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# Writing Clearly: The ECB's Monetary Policy Communication

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**Abstract.** *The article presents a novel methodology for measuring the clarity of central bank communication using content analysis, illustrating the methodology with the case of the European Central Bank (ECB). The analysis identifies the ECB's written communication as clear in about 85–95% of instances, which is comparable with, or better than, similar results available for other central banks. We also find that the additional information on risk to inflation and especially projection risk assessment contained in the ECB's Monthly Bulletins helps to improve communication clarity compared to ECB's press releases. In contrast, the bulletin's communication on monetary developments has a negative, albeit small, impact on clarity.*

**JEL classification:** E31, E43, E58.

**Keywords:** Monetary policy; communication; European Central Bank.

[...] 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.

Stefan Gerlach (2007)

## 1. INTRODUCTION

This article presents a novel approach to measuring the clarity of the monetary policy message using content analysis of the European Central Bank (ECB) communication. The dramatic increase in monetary policy communication in the past two decades or so has been justified by benefits of policy transparency (Čihák, 2007; Geraats, 2002). Most of the empirical literature on central bank communication has focused either on quantitative measures of monetary policy transparency, such as the volume of information, or short-term effects of central bank announcements, with much less attention paid to the overall clarity of the communication. In our view, large volumes of information disclosed in real time are of little use if they have the potential to confuse the intended recipients. The contribution of the article is twofold: first, we add clarity as a crucial dimension of central banks' communication and apply the measure to the ECB case and, second, we extend the analysis of ECB's communication to the more analytical *Monthly Bulletin* in addition to previously researched press releases.

European Central Bank's monetary policy has been subject to considerable scrutiny and 'ECB watching' has become an industry in itself.<sup>1</sup> The ECB sees communication as an important part of its toolkit (ECB, 2004), providing a fertile ground for empirical analysis (de Haan, 2008), including communication clarity (Winkler, 2000). The ECB's monetary policy regime is unique in having a two-pillar approach to setting monetary policy: the first (economic analysis) pillar monitors a range of data and using various models to produce short- to medium-term inflation projections for the euro area; the second (monetary) pillar pays attention to monetary developments, which are assumed to play a role in determining medium- to long-term inflation (ECB, 2000, 2004).

To analyze the clarity of the ECB's communication, we follow Bernanke and Woodford (1997) and Svensson (1997) in assuming that inflation projections and the monetary policy (inflation) target are the main explanatory variables of policy interest rates. To this end, we use the methodology introduced by Bulíř *et al.* (2008b), Guthrie and Wright (2000), and Šmídková and Bulíř (2007) that analyzes the various measures of risk to inflation that the public can derive from central bank communication. These measures provide additional information to the public, improving the understanding of monetary policy decisions.

Detailed information on risk to inflation, which we call the projection risk, is essential when the monetary policy decisions are complex and a policy rule fails to explain the moves in the policy rate. The public is able to understand monetary policy only if the key documents send a coordinated message identifying the projection risk that explains why the interest rate path deviates from that implied by the policy rule. In such a case, we would call monetary policy communication *clear*. In the opposite case, when the messages are uncoordinated, we would call monetary policy communication *confusing*. If monetary policy communication is confusing, it hampers transparency, even if large amounts of information are being disclosed.

There are various ways to extract projection risk measures from the key documents. For example, one popular example of content analysis uses a count of words typically associated with upward or downward projection risk (Heinemann and Ullrich, 2007; Rosa and Verga, 2007). Our approach goes further by encompassing additional resources – we analyze all verbal assessments of inflation factors (both in ECB's press releases and *Monthly Bulletin*), including those coming from the second, monetary pillar. We also analyze the explicitly mentioned overall projection risk and transform these assessments into numerical representation of the inflation projection risk. Clear policy communication is achieved when the various communication tools (the inflation projections, monetary policy target, and verbal assessments contained in the key documents) are consistent with the policy rate changes.

Our main finding is that during 1999–2007,<sup>2</sup> the ECB's communication was clear in about 85–95% of cases, with two short periods of potentially confusing

1. The annual 'ECB Watchers' Conference' organized by the Center for Financial Studies in Frankfurt, brings together academics, analysts, and policy-makers to discuss euro area monetary policy (<http://www.ifk-cfs.de>).
2. To keep the analysis contained, we focus on the period preceding the global financial crisis. During the crisis, the core part of ECB's policy framework remained unchanged, but important enhancements have been made, placing an increased premium on clear communication (e.g., to distinguish liquidity management and monetary policy stance). For an analysis of ECB's policies in the crisis, see Čihák *et al.* (2009).

communication in 2001 and 2004. This compares favorably with other central banks using the same methodology (Bulíř *et al.*, 2008b; Smídková and Bulíř, 2007). On the one hand, additional information tends to be good for clarity – overall, the ECB's *Monthly Bulletin* improves clarity as compared to relying on press releases only. On the other hand, additional information may create scope for confusion: while the bulletin information on the explicit description of the projection risk improves clarity, the usefulness of the detailed discussion of monetary developments is less clear; in fact, they seem to reduce clarity slightly. The ECB's communication policy has been appropriate, however: gradually putting more emphasis on an explicit description of the projection risk and less emphasis on the monetary pillar have improved the understanding of monetary policy decisions.

The article is organized as follows. Section 2 provides an overview of the literature, Section 3 explains the methodology and data, Section 4 presents the results, and Section 5 concludes.

## 2. LITERATURE ON MONETARY POLICY COMMUNICATION

The impetus for central bank communication 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) and that transparent banks tend to achieve lower inflation (Geraats, 2009). While much of the information communicated by central banks is either noisy or imperfect (Morris and Shin, 2002; Woodford, 2005), the value of communicating detailed, yet imperfect information is ambiguous (Dale *et al.*, 2008). 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.

The body of empirical literature on the quantity and timeliness of ECB's communication is large (see Blinder *et al.*, 2008 for a survey). The ECB staff evaluations of the ECB's monetary policy strategy indicated that communication was '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). The subsequent review of the ECB's communications to the financial markets found a high level of predictability for its monetary policy decisions, comparable with other major central banks (ECB, 2006).

Measuring communication quality is naturally more difficult than measuring its quantity and most studies therefore asked an indirect question: does the ECB's communication help in predicting future monetary policy moves? Brand *et al.* (2006) have found that the ECB's communication results in significant changes in the euro area money market yield curve, that is, market expectations of future monetary policy, and that these changes affect medium- to long-term rates. Using content analysis, Jansen and de Haan (2007) have found some evidence of a negative relationship between the ECB's communication of risks to price stability (measured by the use of the keyword 'vigilance') and changes in euro area inflation. Rosa and Verga (2007) focused on the ECB president press conferences, finding that the public generally understands and believes the ECB's

signals. ECB (2007) has cited a trend toward lower market volatility on the short-term money market as an indication that the ECB's communication has improved over time. Jansen and de Haan (2009) have studied the link between the ECB's communication and predictions of its interest rate decisions, finding that communication-based models of policy rate changes do not outperform models based on macroeconomic data. Sturm and de Haan (2009) have reversed, however, that result by finding that the President's press conference introductory statement adds information that helps predict the next policy decision.

The focus of ECB's communication is still evolving as the ECB transitions from an institution stressing the information content of monetary aggregates to one that focuses on inflation projections. Gerlach (2007) have concluded that the ECB's Governing Council reacts to M3 growth, however, the impact of monetary developments is non-linear. Berger *et al.* (2011) concluded that the ECB has paid diminishing attention to monetary analysis and its statements became more correlated with the inflation projection analyses. Lamla and Lein (2011) have argued – based on the analysis of daily 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 (2010) have shown that, based on the high-frequency response of the euro–US dollar exchange rate, ECB information on price developments are considered news by foreign exchange market participants, but that the ECB's assessments of monetary developments are not. Coffinet and Gouteron (2007) have reported that long-term market rates react to M3 growth surprises, but short-term rates do not. Still, even if short-term, indicator properties of monetary aggregates are limited, they may be useful for medium-term inflation projections (Hofmann, 2008; Roffia and Zaghini, 2007).

A more direct approach to assessing the quality of central bank communication has been pioneered by Fracasso *et al.* (2003), who proposed the following three criteria for good central bank communication: clarity, consistency, and coverage of key issues (policy objectives, decision making, analytical framework, input data, presentation of forecasts, and evaluation of past forecasts and policies). The authors examined 19 inflation-targeting central banks, other than the ECB, finding a positive link between report quality and policy predictability. Closely aligned with this approach are the papers by Bulíř *et al.* (2008b) and Šmídková and Bulíř (2007) that assess clarity of monetary policy communication by analyzing numerical measures of projection risk that the public can obtain from various sources of central bank communication.

### 3. METHODOLOGY AND DATA

#### 3.1. Communicating Clearly

Clear communication requires that the various communication tools send signals that are mutually consistent. On the one hand, the public would be confused if the ECB did not lower the policy rate, while (i) the official inflation projection came out as (substantially) below the target, and (ii) the ECB press release dwelled on a downward inflation projection risk. On the other hand, confusion

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could be averted by either emphasizing pro-inflation factors or projection risks in the press release that explain why the policy-makers decided to deviate from the policy rule. Of course, clarity of communication does not guarantee that the projection will be precise – actual inflation deviates from its projection because of unforeseen shocks that hit the economy in the interim. The following three events may occur with regard the clarity of monetary policy communication and in Section 4.5, we identify these periods and their share on overall communication:

- 1 *Clarity, no shocks*. The ECB consistently communicates its policy response, inflation projection, and projection risk. No significant shocks occur afterwards. This is the most favorable outcome: the public understands well the policy response and forms inflation expectations appropriately, anticipating correctly the eventual inflation outturn.
- 2 *Clarity under shocks*. The ECB provides the same consistent communication as in the first case, however, some post-projection, unanticipated shock(s) push inflation above or below the projection. These shocks may even push inflation in the opposite direction to that indicated in the projection risk communication. This is a less favorable outturn: the public is surprised by the inflation outturn, but it is still able to form inflation expectations. Owing to the ECB's consistent communication, it is understood that inflation deviated from the projection because of some unanticipated, temporary shocks.
- 3 *Confusion*. The ECB's inflation projection and policy rate point in different directions, while the policy documents send an inconsistent message *vis-à-vis* the projection risk. This is the least favorable outturn: the public is confused and fails to form meaningful inflation expectations. We identified only a two sets of such events: a short, but 'robust' period of confusing communication in 2001 and a longer, but less 'robust' period in 2004.

### 3.2. Measuring Clarity: 4-Step Methodology

We analyze the clarity of ECB's communication by comparing the inflation projections, monetary policy target, monetary policy interest rate changes, and projection risk, all of which are readily available. The ECB, which uses a definition of price stability of 'inflation below, but close to, 2%', regularly publishes inflation projections as well as various documents. We use two of these documents – the press release and *Monthly Bulletin* – to construct the *projection risk* variable encompassing verbally described inflation factors, monetary developments, and ECB's assessment of the inflation projection risk. Although the ECB documents are available in monthly frequency, we convert the monthly observations into quarterly ones for two reasons. First, the ECB projections are quarterly and ECB communication is tailored to re-iterate the main message. Second, the empirically observed frequency of price changes of about 2–3 quarters suggests that the availability of monthly information has not lead to more frequent price adjustments (Bils and Klenow, 2004; Nakamura and Steinsson, 2008).

We simplify the communication process into four steps, assuming that the public tries to understand monetary policy with the least effort possible.

3.2.1. *First step: the inflation projection and target*

President Trichet often noted that ‘the ECB has only one needle in its compass – price stability’ and, hence, in our procedure the public would rely initially on the three economic variables (the target, inflation projection, and policy rate) that are readily observable. If a parsimonious analysis of these variables confirms that the ECB follows a policy rule, the public would form its inflation expectations using the ECB’s inflation projection. On a technical level, the ECB let it be known that it would follow a forward-looking strategy of monitoring inflation, output gap, and so on (Gerlach and Smets, 1999) and, therefore, we expect the public measure the ECB’s actions against a simple policy rule approximating such a strategy (King, 2005). Unfortunately, variables such as the output gap are not readily available (Orphanides, 2001) and the public is likely to rely on a simpler rule, such as that in which the policy-maker reacts only to the inflation gap, i.e. to the deviation of the inflation projection from the target, both of which are real-time, readily available variables (Batini and Haldane, 1999):

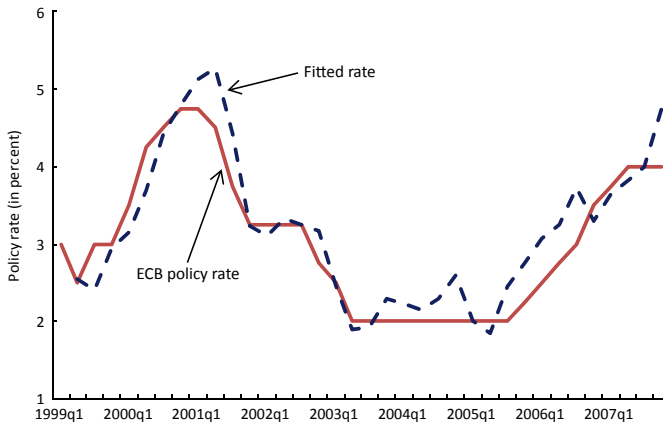
$$i_t = \gamma i_{t-1} + (1 - \gamma) \left[ \delta (\pi_{t+j}^{F,ECB} - \pi^*) + i^n \right], \quad (1)$$

where  $i_t$  is the policy instrument (the repo rate, measured at end-quarter);  $\pi_{t+j}^{F,ECB}$  denotes the ECB’s inflation projection published quarterly at time  $t$  (we use  $j = 4$ , that is, projection for 1 year ahead)<sup>3</sup>;  $\pi^*$  is the publicly announced price stability target of about 2%; and  $i^n$  is a policy-neutral interest rate, equal to the sum of an equilibrium real interest rate and the policy target. The equilibrium real rate is assumed to be 2%, a typical number used in the literature on the euro area (Bernhardsen, 2005). In our procedure, the public extracts the rate smoothing and inflation gap coefficients,  $\gamma$  and  $\delta$ , respectively, from ECB’s decisions. After considering the evidence (see Appendix A1 for discussion of empirically estimated ECB policy rules), we set  $\gamma = 0.7$  and  $\delta = 5$  in the benchmark version of the rule and this parameterizations reflect the ECB’s rate setting reasonably well (Figure 1). While the smoothing parameter is set to correct for the serially correlated inflation gaps, the fairly high inflation aversion coefficient captures the effect of the omitted output gap. The baseline calibration is such as to jointly minimize the statistical bias and mean square forecast error of the policy rate – lower values of  $\delta$  quickly increase the statistical bias.

3.2.2. *Second step: an implied projection update*

If the policy rate decision corresponds to that implied by the rule (1), in our procedure the public will not examine any additional information sources. If the policy rate decision contradicts the one suggested by the policy rule, the public will look for clarification. In other words, a rule-contradicting rate change

3. The ECB inflation projections are conditional on the future interest rates path following market expectations, unchanged bilateral exchange rates, and fiscal policy following the national budget plans (ECB, 2004).



**Figure 1** Actual ECB policy rate and fitted rate using the benchmark rule 1/(calibration of the benchmark rule:  $\gamma = 0.7$  and  $\delta = 5$ ,  $\pi^* = 2.0$ )

Note: 1/The rule is of the following form:  $i_t = \gamma i_{t-1}^i + (1 - \gamma)[\delta(\pi_{t+j}^{F,ECB} - \pi^*) + i^n]$   
 Source: ECB; authors calculations.

implies an update in the inflation projection.<sup>4</sup> The rule-based inflation projection,  $\pi_{t+j}^{F,RULE}$ , can be obtained by rearranging (1):

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

where  $\pi_{t+j}^{F,RULE}$  measures what the public thinks inflation will be given the rule and the policy rate change effected by the ECB,  $\Delta i_t$ . The need for clarification is proportional to the difference between the above rule-based inflation projection and the official ECB inflation projection,  $\pi_{t+j}^{F,ECB}$ . We call this difference the *implied projection update* (2):

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

The public knows, of course, that the rule is an approximation of policy-making and is concerned only about substantial implied projection updates that indicate that the policy-maker revised the original inflation projection with some additional information.

When to call the projection update ‘substantial’? This depends on the *ex ante* admitted uncertainty of the monetary policy-making (Šmídková, 2005). For example, the December 2007 *Monthly Bulletin* said that ‘staff projections foresee annual inflation [...] to rise between 2.0% and 3.0% in 2008’, implying a central

4. The difference between the above rule-based inflation projection and the official ECB inflation projection cannot be obtained directly from the financial markets projections. The market polls – such as the widely used 1 week ahead Reuter’s poll of independent forecasters, for example Berger *et al.* (2009) – aim at guessing the next movement of the ECB rather than making an independent assessment of what the rate should be in light of macroeconomic developments. Moreover, the ECB gradually began signaling its interest intentions and starting from 2002 the ECB interest rate moves and market predictions thereof were essentially identical.

projection of 2.5% with a  $\pm 0.5$  percentage point confidence interval, that is, the ECB's publicly admitted uncertainty of inflation projections in the 1-year projection horizon. Thus, it is reasonable to assume that the public will try to understand the reasons for the ECB's inflation projections deviating from the rule by more than  $\pm 0.5$  percentage points and ignore smaller deviations. While the previous studies have used 1 percentage point as a threshold for the implied update for the emerging market economies (Bulíř *et al.*, 2008b; Šmídková and Bulíř, 2007), the 0.5 percentage point threshold corresponds to the much lower euro area inflation volatility.

To assess the robustness of our calculations, we present the results for alternative parameterizations of the rule (Table 1). These include a more aggressive reaction to inflation, a higher smoothing parameter, a higher sensitivity to shocks (the threshold for the implied projection update is halved), and less emphasis on the inflation target (the ECB is set to react only to inflation projections higher/lower than the target by 0.75 percentage points). In addition, we compare the benchmark calibration with the empirically estimated rules by Bulíř *et al.* (2008a), Gerdesmeier and Roffia (2004), and Gorter *et al.* (2008).

### 3.2.3. Third step: content analysis

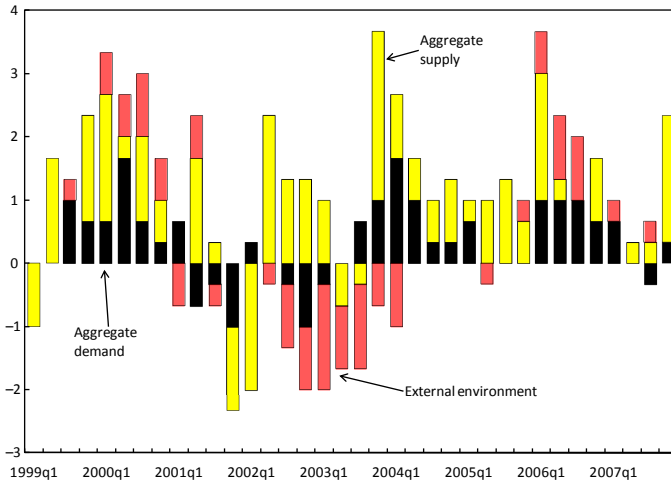
Substantial implied projection updates are to be explained verbally in monetary policy documents as descriptions of the projection risk (Bernanke and Woodford, 1997). To this end, we construct a numerical approximation of the ECB's projection risk,  $\rho_t$ , from the verbal assessments of the inflation factors, monetary

**Table 1** Robustness scenarios

	Policy rule parameters		When are the implied projection updates 'substantial'?	
	Smoothing ( $\gamma$ )	Inflation aversion ( $\delta$ )	Shocks	Deviations from the target
<i>Calibrated rules</i>				
(1) Benchmark calibration	0.70	5.00	0.50	0.50
(2) More aggressive reaction to inflation	0.70	7.00	0.50	0.50
(3) Slower policy rate adjustment	0.80	5.00	0.50	0.50
(4) More emphasis on shocks	0.70	5.00	0.25	0.50
(5) Less emphasis on target	0.70	5.00	0.50	0.75
<i>Empirically estimated rules 1/</i>				
(6) Gerdesmeier and Roffia (2004)	0.90	2.57	0.50	0.50
(7) Gorter <i>et al.</i> (2008)	0.86	1.39	0.50	0.50
(8) Bulíř <i>et al.</i> (2008a)	0.94	5.96	0.50	0.50

Note: 1/The first two empirically estimated rules (6) and (7) included both the inflation and output gaps and, hence, the estimated coefficient of the former gap is much lower than that in either the calibrated rule (1–5) or the last empirical rule (8).





**Figure 2** ECB bulletins: inflation factors

Source: European Central Bank; authors' calculations.

developments, and projection risk, relying on two documents: the introductory statement at the ECB's monthly press conference and the ECB's *Monthly Bulletin*.<sup>5</sup> The introductory statement – known as 'the principal vehicle of the ECB's communication' (ECB, 2007) – conveys the collective monetary policy decision of the ECB's Governing Council and reaches out to a wide audience through the media. The bulletin – published monthly 1 week after the first meeting of the Governing Council – provides a more comprehensive analysis than the press releases, especially with respect to supply-side developments. While the verbal assessments from the press releases have been used in previous studies (Heinemann and Ullrich, 2007; Rosa and Verga, 2007), the bulletins have been mostly ignored. To our best knowledge, the only other paper analyzing them is Gerlach (2007), who scrutinized the ECB's views on economic activity, realized inflation, and M3 growth on inflation. Overall, we used 108 press releases and bulletins from January 1999 to December 2007.

Content analysis is not trivial in our procedure. First, classifying the inflation factors in the ECB documents is labor intensive, requiring that each is cataloged into a supply, demand, or external environment factors (corresponding to the 'economic analysis' pillar), and then classified as pushing the rate of inflation either higher (+1), lower (-1), or neutral (0) (see Figure 2 for summary indicators and Appendix A2 for a description of the coding procedure and frequency indicators of individual inflation factors). We gave each inflation factor an equal weight, because neither document provide information on the factors' quantitative importance and we wanted to avoid subjective judgements of the type made by Rosa and Verga (2007). The sum of monthly observations was then averaged into quarterly frequency and aggregated to obtain the desired 'stock of

5. We exclude interviews and speeches by the members of the Governing Council from our analysis. Such exclusion may bias our results toward higher clarity, since previous research has suggested that such releases lower the market's ability to anticipate future path of interest rates (Ehrmann and Fratzscher, 2007).

communication' (Conrad and Lamla, 2010; Ehrmann and Fratzscher, 2007). We note that the balance of the inflation factors has been clearly positive for most of the sample period, except for 2001–3 (Figure 2), indicating a pro-inflation projection risk as perceived by the ECB. Moreover, the inflation factors – with the exception of aggregate supply factors – have been serially correlated. While demand factors were deemed to be pro-inflationary throughout the sample period, the massive appreciation of the euro in 2001–3 was seen as an offsetting factor.

Second, the interpretation of the monetary pillar is less straightforward. Although the short-run implications of M3 growth should not be taken mechanically, ECB documents restated the usefulness of this indicator in understanding ECB's monetary policy (ECB, 2003, 2004). Until the 2003 review of the ECB monetary policy framework (ECB, 2003), it was understood that the rate of growth of M3 above/below the reference rate of 4.5% annually implies loose/tight monetary conditions in the medium to long run. Starting with the May 2003, the bulletins include a verbal statement of the following sort: 'the monetary analysis confirms the prevailing upside risks to price stability at medium to longer horizons'. However, these statements have remained highly correlated with the M3 growth indicator and we therefore continue to use the M3 growth relative to the reference rate.

Third, explicit verbal assessments of downward or upward projection risk are summarized in the bulletin's editorial, presumably encompassing both the economic and monetary pillars. A typical assessment thereof reads: '[...] the outlook for price developments remains [...] subject to upside risks'. The correlation between the projection risk and inflation factors (the economic pillar) was high, between 0.5 and 0.8, breaking only during the low-inflation period of 2001–3, when the ECB communication did not mention downward risks to the inflation projection, despite the economic pillar signaling strong deflationary pressures.

Our estimates of the projection risk,  $\rho_t$ , are comparable to the alternative estimates. Our summary index is highly correlated, at 0.77 and 0.82, respectively, with the KOF Monetary Policy Communicator published by the Swiss Federal Institute of Technology in Zurich and the Rosa-Verga index of ECB President announcements (Table 2). These correlations also highlight the value added of the bulletins: the press releases, and therefore also the release-based KOF and Rosa-Verga indexes, largely ignore the supply-side factors of inflation as they focus almost exclusively on demand factors.

#### 3.2.4. Fourth step: does the projection risk explain the implied projection update?

In our procedure, we assume that the public views monetary policy communication as clear if the projection risk,  $\rho_t$ , matches the inflation projection update ( $\pi_{t+j}^{F,RULE} - \pi_{t+j}^{F,ECB}$ ). For example, a positive inflation projection update is explained away by upward inflation factors or upward risks to the inflation projection, or both. If, however, the projection update and projection risk point in the opposite directions, the ECB communication is not clear, no matter how much information was disclosed in the process. As a result, the public is confused and does not know which inflation projection is relevant for expectation formation.

Clarity does not guarantee, however, that the ECB is going to fulfill either the inflation target or the inflation projection. Other things being equal, inflation

**Table 2** Correlation of the alternative indexes with our indexes (Spearman’s rank correlation coefficient; the corresponding  $p$ -level in brackets)

	KOF MPC	RV	Press release	Aggregate demand	Aggregate supply
RV	0.76 (0.00)				
Press release	0.83 (0.00)	0.77 (0.00)			
Our summary index	0.77 (0.00)	0.82 (0.00)	0.76 (0.00)		
<i>Of which</i>					
Aggregate demand	0.58 (0.00)	0.60 (0.00)	0.48 (0.02)		
Aggregate supply	0.02 (0.92)	0.19 (0.36)	0.24 (0.26)	0.36 (0.09)	
External environment	0.61 (0.00)	0.72 (0.00)	0.60 (0.00)	0.36 (0.09)	0.23 (0.28)

*Notes:* KOF is the Monetary Policy Communicator based on the ECB president’s statements on risks to price stability made during the monthly press conferences; RV is the Rosa-Verga index of ECB President announcements about future monetary policy moves. Press releases and the remaining entries are based on our coding of the ECB documents. *Source:* Authors’ calculations; KOF MPC index was kindly provided by the KOF; Rosa and Verga (2007).

will differ from the projection by the cumulative shocks hitting the economy during the  $j$  projection periods:

$$\left( \pi_{t+j} = \pi_{t+j}^{F,RULE} + \sum_{t=1}^j \epsilon_t \right). \tag{4}$$

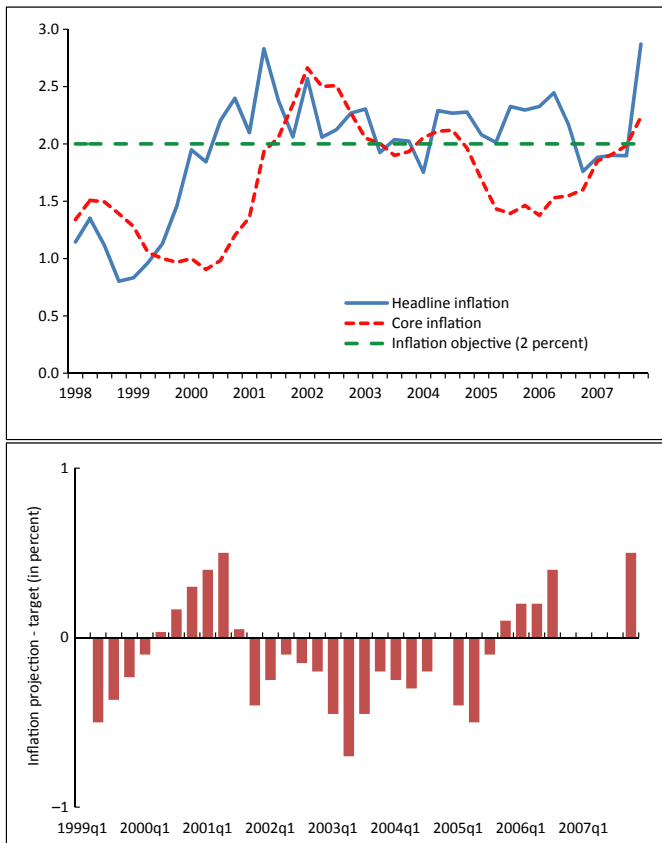
### 3.3. Stylized Facts

To test our methodology empirically, we use the publicly available harmonized consumer price index from the ECB and Eurostat. While the headline inflation rate frequently exceeded the 2% target, core inflation was mostly below the target (Figure 3, upper part). The ECB inflation gap ( $\pi_{t+4}^{F,ECB} - \pi^*$ ), constructed from the published midpoints of the projection range and the inflation objective, confirms price shocks in the euro area have been highly autocorrelated (Figure 3, lower part).

The inputs for our methodology are summarized in Figure 4. The public uses the ECB’s 4-quarter-ahead inflation projections (Chart I in Figure 4) and policy rate changes (Chart II) to derive an implied projection update (Chart III). Positive values of the update indicate that the public’s expectations of inflation – conditional on the policy rule – are above the official ECB projection, ( $\pi_{t+j}^{F,RULE} > \pi_{t+j}^{F,ECB}$ ). If the deviation is sizable, say  $\pm 0.5$ , the public tries to match the projection update with corresponding inflation factors derived from content analysis (Chart IV).

## 4. RESULTS

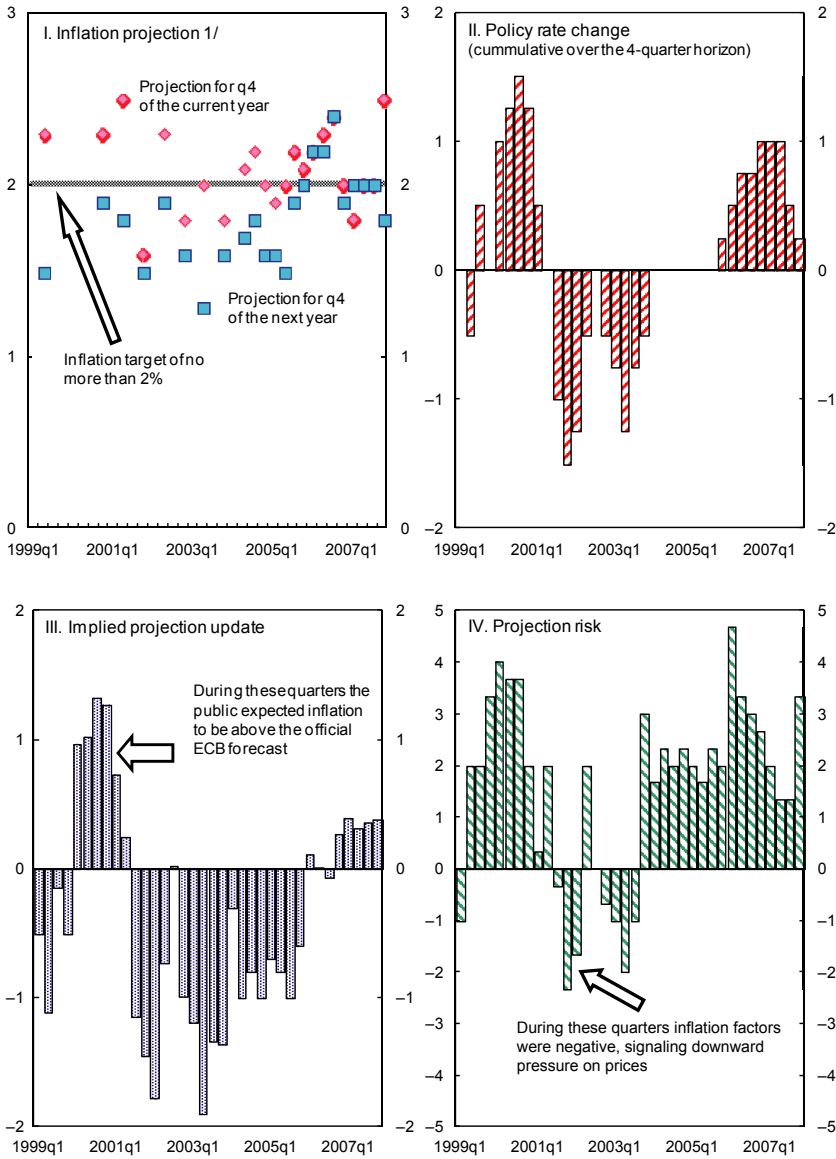
We present our results in several steps, gradually adding more components to the estimate of the projection risk. We start with the press release; add inflation



**Figure 3** Euro area: inflation and ECB inflation gap, 1999–2007 (percent change, year-on-year)

*Notes:* The upper chart: Headline inflation is the harmonized index of consumer prices (HICP); core inflation is HICP excluding energy and unprocessed food. The bottom chart: The inflation gap is the mid-point of the ECB inflation projection *minus* the 2-percent inflation objective,  $(\pi_{t+4}^{F,ECB} - \pi^*)$ . *Source:* Eurostat and ECB.

factors contained in the *Monthly Bulletin*, then the explicit verbal description of projection risk; and finally, the monetary pillar. To assess the robustness of our findings, we present the results of each of these steps for different calibrations, including the empirically estimated rules, as defined in Table 1. A reader could get a clearer picture of ECB's monetary policy based on reading either the *Monthly Bulletin* or the press releases augmented with the bulletin's description of the projection risk. Moreover, a sizable part of potential confusion can be eliminated by explaining the projection risk, that is, the policy-makers' uncertainty about the inflation projection. The monetary pillar communication does not improve the understanding of ECB's monetary policy, although the loss in clarity is not large. In all cases, the exact share of clear/confusing communication depends on the calibration of the rule. The results are summarized in Figures 5–8; and the periods of potentially confusing communication are identified in Figure 9.

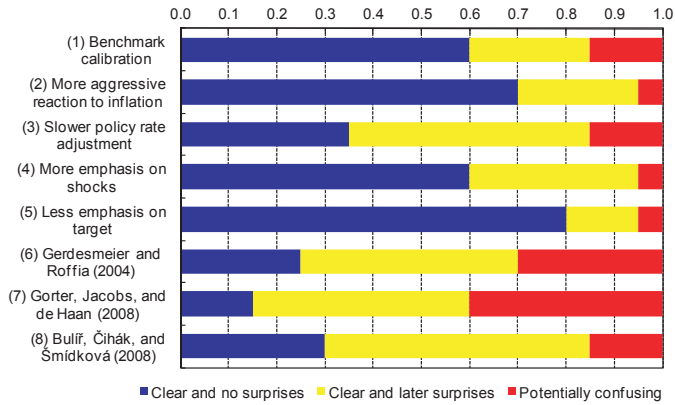


**Figure 4** The ECB: the implied projection update and projection risk

Note: 1/ The ECB's projections were initially published annually, semiannually from 2001, and quarterly from 2004q3. Source: ECB; author's calculations.

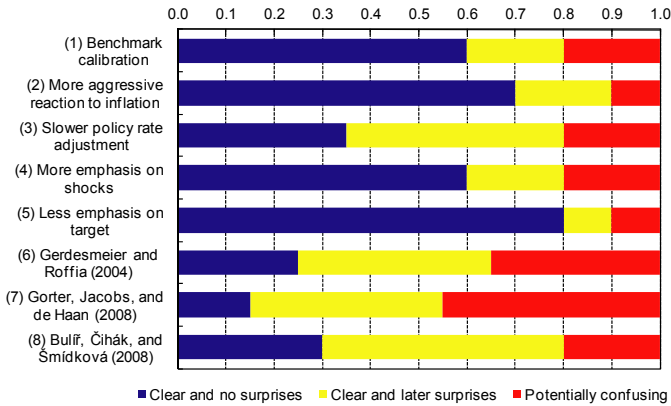
### 4.1. Press Statements

Assuming that the public follows our procedure, while reading the press releases only, the ECB communication is found clear in about 85–95% of all cases and potentially confusing in the remaining 5–15%, depending on the calibration used (Figure 5). Clarity drops to 60–70% when we use the empirical rules (Gerdesmeier and Roffia, 2004; Gorter *et al.*, 2008); however, these results need



**Figure 5** Press statements

Notes: For the exact values of the coefficients  $\gamma$  and  $\delta$  in (1–8) as well as for the other robustness checks in (2–5) see Table 1.



**Figure 6** ECB bulletin: inflation factors

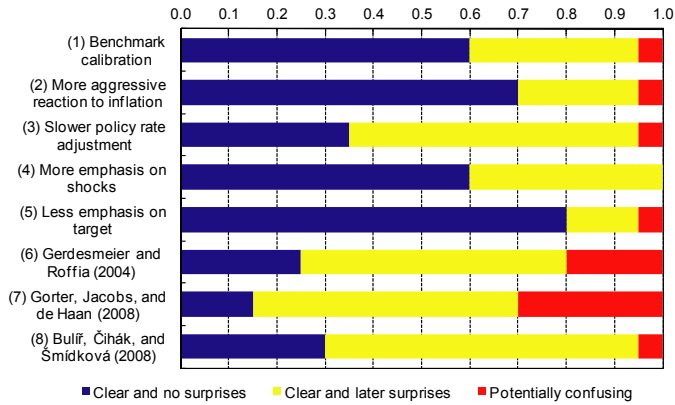
Notes: For the exact values of the coefficients  $\gamma$  and  $\delta$  in (1–8) as well as for the other robustness checks in (2–5) see Table 1.

to be interpreted with caution. The rules were estimated with both the inflation and output gaps and by omitting the latter gap we underestimate the impact of the former, unduly penalizing the clarity of the ECB. The empirical rule of Bulíř *et al.* (2008a) – which includes only the inflation gap – suggests clarity comparable to the benchmark calibration (85%). Overall, the ECB communication appears the clearest when one assumes either a high level of inflation aversion or less emphasis on fulfilling the inflation objective – these results hold for all calibrations (2) and (5) in Figure 5 through 8.

#### 4.2. Monthly Bulletins: Inflation Factors

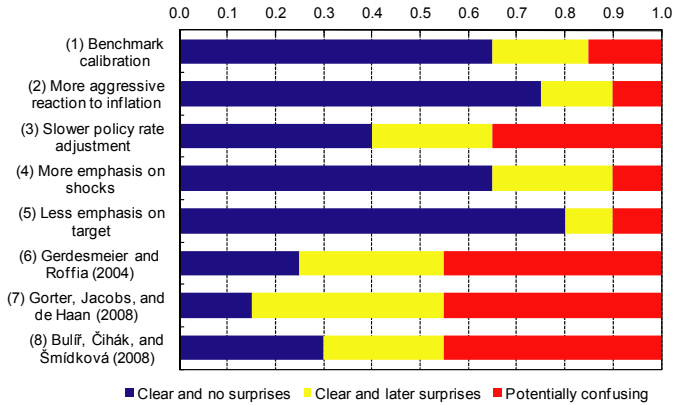
Bulletin’s additional details about inflation factors do not improve the understanding of the ECB *vis-à-vis* the press releases, indeed the incidence of

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**Figure 7** ECB bulletin, including ECB's description of the projection risk

*Notes:* For the exact values of the coefficients  $\gamma$  and  $\delta$  in (1–8) as well as for the other robustness checks in (2–5) see Table 1.



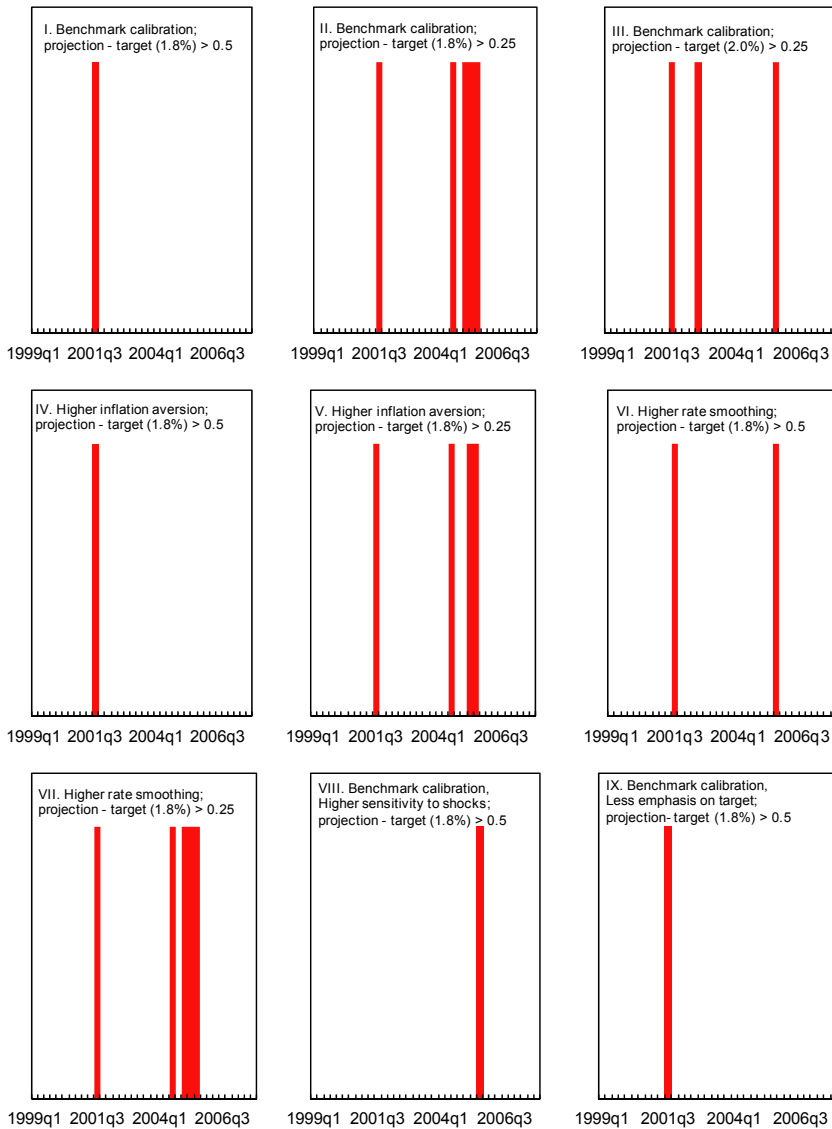
**Figure 8** Adding the monetary pillar

*Notes:* For the exact values of the coefficients  $\gamma$  and  $\delta$  in (1–8) as well as for the other robustness checks in (2–5) see Table 1.

potentially confusing communication is marginally higher (Figure 6). In the benchmark calibration, communication is found clear in about 80% of all cases and potentially confusing in the remaining 20%, the alternative calibrations provide similar results, and the first two empirically estimated rules, (6) and (7), again fare much worse. The results imply that a more detailed inspection of the ECB projection process, in particular on the supply side, fails to clarify the instances of ECB deviating from the policy rule.

### 4.3. Monthly Bulletins: Adding the ECB's Description of the Projection Risk

The ECB's explicit description of the projection risk significantly improves communication clarity *vis-à-vis* the two previous cases – clear in 95–100% of all cases



**Figure 9** Cases of confusing communication: robustness checks

*Notes:* The calibrations correspond to those in Table 1 in the main text.

*Source:* Author's calculations.

and potentially confusing in only 5% of cases (Figure 7). Using the empirical rules, the communication is clear in 70–80% of all cases using rules (6) and (7), but 95% using the rule (8). The results suggest that a big part of monetary policy ambiguity can be eliminated by saying ‘we don’t know’. By observing the declared ECB’s projection risk – the policy-maker’s uncertainty about the future – the public will understand and tolerate bigger departures from the rule than it would do without such information.



### 4.4. *Monthly Bulletins: Adding the Monetary Pillar*

Lastly, adding information on the monetary pillar does little to improve the understanding of the ECB's policy-making and may confuse the public somewhat (Figure 8). For the calibrated rule, 85–90% of communication can be characterized as clear, with the exception of the calibration using a higher weight on past inflation, where clarity declines to 65%. The use of the empirical policy rules lowers clarity to 55% only.

### 4.5. *When Might the Public Get Confused?*

The periods of potentially confusing communication are identifiable (Figure 9). First, using the benchmark calibration and the inflation target of 1.8%, we find only one case of potentially confusing communication (Chart I in the upper left corner of Figure 9): following the 2001q3 above-target projection, ( $\pi_{t+j}^{F,ECB} - \pi^* = 0.3$ ), the policy rate was lowered by 1 percentage point during the next four quarters, however, our indicator of the projection risk was close to zero ( $-0.33$ ). Thus, the verbal assessments failed to explain the case for the rate cut. Second, should the public expect the ECB to react to smaller projection-to-target deviations, say 0.25, the cases of confusing communication increase to four (Chart II). For example, in 2004q3, the ECB kept the rate unchanged despite the negative implied projection update, while the verbal assessments were strongly biased toward pro-inflation factors (our indicator of the projection risk was equal to 2). Third, increasing the inflation target to 2.0%, the number of confusing cases declines to three (Chart III). Charts IV–IX show, similarly, the instances of potentially confusing communication for the various parameterizations described in Table 1.

## 5. CONCLUSIONS

The ECB's press releases and *Monthly Bulletins* help in understanding its monetary policy. Based on the analysis of the ECB's inflation projections and policy target as well as content analysis (verbal descriptions of the inflation factors, projection risk, and the monetary pillar), we conclude that the ECB's written communication has been fairly clear during 1999–2007, and instances of potential confusion have been rare. The overall clarity is either comparable or higher than in other central banks for which similar analysis has been carried out. Clarity in communication ensures that the public understands the actions of the ECB and that it can form its inflation expectations effectively.

The ECB's flagship publication, the *Monthly Bulletin*, contains additional information that helps improve clarity compared to ECB's press releases. In particular, the assessment of the projection risk improves clarity measurably. The bulletin's detailed information on individual inflation factors (demand, supply, and external) do not seem to matter for clarity as compared to the press releases. The bulletin's discussion of monetary developments seems to reduce communication clarity, although this negative impact on clarity is small.

The policy implication of our article is that although the overall ECB's communication is mostly clear, some scope remains for improvements in clarity.

Additional emphasis on explicit description of the projection risk in the press releases and the monthly bulletins could improve understanding, and so could less emphasis on the monetary pillar.

## APPENDIX A1: POLICY RULE ESTIMATION AND CALIBRATION

The values of the behavioral parameters  $\gamma$  and  $\delta$  in monetary policy rules are unknown and their empirical estimation is plagued by problems. Moreover, the question asked here, ‘what the public expects the central bank to do’, is different from that asked in the empirical literature on policy rules, ‘what the central bank has been doing’. While the former rule cannot be too different from the latter, there is little reason to assume that they have been identical. Still, the empirical estimates provide a useful robustness check of our calibrations.

First, the empirical policy rule literature has had problems with observational equivalence, while the coefficient of determination barely changes across the vastly different specifications.<sup>6</sup> Most regression-based estimates for the ECB have found implausibly high coefficient of the lagged interest rate, often above 0.9, implying extremely gradual reaction to inflation news. Carare and Tchaizde (2005) and Rudebusch (2006) have shown, however, that policy rules with interest rate smoothing are difficult to distinguish from rules with serially correlated policy shocks as is the case in the euro area. Rather than reflecting policy-makers’ slow reaction to random shocks, the high value of  $\gamma$  reflects persistency in inflation factors.

Second, most regressions were based on backward-looking rules, even though central banks base their policy decisions on a forward-looking (expectations-based) rules (Svensson, 1997). We found only five papers estimating forward-looking rules (Bulíř *et al.*, 2008a; Gerdesmeier and Roffia, 2004; Gorter *et al.*, 2008; Sauer and Sturm, 2007; Sturm and de Haan, 2009), each using a different estimation procedure and most including both the output and inflation gaps. The public does not possess information regarding the output gap, however, and by using such rules without the output gap would underestimate the impact of the inflation gap on policy rate changes. Compare, for example, the values of  $\delta$  in Gorter *et al.* (2008) with that in Bulíř *et al.* (2008a).

We prefer to calibrate the policy rule. The benchmark calibration of the smoothing parameter,  $\gamma = 0.7$ , corrects for the serially correlated policy shocks, while the high value of the inflation aversion coefficient,  $\delta = 5$ , reflects the exclusion of the output gap from the rule. Other things being equal, the output gap enters the rule indirectly through its impact of future inflation. The baseline calibration is such as to minimize the bias and mean square forecast error of the policy rate: while lower values of  $\delta$  do not improve the mean square forecast error, they worsen the bias, Table A1.

6. For example, one obtains an identical rate adjustment from the rule describing an inflation averse but interest-smoothing central bank ( $\delta = 5$  and  $\gamma = 0.9$ ) and from an inflation indifferent but fast-moving central bank ( $\delta = 0.56$  and  $\gamma = 0.1$ ).

**Table A1** Mean square forecast error and bias for alternative calibrations of inflation aversion

	$\delta = 7$	$\delta = 5$	$\delta = 3$	$\delta = 1$
Mean square forecast error	0.23	0.14	0.13	0.17
Bias	-0.09	-0.14	-0.19	-0.24

Notes: The baseline calibration with  $\gamma = 0.7$ , inflation target of 2%, and real interest rate of 2%. Bias is the sum of forecast errors and mean square forecast error is the average of squared errors.

## APPENDIX A2: CODING THE ECB STATEMENTS

Radu Păun, our research assistant, extracted all verbal assessments, broad money growth rates, qualifications about forecast uncertainty, and noted the presumed direction of all these effects on inflation. His entries were then reviewed and checked by every co-author to ensure consistency and limit subjectivity. Less than 10% of the initial codes required vetting by the co-authors. The verbal entries are available from the authors on request, while the codes are available at: [http://ales-bulir.wbs.cz/ecb\\_summary\\_table.xls](http://ales-bulir.wbs.cz/ecb_summary_table.xls).

The coding of press releases was simple (-1, 0, +1) as these provided straight-forward assessments of growth and inflation. The coding of the *Monthly Bulletins* required several steps. First, each verbal comment was cataloged into a major category and several subcategories: *demand* (fiscal, domestic cycle pressure, wages, external demand, domestic asset price bubbles, other), *supply* (weather and similar shocks, oil/gas prices, agricultural prices, capacity utilization, labor supply, regulated prices, structural changes, retail competition, indirect taxes, other), or *external* (exchange rates, global financial shocks, other). Second, factors putting upward/downward pressure on inflation were denoted as +1/-1 and neutral factors were denoted as 0. Neutral factors were rare and we identified only five neutral verbal statements, three of them in 1999–2000. As far as the summary

**Table A2** Summary statistics for the verbal statements, January 1999–December 2007

	Count	Average value		
		1999–2007	1999–2002	2003–7
<i>Press releases</i>				
Inflation	NA	0.278	-0.042	0.533
<i>Monthly Bulletins</i>				
All factors	1,924	1.009	0.854	1.133
Of which:				
Aggregate demand	648	0.519	0.521	0.517
Aggregate supply	756	0.083	-0.021	0.167
External environment	520	0.407	0.354	0.450
Risks	NA	0.546	0.333	0.717

Notes: Inflation assessment and risks to the inflation projection were reported in every press release and bulletin, so we do not report the overall count. The sample is divided along the 2003 clarification of the ECB communication framework. Source: Authors' calculations.

statements on inflation were concerned, they were coded as neutral in 42 cases in 108 bulletins. Third, all factors were aggregated across categories and averaged over 3 months. Selected summary statistics are provided in Table A2.

Below are some examples of our coding. The July 2004 press releases read ‘inflation rates would most likely remain above 2% for longer than previously thought’ and were coded as +1 in the projection risk category. The January and March 2003 *Monthly Bulletins* contained the following sentences: ‘the current subdued pace of economic growth should contain inflationary pressures’ and ‘the moderate pace of economic growth should also reduce inflationary pressures’, respectively, and these were coded as –1 in the demand category. The January 2003 bulletin noted ‘various increases in administered prices’, and was coded as +1 in the supply category.

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