1) Benchmark calibration	0.70	5.00	2.00	0.50	0.50
(2) More aggressive reaction to inflation	0.70	7.00	2.00	0.50	0.50
(3) Slower policy rate adjustment	0.80	5.00	2.00	0.50	0.50
(4) More emphasis on shocks	0.70	5.00	2.00	0.25	0.50
(5) Less emphasis on target	0.70	5.00	2.00	0.50	0.75

Source: authors' parameterization.

Third step: reading what the central bank says

Finally, verbal assessments of current and future developments and any additional information, such as monetary growth, uncertainty about the inflation forecast and so on, are taken into account. Unlike forecasts and policy rate adjustments, which are in a numerical format, verbal assessments are necessarily vaguer. On the one hand, verbal assessments describe quantifiable information that may not be explicitly modeled in the forecasting framework, say, labor market conditions or global financial conditions. The policymaker envisions some impact of these shocks on domestic inflation, but their impact may be difficult to quantify or even include in the existing modeling framework. On the other hand, verbal assessments reflect unquantifiable factors that reflect the policymaker's uncertainty vis-à-vis the forecast (Šmídková, 2003). Verbal qualifications thus mirror uncertainty about the data, forecast model, or both.

To this end, we perused the ECB's *Monthly Bulletins* and extracted all verbal assessments, broad money growth rates, qualifications about forecast uncertainty, and the presumed direction of all these effects on inflation.⁹ Each verbal comment was catalogued into a supply, demand or external environment category, further divided into subcategories, and classified as pushing the rate of inflation either higher or lower. Each factor was given an equal weight, because *Monthly Bulletins* do not provide information on the factors' quantitative importance. To this end, we denote factors that put upward pressure on the inflation rate as 1, and factors that put downward pressure on the inflation rate as -1. All factors were then aggregated across categories to obtain an index-like measure of what the policymaker thought of the inflation factors in any given quarter. This index can then be directly compared with the implied inflation factors obtained from the comparison of the two forecasts.

The framework described above hinges on the superior information content of the monthly bulletins as compared to other communication devices, and on the public's ability to extract

⁹ Giavazzi and Mishking (2006) used a similar approach to assess selected periods of Swedish monetary policy.

it. There are two potential criticisms of this approach, although neither stands up to serious scrutiny. First, it has been argued that the *Monthly Bulletins* are primarily “staff” documents and that policymakers’ views are better found in other documents, such as press releases or ex post interviews. In our view, the staff-to-policymaker distinction is largely superficial, even though the policymakers and staff may disagree on the relative importance of various inflation factors. Moreover, augmenting the monthly bulletin information with information from the monthly press releases does not seem to change the results materially.

Second, it could be argued that the bipolar grading of inflation factors $(-1;1)$ does not capture their magnitude. We argue that the public does not scrutinize a 60-page document for the pleasure of it, but that it searches for a general message in the text and for the implications that the verbal assessments have for downward or upward pressures on inflation. This implies that the public will only scrutinize reports if the implied forecast update is large enough to justify the time-consuming, and hence costly, scrutiny of the report.

Putting it all together

To summarize, the communication timeline in our analysis is as follows. First, the inflation target is announced. Second, the central bank publishes official inflation forecasts $(\pi_{t+j}^{F,CB})$. Third, the public observes the evolution of policy interest rates, computes rule-based inflation forecasts $(\pi_{t+j}^{F,P})$, and derives an estimate of the implied forecast update. Fourth, the public scrutinizes the *Monthly Bulletins* for verbal assessments and tries to match them with the implied update, providing this update is large enough to warrant the effort. Regarding the former, we simply sum up all policy-rate changes within each quarter, and regarding the latter, we average the monthly announced factors. Finally, the public observes inflation at the end of each horizon and concludes whether the central bank communicated (1) well and that there were no surprises, (2) well, but there were surprises, or (3) in a confusing manner.

B. Data

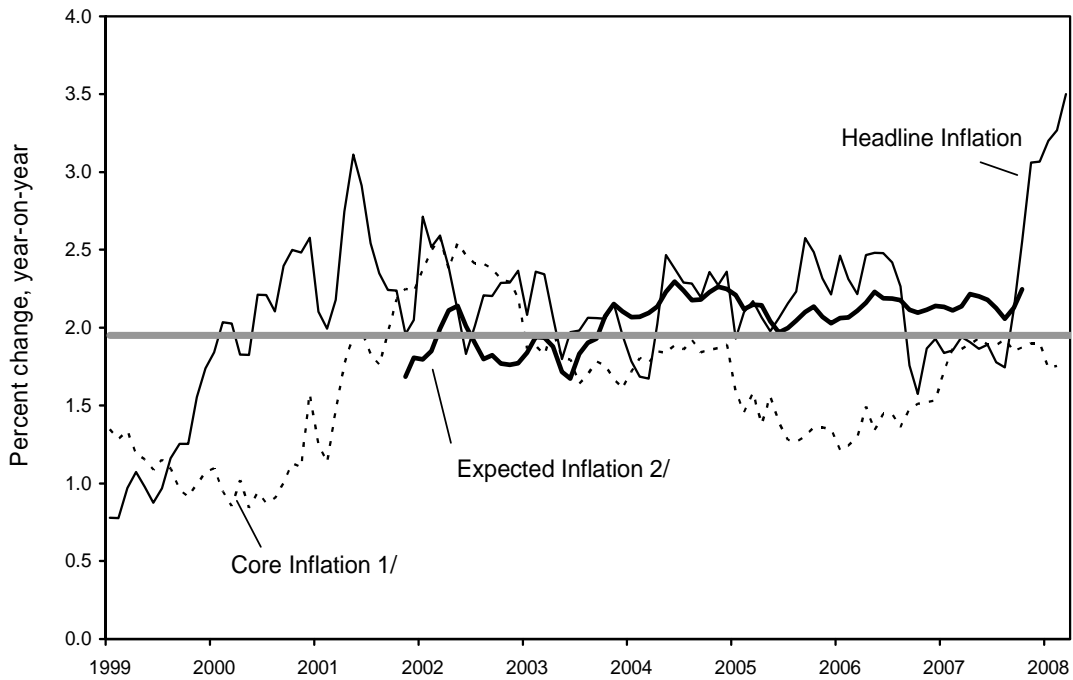
We use publicly-available data from the ECB and Eurostat. The measure of inflation used in this study is year-on-year change in the price level in the last month in each quarter. Figure 2 illustrates the development in the headline inflation, core inflation, and inflation expectations extracted from bond prices. The chart suggests that even though the headline inflation has been in excess of the 2 percent target for considerable periods of time, the core inflation has been more subdued, and that there has been a substantial degree of stability in inflation expectations.

Policy interest rates (repo rates) are end-period observations for each quarter. Using quarterly averages does not have a material impact on our results.

To analyze ECB’s communication, we use two main data sources: the introductory statement at the ECB’s monthly press conference, and ECB’s *Monthly Bulletin*. The focus on these two communication instruments reflects the key role they play in ECB’s communication and their

use in previous analyses of the ECB. The introductory statement at the monthly press conference is, in ECB's own words, "the principal vehicle of the ECB's communication" (ECB, 2007). It explains in depth the monetary policy decisions taken by the Governing Council and it conveys its collective, real-time view on the monetary policy stance. The statement attracts substantial interest from financial market participants, while at the same time reaching out to a wider audience through the media. The *Monthly Bulletin* provides a more detailed and comprehensive economic, financial and monetary analysis one week after the first Governing Council meeting each month.¹⁰ We use the full set of press statements and the *Monthly Bulletins* available. That is a rather rich information source, consisting of 108 press statements and 108 *Monthly Bulletins*, covering the period from January 1999 to December 2007.

Figure 2. Actual Inflation, Inflation Targets, and Inflation Expectations



Sources: Eurostat; ECB; and Haver Analytics.

1/ Excludes energy, food, alcohol, and tobacco.

2/ Break-even expected inflation derived from inflation-indexed sovereign bonds.

¹⁰ In addition to these two principal communication tools, the members of the Governing Council also give interviews and speeches to many different audiences during the inter-meeting period, explaining the decisions taken and commenting on topics within the ECB's sphere of competence. Those communications (and their contribution to clarity) are not covered by our analysis. The exclusion of the verbal communication is likely to bias our results towards higher clarity, since previous research on individual board members' statements suggests that these communications generally lower the market's ability to anticipate policy decisions as well as the future path of interest rates (Ehrmann and Fratzcher, 2005)

From the *Monthly Bulletin*, we extracted the inflation forecasts, using the midpoint of the forecast range in our calculations. For example, the December 2007 *Monthly Bulletin* states that the average rate of increase in the overall HICP “is projected to be between 2.0% and 2.2% in 2007, between 2.0% and 3.0% in 2008, and between 1.2% and 2.4% in 2009,” with the relevant midpoints of 2.1 percent, 2.5 percent, and 1.8 percent for 2007, 2008, and 2009, respectively. We need to stress that individual members of the Governing Board may use some other (e.g., their own) forecasts of inflation instead of this forecast; nonetheless, as the ECB staff forecast, it plays a central role in the ECB’s communication. We also need to reiterate that the forecast is a conditional forecast—it is based on the technical assumptions that the future interest rates path will follow the existing market expectations, bilateral exchange rates remain unchanged over the projection horizon, and fiscal policy follows national budget plans in the individual euro area countries (ECB, 2004).

From the press statements and *Monthly Bulletins*, we extracted all verbal assessments, broad money growth rates, qualifications about forecast uncertainty, and the presumed direction of all these effects on inflation.¹¹ Each verbal comment was catalogued into a supply, demand or external environment category, with further subcategories as follows: fiscal, domestic cycle pressure, wages, external demand, domestic asset price bubbles, and other (for aggregate demand), weather and similar shocks, capacity utilization, labor supply, regulated prices, structural changes, retail competition, indirect taxes, and others (for aggregate supply), and exchange rates, global financial shocks, oil/gas prices, agricultural prices, and other (for external factors). Factors that put upward pressure on the inflation rate were denoted as 1, and factors that put downward pressure on the inflation rate as -1. All factors were then aggregated across categories to obtain an index-like measure of what the policymaker thought of the inflation factors in any given quarter (Figure 3). This index can then be directly compared with the implied inflation factors obtained from the comparison of the two forecasts. Among other things, the figure illustrates that, first, the balance of the factors has been clearly positive for most of the sample period, except for 2001–03, and second, the inflation factors—with the exception of aggregate supply factors—have been serially correlated (Table 4).

¹¹ The first round of the information extraction was done by Radu Păun and each of his entries was cross-checked by one or more of the authors to ensure consistency and limit subjectivity of the classification.

Table 4. Inflation Factors and Their Serial Correlation

The type of shock	One lag	Two lags
Aggregate demand	0.41	0.05
Aggregate supply	0.06	-0.02
External environment	0.49	0.42
All combined	0.49	0.21

Source: European Central Bank; authors' calculations.

To assess the robustness of our coding of the press statements, we have cross-checked our index measure of the inflation factors with the “KOF Monetary Policy Communicator for the Euro Area” (KOF MPC), published by the Swiss Federal Institute of Technology in Zurich (KOF).¹² The KOF MPC is an index, based on the ECB president's statements on risks to price stability as made during the monthly press conference. Higher values of the index should indicate higher risks to price stability and higher likelihood of policy rate increases. The correlation between our overall index and the KOF MPC index is positive (0.74) and highly statistically significant (Table 5, last row, first column). This gives us a reasonable degree of confidence into the coding system used in this paper.

Table 5. Comparison of the KOF MPC Index with Our Indexes

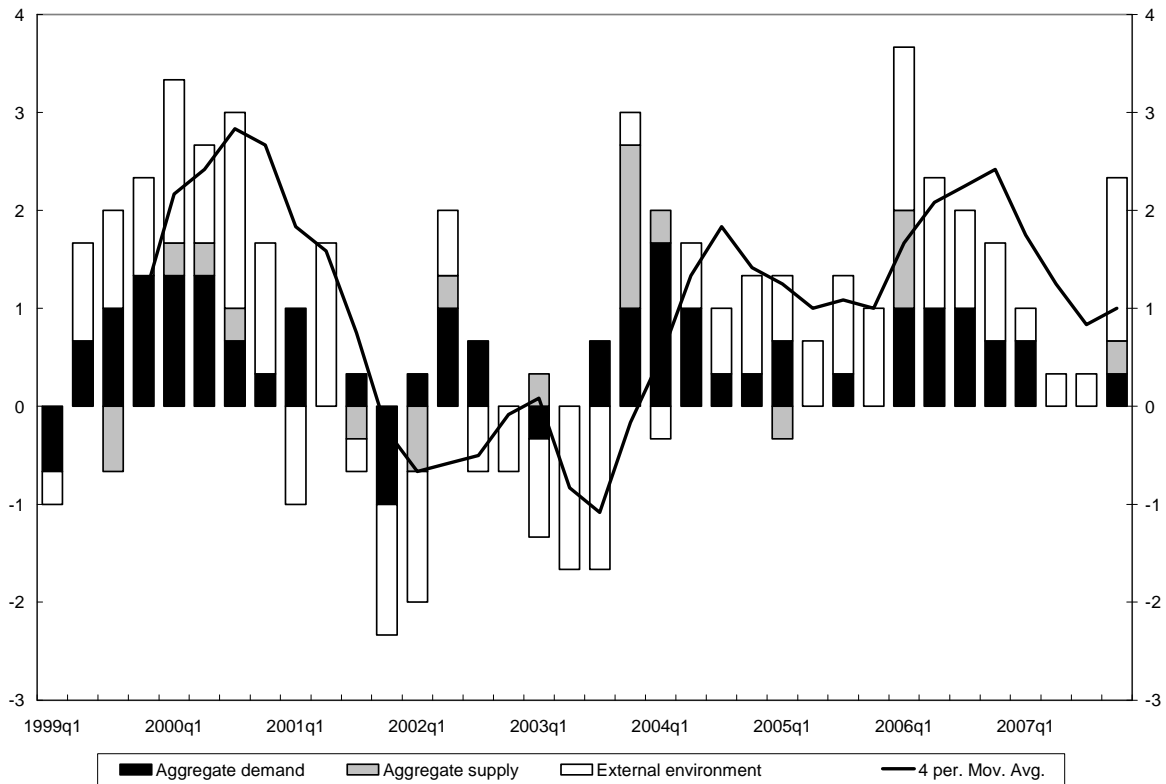
	KOF MPC	Aggregate Demand	Aggregate Supply	External Environment
Aggregate Demand	0.33 (0.05)			
Aggregate Supply	0.05 (0.78)	0.29 (0.09)		
External Environment	0.57 (0.00)	0.32 (0.06)	0.27 (0.11)	
All Combined	0.74 (0.00)	0.16 (0.35)	-0.02 (0.89)	0.62 (0.00)

Note: The upper number in each cell is Spearman's rank correlation coefficient; the bottom number in brackets is the corresponding p-level.

Source: authors' calculations; KOF MPC data from KOF.

¹² The coding for KOF MPC is provided by Media Tenor, a media research institute. For methodology and data, see <http://www.kof.ethz.ch/publications/indicators/communicator/en>.

Figure 3. ECB Bulletins: Inflation Factors

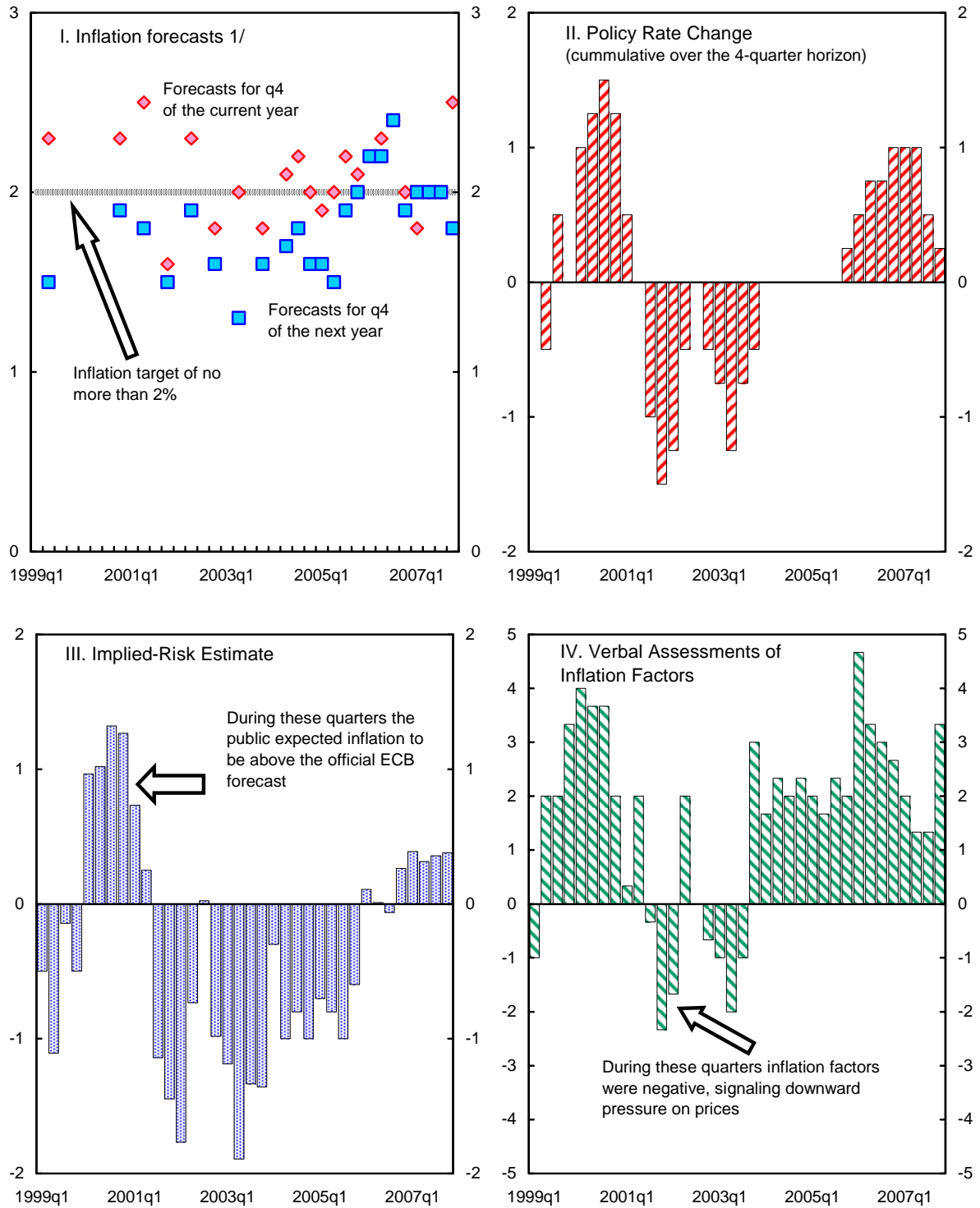


Source: European Central Bank; authors' calculations.

C. ECB Watching

Our analysis of the data is summarized graphically in Figure 4. The public uses ECB's 4-quarter-ahead inflation forecasts (Chart I in Figure 4) and policy rate changes (Chart II) to derive an estimate of the implied risk (Chart III). Positive values of the implied risk indicate that the public's expectations of inflation—conditional on the policy rule—are above the official ECB forecasts, $\pi_{t+j}^{F,P} > \pi_{t+j}^{F,CB}$. If the deviation is sizable, say, ± 1 or ± 0.5 , then the public would expect this deviation to be explained by the verbal assessments (Chart IV). If the deviations are not explained, the public would be confused.

Figure 4. ECB: Central Bank Watching



Source: European Central Bank; author's calculations

1/ ECB's forecasts were initially published annually, semiannually from 2001, and quarterly from 2004q3.

IV. RESULTS

This section presents the main results of the analysis. We present the analysis in several steps, depending on how much the recipients of ECB's communications are assumed to read in ECB's documents. First, we present the case when the public reads the press release only. Second, we assume that the public reads the *Monthly Bulletin*, but focuses only on the individual risk factors and not on the overall assessment or risks. Third, we assume that the readers take into account also the overall assessment risk. Fourth, we assume that the readers also take into account the monetary pillar information.

To assess the robustness of our findings, we present the results of each of these steps for different calibrations of the underlying model, namely the benchmark calibration and the four alternative calibrations summarized in Table 3 (more aggressive reaction to inflation, slower policy rate adjustment, more emphasis on shocks, and less emphasis on the target). The main results are summarized in Figures 5–8; and robustness checks are provided in Figure 9.

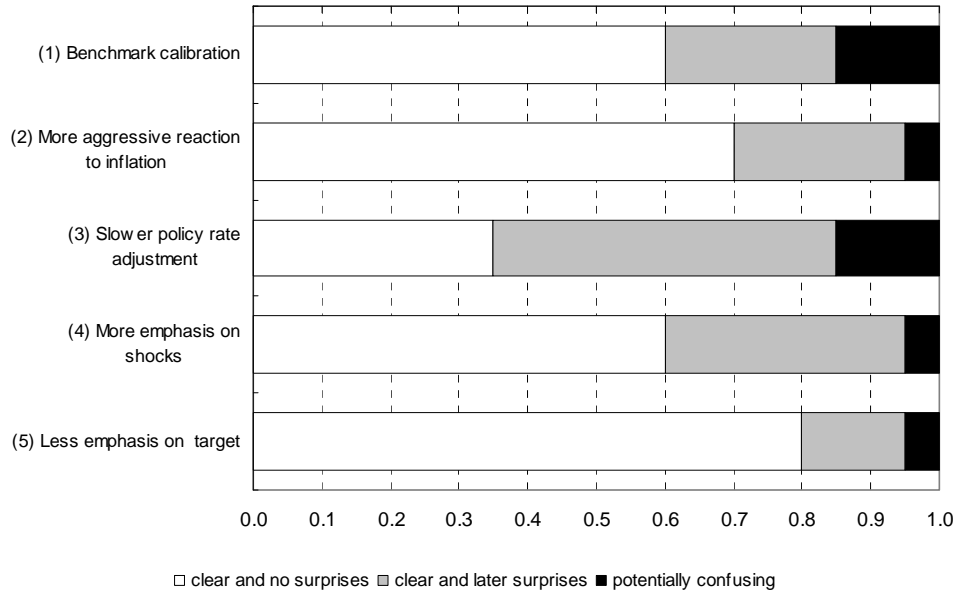
A. Press Statements Only

First, we analyze the situation when the recipients of ECB communication read press releases only. In this case, the ECB communication is found clear in about 85–95 percent of all cases and potentially confusing in the remaining 5–15 percent cases depending on the calibration used (Figure 5). When we concentrate only on the period since mid-2003 (which is when the monetary policy framework was adjusted in several important respects), the share of potentially confusing communication is even lower, 5 percent in the benchmark specification and 0 to 5 percent in the alternative specifications).

B. Monthly Bulletins: Shock Descriptions

The public may decide to rely on the ECB bulletin, extracting much richer information on the demand, supply, and external shocks, but not forecast risks. This is similar to the previous approach, but the readers are left to make their own assessments of forecast risks. In the benchmark calibration, this case yields a result similar to the previous case: the ECB communication is found clear in about 80 percent of all cases and potentially confusing in the remaining 20 percent cases. The alternative calibrations provide slightly worse results: 60–85 percent of clear cases and 15–40 percent of potentially confusing cases, respectively, in the various alternative calibrations (Figure 6). Overall, these results are marginally worse than when the press release is relied on only, presumably on the account of missing assessment of the forecast risk.

Figure 5. Press Statements Only
 (i) Full Sample (1999 to 2007)



(ii) Mid-2003 to 2007

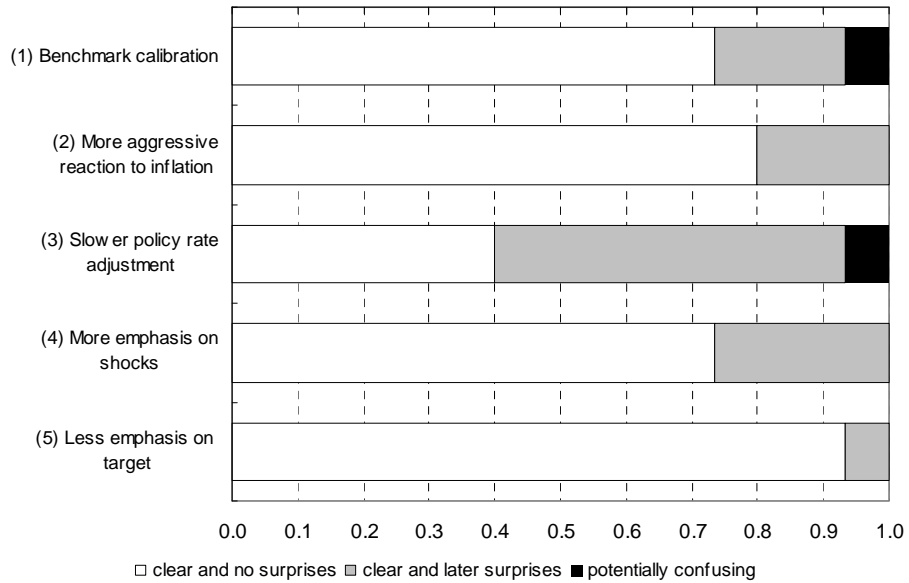
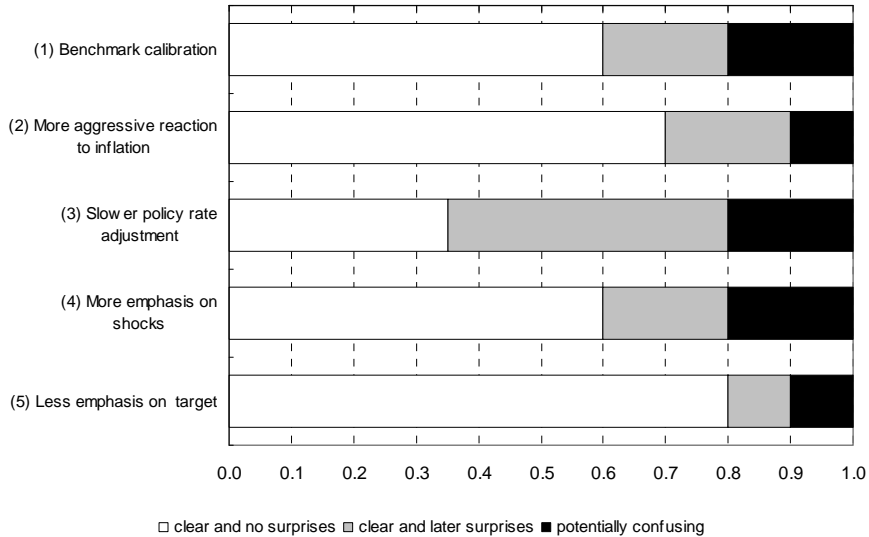
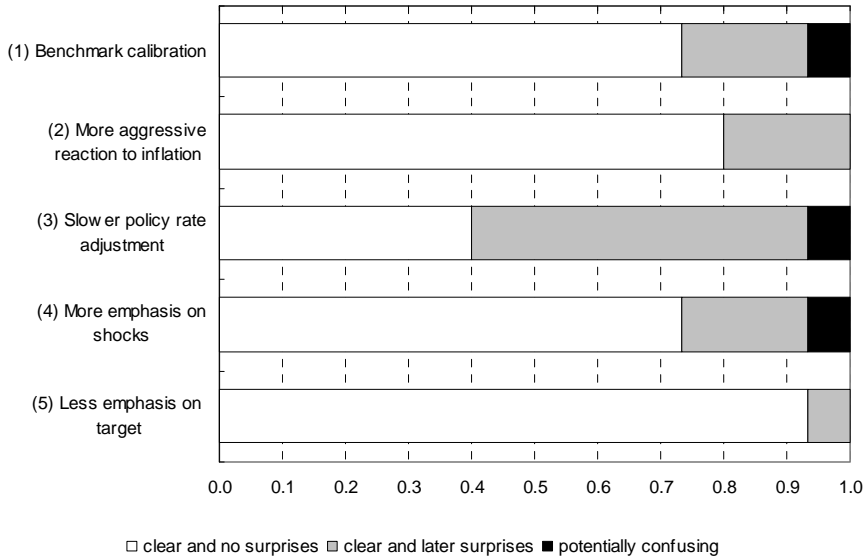


Figure 6. ECB Bulletin, Shock Description, but No Forecast Risk Assessment
 (i) Full Sample (1999 to 2007)



(ii) Mid-2003 to 2007

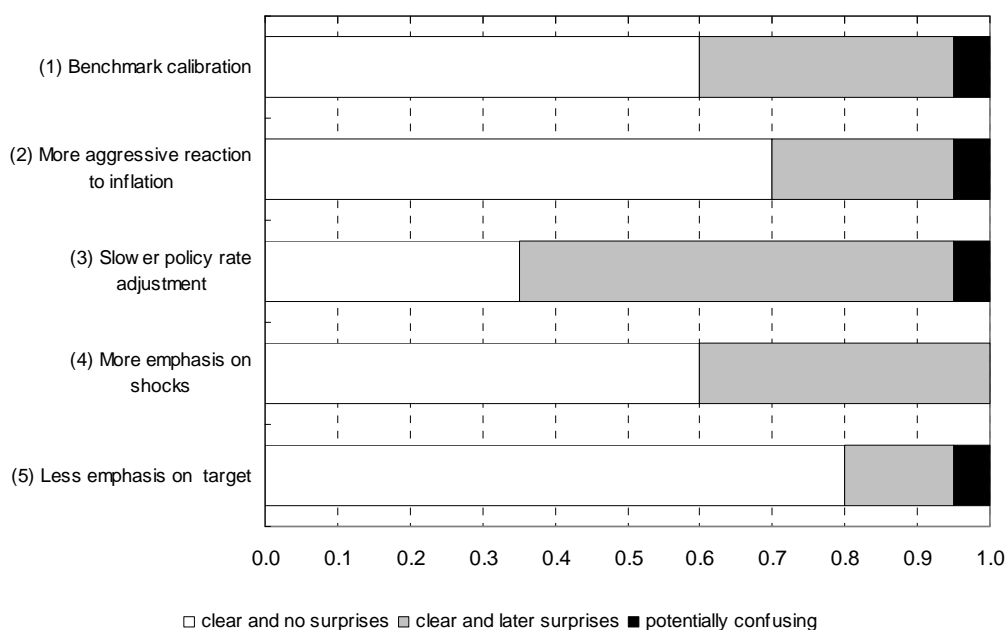


C. Monthly Bulletins: Shock Descriptions and Forecast Risk Assessment

It is likely that an advanced reader will take into account not only all shocks, but also the ECB’s description of the forecast risk. We find that this approach significantly improves communication clarity. Specifically, in the benchmark specification, the ECB communication is found clear in 95 percent of all cases, and potentially confusing in only 5 percent of cases. In the alternative specifications, the communication is clear in 75–95 percent of all cases, and confusing in 5–25 percent of all cases, depending on the calibration (Figure 7). Whereas the ECB bulletins provide explicit assessments of the overall forecast risk, little information is

available on how the forecast uncertainty has affected the policymaking in the ECB. Unlike central banks that describe diversity of views of voting member during the policy debates, either verbally or in terms of the voting pattern, the ECB does not provide any such information. This is obviously an important input for the central bank watchers—unchanged policy rates after a close vote (say, 4:3) signal a very different forecast uncertainty than unchanged policy rates after all policymakers voted in favor (Šmídková and Bulíř, 2007). Additional information would be beneficial for the ECB watchers.

Figure 7. ECB Bulletin, All Shocks



D. Monthly Bulletins: Adding Monetary Pillar Information

Lastly, given the role that the ECB attaches to its monetary analysis, we consider the case when the reader in addition to all the above information absorbs also the information that the ECB's *Monthly Bulletin* provides on the “monetary pillar.” In other words, in this case, the reader processes three types of information: (i) information on the three types of shocks; (ii) information on the forecast risk; and (iii) information on price risks based on the ECB's monetary analysis (the monetary pillar). Thus, we ask here whether the presumed role of money in the medium-to-long term (ECB, 2000 and 2004) has an impact on understanding the short-term monetary policy decisions.

Extracting the information from the monetary pillar is not completely straightforward. An important element of the pillar is an explicit “reference rate” for money (M3) growth, announced in 1998 and set since then at 4.5 percent (ECB, 2000, 2003, 2004). M3 growth rates above (below) this reference value could be considered to indicate upside (downside) risks to inflation. In 2003, the ECB has carried out a review of its monetary policy framework (ECB, 2003), noting that the reference value relates to medium to long term

inflation risks and emphasizing the importance of disaggregated monetary analysis. This suggests that the reference value for M3 growth should not be taken completely mechanically, at least not after 2003. Nonetheless, subsequent documents (e.g., ECB, 2004) and statements by senior ECB officials¹³ reconfirmed the usefulness of the reference rate in understanding ECB's monetary policy.

For an ECB watcher, a basic way of extracting the monetary pillar information is therefore is to simply compare the M3 growth rate with the reference rate, 4.5 percent, and interpret money growth rates above (below) the reference rate as indicating upward (downward) inflation risks in the medium to long term. A somewhat more sophisticated approach, which we use in this paper, is to use the reference value comparison as a baseline, but also cross-check it with explicit statements in ECB's monthly bulletins and press releases about conclusions from the monetary analysis.¹⁴ If the explicit statements indicated an opposite conclusion about inflation risks than what would be implied by a simple comparison of the M3 growth rate and the reference rate, then the ECB watcher can be expected to use the explicit statement, which reflects a more detailed, disaggregated analysis. We have used the latter approach, because it is more consistent with the ECB's description of its monetary policy framework; however, the results derived using the simpler approach are virtually the same.¹⁵

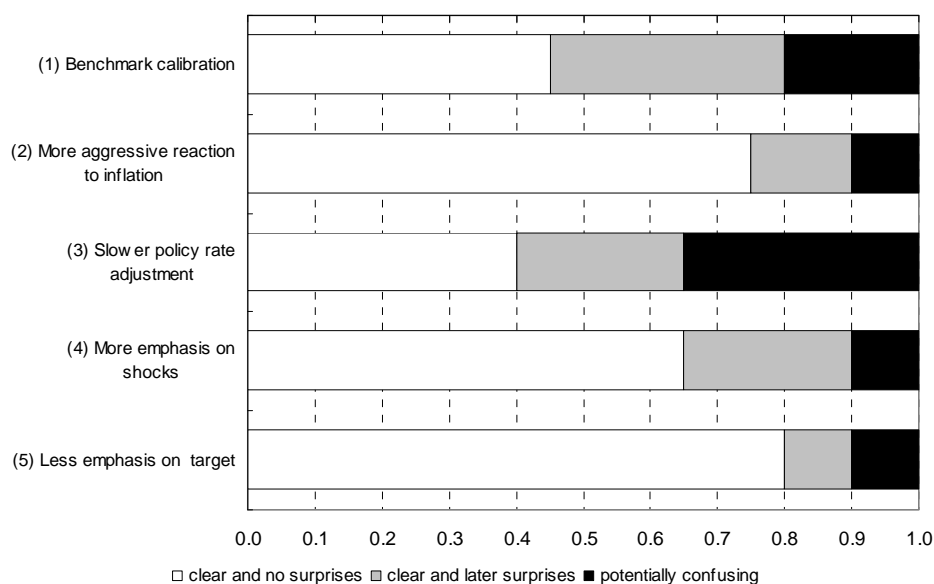
We find that the addition of the monetary information does not help in understanding ECB's short-run monetary policy decisions, and, indeed, may confuse public compared to the other approaches. In the benchmark calibration, the results are the same as in cases A (press release only) and B (inflation factors only from the bulletin) discussed above, i.e., 80 percent of communication can be characterized as clear, while 20 percent has potential for confusion. However, the results for the robustness calibrations are worse than in any of the above cases. Specifically, depending on the specific calibration, the communication is clear in only 60–85 percent of cases, and has potential for confusion in 15–40 percent of cases (Figure 8).

¹³ See, e.g., a Financial Times interview with Mr. Trichet, the ECB President, conducted on May 14, 2007.

¹⁴ The bulletins are more specific in this regard. For example, the July 2008 bulletin states (on page 7) that “the monetary analysis helps to support the necessary medium-term orientation of monetary policy by focusing attention on the upside risks to price stability prevailing at medium to longer horizons.”

¹⁵ The practical difference between the two approaches to extracting information from the monetary pillar is small because the M3 growth rate has consistently exceeded the reference rate, and the explicit statements, when available, have usually indicated upward risks to inflation.

Figure 8. Monetary Pillar

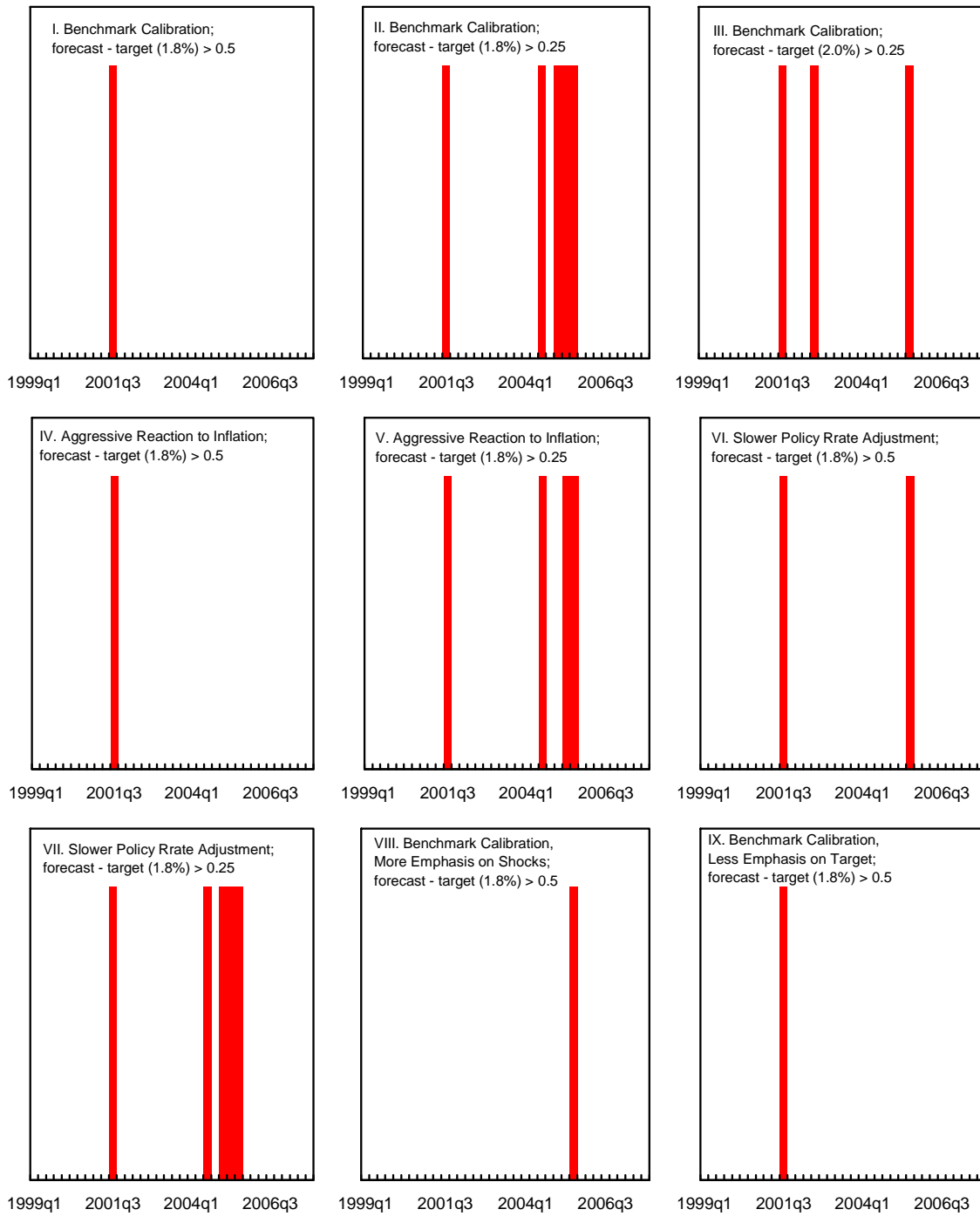


E. Summary Discussion: When Could the Public Get Confused?

The results from the preceding sub-sections suggest that ECB monetary policy is best understood from reading the ECB's Monthly Bulletin and the inflation factors therein, in addition, augmenting these with the bulletin's forecast risk. The second best approach, which also happens to be less time consuming, is to read the press releases. Bulletins without the forecast risk fare marginally worse than the statements. Adding monetary developments information to the picture results to an even less clear communication, however, the loss in clarity is not large. The results in the preceding sections illustrate that the precise share of confusing communication changes depending on the calibration of the rule.

So, when could the public get confused? Using the baseline calibration with 0.5 percentage point sensitivity of forecast-to-target deviations and the inflation target of 1.8 percent, we find only one case of confusing communication (Chart I in Figure 9). Following the 2001q3 above-target forecast ($\pi_{t+j}^{F,CB} - \pi^* = 0.3$) the policy rate was lowered by 1 percentage point during the next four quarters, however, the sum of verbal assessments was too close to zero (-0.33). Thus, the verbal assessments failed to explain the case for the rate cut. Assuming that the public expects the ECB to react to smaller forecast-to-target deviations, say, 0.25, the share of confusing communication increases to 4 (or one-fifth of all cases), see Chart II in Figure 9. For example, in 2004q3 the ECB did not change the rate despite negative implied risks—conditional on the forecast the public expected a cut—and the verbal assessments were strongly biased toward pro-inflation shocks (the sum was equal to 2). Assuming the ECB's inflation target is 2.0 rather than 1.8 percent, other things being the same as in Chart II, the number of confusing cases drops from 4 to 3 (Chart III). Charts IV–IX show, similarly, the instances of potentially confusing communication for the various parameterizations described in Table 3.

Figure 9. Confusing Communication: Robustness Checks



Source: Author's calculations.

Notes: The calibrations correspond to those in Table 2 in the main text.

F. Comparison with Other Studies

How does the clarity of ECB's communication compare to other central banks? A similar methodology to the one used here has been employed recently by Bulíř, Šmídková, Kotlán, and Navrátil (2008) for the inflation-targeting central banks of Chile, the Czech Republic, Hungary, Poland, Thailand, and Sweden in 2000–05. The authors found that in those countries, the three communication tools—inflation targets, inflation forecasts, and verbal assessments of inflation risk contained in inflation reports—provided a consistent message in five out of six observations, i.e. comparable to the results that we have found for the ECB.

Our findings on the mixed contribution of the monetary pillar toward understanding the policy of the ECB are consistent with some of the recent academic literature on the topic discussed earlier (Berger, de Haan, and Sturm, 2006). In general, this is in line with the findings that the short-term, indicator properties of monetary aggregates, while still useful for inflation forecasts at medium-term horizons, are limited (e.g., Hofmann, 2008; Roffia and Zaghini, 2007). Some studies show that financial markets have stopped paying attention to Governing Council communication regarding the monetary pillar altogether and react either to price news or economic analyses. In particular, based on the analysis of high-frequency interest-rate data for horizons of up to twelve months, Lamla and Rupprecht (2006) find that the ECB's comments on price developments—which tend to be based on its economic analysis—during the press conference after General Council meetings prices are strongly reflected in financial market activity controlling for other determinants. In contrast, they fail to find any reaction whatsoever to the ECB's reporting of monetary aggregates.¹⁶ Conrad and Lamla (2007) show that, based on the high-frequency response of the euro-U.S. dollar exchange rate, ECB information on price developments are considered news by foreign exchange market participants, but that the ECB's assessments of developments in the monetary sector are not.

According to ECB research, the financial market reaction to the monthly release of M3 data is mixed. Looking at intraday market reactions across the yield curve, Coffinet and Gouteron (2007) report that market rates between a horizon of one and five years reacted significantly to M3 growth surprises over their full sample period from November 2000 to November 2006. However, as in Lamla and Rupprecht (2006), there is no significant impact on interest rates either at shorter horizons or at horizons beyond five years. Moreover, the authors show that the impact of M3 news has dramatically declined over time across all interest rate horizons, essentially becoming insignificant before or around the time of the ECB's monetary strategy clarification in 2003. The authors attribute this decline to a learning process, where market participants have gradually understood that M3 surprises have no predictable impact on either policy rates or medium-to-longer-term ECB actions.

¹⁶ Their basic setup is a regression of the change in the Euribor rate on the post-meeting policy rate surprise (i.e., the difference between the actual post-meeting policy rate and the expected rate) and an communication indicator based on Berger, de Haan, and Sturm (2006).

V. CONCLUSIONS

Our main result is that the ECB's communication has been clear in about 95 percent of cases. This finding is based on an extensive analysis of ECB's inflation forecasts, inflation targets, and verbal descriptions of inflation factors, risk assessments, and monetary pillar information in monthly bulletins and press statement. The overall clarity is either comparable or higher than in other central banks for which similar analysis has been carried out. Furthermore, the ECB's monthly bulletin contains useful additional information that helps improve message clarity compared to ECB's press releases. Specifically, the bulletins contain useful detailed information on individual inflation factors (demand, supply, and external) and also on the overall forecast risk. This information improves clarity. The usefulness of the bulletin's discussion of monetary shocks is less clear; in fact, it seems to reduce somewhat the clarity of the communicated message, even though this negative impact on clarity is not large. Our findings are consistent with much of the recent academic literature on the topic. In particular, the limited usefulness of the monetary pillar information has been corroborated by Berger, de Haan, and Sturm (2006), Lamla and Rupprecht (2006), Conrad and Lamla (2007), and Coffinet and Gouteron (2007) using different data sets and methodologies.

The policy implication of our paper is that although the overall ECB's communication is predominantly clear, some scope remains for improvements in clarity. Additional emphasis on overall forecast risk in the press releases and the monthly bulletins could improve understanding, and so would less emphasis on the monetary pillar. Also, the overall forecast risk could be enriched with some description of diversity of views of Governing Council members during the policy debates.

References

- Aurelio, Marcela Meirelles, 2005, “Do We Really Know How Inflation Targeters Set Interest Rates?” Federal Reserve Bank of Kansas City Working Paper RWP 05-02 (Kansas City: Federal Reserve Bank). Available at: <http://www.kc.frb.org/PUBLICAT/RESWKPAP/PDF/RWP05-02.pdf>.
- Batini, Nicoletta, and Andrew G. Haldane, 1999, “Forward Looking Rules for Monetary Policy,” Bank of England Working Paper, No. 91 (London: Bank of England). Available at: <http://www.bankofengland.co.uk/publications/workingpapers/wp91.pdf>.
- Berger, Helge, Michael Ehrmann, and Marcel Fratzscher, 2006, “Forecasting ECB Monetary Policy: Accuracy Is (Still) a Matter of Geography,” IMF Working Paper No. 06/41 (Washington: International Monetary Fund). Available at: www.imf.org/external/pubs/ft/wp/2006/wp0641.pdf.
- Berger, Helge, Jakob de Haan, and Jan-Egbert Sturm, 2006, Does Money Matter in the ECB Strategy? New Evidence Based on ECB Communication, CESifo Working Paper No. 1652. Available at: http://www.cesifo-group.de/~DocCIDL/cesifo1_wp1652.pdf.
- Bernhardsen, Tom, 2005, “The Neutral Interest Rate,” Norges Bank Staff Memo, 2005/1 (Oslo: Norges Bank). Available at: http://www.norges-bank.no/upload/import/publikasjoner/staff_memo/memo-2005-01.pdf
- Brand, Claus, Daniel Buncic, and Jarkko Tutunen, 2006, “The Impact of ECB Monetary Policy Decisions and Communication on the Yield Curve,” ECB Working Paper No. 657 (Frankfurt: European Central Bank). Available at: <http://www.ecb.int/pub/pdf/scpwps/ecbwp657.pdf>.
- Bulíř, Aleř, Kateřina Šmídková, Viktor Kotlán, and David Navrátil, 2008, “Inflation Targeting and Communication: It Pays Off to Read Inflation Reports” IMF Working Paper No. 08/234 (Washington: International Monetary Fund). Available at: <http://www.imf.org/external/pubs/ft/wp/2008/wp08234.pdf>.
- Carare, Alina and Robert Tchaidze, 2005, “The Use and Abuse of Taylor Rules: How Precisely Can We Estimate Them?” IMF Working Paper No. 05/148 (Washington: International Monetary Fund). Available at: <http://www.imf.org/external/pubs/ft/wp/2005/wp05148.pdf>.
- Chortareas, G., Stasavage, D., Sterne, G., 2002. “Does It Pay to Be Transparent?” Federal Reserve Bank of St. Louis *Review*, Vol. 84, No. 4, pp. 99–118. Available at: <http://research.stlouisfed.org/publications/review/02/07/99-118Chortareas.pdf>.
- Čihák, Martin, 2006, “How Do Central Banks Write on Financial Stability?” IMF Working Paper No. 06/163 (Washington: International Monetary Fund). Available at: <http://www.imf.org/external/pubs/ft/wp/2006/wp06163.pdf>.

- Čihák, Martin, 2007, “The Art and Science of Monetary Policy Communication,” *Czech Journal of Economics and Finance*, Vol. 57, No. 11–12, pp. 490–8. Available at: <http://journal.fsv.cuni.cz/mag/article/show/id/1089>.
- Coffinet, Jerome, and Sylvain Gouteron, 2007, Euro Area Market Reactions to the Monetary Policy Developments Press Release, ECB Working Paper No. 792 (Frankfurt: European Central Bank). Available at: <http://www.ecb.int/pub/pdf/scpwps/ecbwp792.pdf>.
- Conrad, Christian and Michael Lamla, 2007, The High-frequency Response of the EU-US Dollar Exchange Rate to ECB Monetary Policy Announcements, KOF Swiss Economic Institute ETH Zurich Working Paper, 07-174. Available at: http://www.kof.ethz.ch/publications/science/pdf/wp_174.pdf.
- Dale, Spencer, Athanasios Orphanides, and Pär Österholm, 2008, “Imperfect Central Bank Communication –Information versus Distraction,” IMF Working Paper No. 08/60 (Washington: International Monetary Fund). Available at: <http://www.imf.org/external/pubs/ft/wp/2008/wp0860.pdf>.
- Dennis, Richard, and John C. Williams, 2007, “Monetary Policy, Transparency, and Credibility: Conference Summary,” Federal Reserve Bank of San Francisco *Economic Letter*, 2007-12 (San Francisco: Federal Reserve Bank of San Francisco). Available at: <http://www.frbsf.org/publications/economics/letter/2007/el2007-12.pdf>.
- European Central Bank, 2000, “The two pillars of the ECB's monetary policy strategy,” *ECB Monthly Bulletin*, November. Available at: <http://www.ecb.int/mopo/strategy/html/index.en.html>.
- European Central Bank, 2003, The outcome of the ECB's evaluation of its monetary policy strategy. *ECB Monthly Bulletin*, June. Both the article and the background studies available via the internet at <http://www.ecb.int/mopo/strategy/html/index.en.html>.
- European Central Bank, 2004, The monetary policy of the ECB, Chapter 3, January. Available at: <http://www.ecb.int/mopo/strategy/html/index.en.html>.
- European Central Bank, 2006, The predictability of the ECB's monetary policy. *ECB Monthly Bulletin*, January. Available at: <http://www.ecb.int/mopo/strategy/html/index.en.html>.
- European Central Bank, 2007, Communicating monetary policy to financial markets, *ECB Monthly Bulletin*, April. Available at: <http://www.ecb.int/mopo/strategy/html/index.en.html>.
- Ehrmann, Michael, and Marcel Fratzcher, 2005, “How Should Central Banks Communicate,” ECB Working Paper No. 557 (Frankfurt: European Central Bank). Available at: <http://www.ecb.int/pub/pdf/scpwps/ecbwp557.pdf>.

- Fracasso, Andrea, Hans Genberg, and Charles Wyplosz, 2003, "How Do Central Banks Write?" Geneva Reports on the World Economy, Special Report 2, The Center for Economic Policy Research. Available at: http://hei.unige.ch/~wyplosz/IR_fgw.pdf.
- Geraats, Petra, 2002, "Central bank transparency," *Economic Journal*, Vol. 112, F532–F565.
- Giavazzi, Francesco, and Frederic S. Mishkin, 2006, "An Evaluation of Swedish Monetary Policy between 1995 and 2005," A report prepared for the Riksbank. Available at: http://www.riksdagen.se/upload/Dokument/utskotteunamnd/200607/FiU/200607_RF_R1_eng.pdf
- Goldberg, Linda S. and Michael W. Klein, 2005, "Establishing Credibility: Evolving Perceptions of the European Central Bank." NBER Working Paper 11792 (Cambridge: National Bureau of Economic Research). Available at: www.nber.org/papers/w11792
- Hahn, V., 2002, "Transparency in Monetary Policy: A Survey," *Ifo Studien*, Vol. 48, pp. 429–455. Available at: <http://portal.ifo.de/link/ifoStudien-3-2002-4-S429.pdf>.
- Hofmann, Boris, 2008, "Do Monetary Indicators Lead Euro Area Inflation?" ECB Working Paper, 867 (Frankfurt: European Central Bank). Available at: <http://www.ecb.int/pub/pdf/scpwps/ecbwp867.pdf>.
- Jansen, David-Jan, and Jakob de Haan, 2006a, "Does ECB Communication Help in Predicting Its Interest Rate Decisions?," CESifo Working Paper No. 1804. Available at: http://www.cesifo-group.de/~DocCIDL/cesifo1_wp1804.pdf.
- Jansen, David-Jan, and Jakob de Haan, 2006b, "Look Who's Talking: ECB Communication During the First Years of EMU," *International Journal of Finance & Economics*, Vol. 11, No. 3, pp. 219–228.
- Jansen, David-Jan, and Jakob de Haan, 2007, "The Importance of Being Vigilant: Has ECB Communication Influenced Euro Area Inflation Expectations?" CESifo Working Paper No. 2134. Available at: http://www.cesifo-group.de/~DocCIDL/cesifo1_wp2134.pdf.
- King, Mervyn, 2005, *Monetary Policy: Practice Ahead of Theory*, Mais Lecture delivered at the Cass Business School, City University, London, May 17. Available at: <http://www.bankofengland.co.uk/publications/speeches/2005/speech245.pdf>.
- Lamla, Michael, and Sarah Rupprecht, 2006, "The Impact of ECB Communication on Financial Market Expectations," KOF Swiss Economic Institute, ETH Zurich Working Paper, 06-135. Available at: http://www.kof.ethz.ch/publications/science/pdf/wp_135.pdf.
- Podpiera, Jiří, 2008, "Monetary Policy Inertia Reconsidered: Evidence from Endogenous Interest Rate Trajectory," *Economics Letters*, Vol. 100, pp. 238–240.

- Roffia, Barbara and Andrea Zaghini, 2007, "Excess Money Growth and Inflation Dynamics," ECB Working Paper, 749 (Frankfurt: European Central Bank). Available at: <http://www.ecb.int/pub/pdf/scpwps/ecbwp749.pdf>.
- Rosa, Carlo and Giovanni Verga, 2005, "Is ECB Communication Effective?" Centre for Economic Performance Discussion Paper No. 682 (London: London School of Economics). Available at: http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID707441_code417601.pdf?abstractid=621641&mirid=1
- Rudebusch, Glenn D., 2002, "Term Structure Evidence on Interest Rate Smoothing and Monetary Policy Inertia," *Journal of Monetary Economics*, Vol. 49, No. 6, pp. 1161–87.
- Söderlind, Paul, Ulf Söderström, and Anders Vredin, 2005. "Dynamic Taylor Rules and the Predictability of Interest Rates," *Macroeconomic Dynamics*, Vol. 9, No. 3, pp. 412–428.
- Šmídková, Kateřina, 2003, "Targeting Inflation under Uncertainty: Policy Makers' Perspective," CNB Research and Policy Note 2003/2 (Praha: Czech National Bank). Available at: http://www.cnb.cz/en/research/research_publications/irpn/download/irpn_2_2003.pdf
- Šmídková, Kateřina, and Aleš Bulíř, 2007, "Striving to Be 'Clearly Open' and 'Crystal Clear': Monetary Policy Communication of the CNB," *Czech Journal of Economics and Finance*, Vol. 57, No. 11–12, pp. 540–57. Available at: <http://journal.fsv.cuni.cz/mag/article/show/id/1092>.
- Svensson, Lars, 1997, "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets," *European Economic Review*, Vol. 41, pp. 1111–46.
- Winkler Bernhard, 2000, "Which Kind of Transparency? On the Need for Clarity in Monetary Policy-Making," ECB Working Paper No. 26 (Frankfurt: European Central Bank). Available at: <http://www.ecb.int/pub/pdf/scpwps/ecbwp026.pdf>.
- Woodford, Michael, 2001, "The Taylor Rule and Optimal Monetary Policy," *The American Economic Review*, Vol. 91, No. 2, Papers and Proceedings of the 113th Annual Meeting of the American Economic Association, pp. 232–237.
- Woodford, Michael, 2005, "Central Bank Communication and Policy Effectiveness," NBER Working Paper No. 11898, (Cambridge: National Bureau of Economic Research). Available at: <http://www.nber.org/papers/w11898>.