

# Talking Numbers: Central Bank Communications on Monetary Policy and Financial Stability\*

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November 2010

## Abstract

During the last two decades, central banks have increasingly provided quantitative information about monetary policymaking, including their primary objective, macroeconomic prospects and to a lesser extent the decision-making process. Nevertheless, the recent financial turmoil shows there is room for improvement by concentrating more on conveying uncertainty and incorporating higher moments. This is illustrated by assessing measures of central bank credibility, with a special focus on the European Central Bank (ECB). It is shown that ECB credibility was at a historic low at the height of the financial crisis. More recently, the ECB appears to have conducted monetary policy by stealth through liquidity operations and its main policy rate no longer provides an appropriate measure of the monetary policy stance. Some other challenges related to financial stability are discussed, including the issue that communications may be harmful *ex post* but beneficial *ex ante*. As a result, it is important that central banks commit to regular information releases.

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\*Paper presented at the 5th ECB Statistics Conference “Central Bank Statistics: What Did the Financial Crisis Change?”, 19-20 October 2010. I thank Athanasios Orphanides, the discussants Elga Bartsch and Frank Paul Weber, and other conference participants for their comments.

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# 1 Introduction

During the last two decades, central banks have greatly enhanced their communications about monetary policy. The financial turmoil starting in the summer of 2007 led to some serious challenges for this regime of transparency. Some central banks were still trying to ward off high inflation expectations when they suddenly had to embark on extensive expansionary liquidity operations. Financial markets were so volatile that any bad news could spark off a crash or trigger a bank run. At the same time, it is believed that the financial crisis may have been mitigated if there had been greater transparency. Furthermore, the turbulence in financial markets has underscored the importance of communicating uncertainty more effectively in the context of monetary policy and financial stability.

This paper argues that central banks could improve the way in which they provide quantitative information about monetary policymaking and financial stability by focusing more on conveying underlying uncertainty and using measures that incorporate higher moments. After a brief overview in section 2 of the potentially conflicting information and incentive effects of transparency, section 3 explains how central banks throughout the world have increasingly been talking numbers about their monetary policymaking. Section 4 discusses measures of central bank credibility, focusing on the European Central Bank (ECB). Issues in financial stability communications are considered in section 5. The concluding section summarizes the main findings of this paper.

## 2 Effects of Transparency

Central bank communications contribute to transparency when they reduce information asymmetries between the central bank and the private sector. In a world without any other market imperfections, the elimination of asymmetric information would always be beneficial (by virtue of the first fundamental welfare theorem). One straightforward benefit is that the communication of information by the central bank reduces uncertainty for the private sector. This presumes that central bank communications are correctly understood. In practice, transparency requires openness, honesty, clarity and common understanding (Winkler 2002). A useful method to promote clarity is to provide quantitative information, which has been done increasingly by central banks to facilitate communication about monetary policymaking, as is further discussed in section 3.

It is useful to distinguish two types of effects of transparency (Geraats (2002, 2009)): information and incentive effects. Information effects are the direct (ex post) consequences of removing an information asymmetry. This could be beneficial, such as a reduction in uncertainty, but it may also be harmful as the adjustment of private sector expectations in response to communications could cause fluctuations in macroeconomic

outcomes. The latter is worsened by misinterpretations and imperfect common knowledge (Geraats 2007). Incentive effects are the indirect (*ex ante*) influences of changing the information structure. For example, when the central bank publishes its macroeconomic forecasts, it becomes easier for the private sector to infer the central bank's intentions from its policy actions, which gives the central bank an incentive refrain from inflationary policy (Geraats 2005). In addition, it is likely to induce the central bank to produce high quality macroeconomic forecasts, thereby promoting better monetary policymaking. But there could also be undesirable incentive effects, for instance when agents in financial markets respond disproportionately to central bank communications to coordinate their actions and pay less attention to their private signals, making market expectations less informative (Morris and Shin (2002, 2005)).

Although these effects have been analyzed in the literature on monetary policy transparency, information and incentive effects are equally relevant to understanding the consequences of communications pertaining to financial stability. For instance, the reliance on 'constructive ambiguity' as lender of last resort to prevent moral hazard is an example of an incentive effect. In addition, a central bank that publicly reveals the liquidity problems of a commercial bank could trigger a bank run (as was experienced by Northern Rock in September 2007), constituting a detrimental information effect. However, if the liquidity positions of banks are regularly disclosed in data releases, it is likely to engender a beneficial incentive effect that encourages prudent behavior and reduces financial fragility. The crucial difference is that the former is the disclosure of an accomplished fact, but the latter leads to anticipatory behavior that changes the facts. Thus, 'ex post discretionary disclosures' may imperil financial stability, whereas 'ex ante communications' could enhance it (Gai and Shin 2003). As a result, central bank communications that may be very harmful during times of financial turmoil could actually contribute to financial stability when routinely performed well in advance. Thus, greater transparency *ex ante* could be beneficial for financial stability, but performed *ex post* it may be detrimental.

### **3 Talking Numbers about Monetary Policymaking**

The objective of monetary policy is generally to stabilize the internal or external value of the currency. Many central banks nowadays clarify their monetary policy objectives by providing a numerical target for their primary goal. This is ubiquitous among inflation targeters, which focus on an explicit inflation target, but it is also common for other monetary policy frameworks.<sup>1</sup> For instance, the ECB announced in October 1998 that its primary objective of price stability is "a year-on-year increase in the Harmonized Index

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<sup>1</sup>Using 2006 data for 98 central banks, 53%, 56% and 44% of exchange rate targeters, monetary targeters and non-targeters, respectively, have a quantified primary objective (Geraats 2009).

Table 1: Trends in talking numbers about monetary policymaking

Information disclosure about monetary policymaking	1998	2006	Change
Quantified primary objective	43	62	19**
Numerical macroeconomic forecasts	18	56	38**
quarterly, medium term for inflation and output	4	17	13**
Voting records	5	10	5*
Observations	98	98	

Note: Asterisks indicate change from 1998 to 2006 is significant at \* 5% or \*\* 1%.

Source: Dincer and Eichengreen (2009) data set.

of Consumer Prices (HICP) for the euro area of below 2%”, to be maintained over the medium term.<sup>2</sup> Overall, the fraction of central banks with a quantified primary objective has risen from 43% in 1998 to 62% in 2006. Table 1 shows how the disclosure of key numerical information about monetary policymaking has evolved during the last decade.<sup>3</sup>

The publication of numerical macroeconomic forecasts has experienced a dramatic increase from less than one-fifth of central banks in 1998 to over one-half in 2006. These forecasts could be considered as predictive statistics that help to reduce uncertainty about macroeconomic prospects. Furthermore, they provide a powerful tool for determining and explaining the appropriate policy stance for forward-looking monetary policy frameworks such as inflation targeting. Theoretically, the deviation of the inflation forecast from the inflation target could even serve as a sufficient statistic for setting the policy rate and the inflation forecast could act as an intermediate target for inflation targeters (Svensson 1997). This helps to explain why the release of quantitative macroeconomic forecasts is nearly universal among inflation targeters but less common for monetary and exchange rate targeters.<sup>4</sup>

Whether macroeconomic forecasts are used as predictive or sufficient statistics, it is important that they be timely and informative. Macroeconomic data are generally available at quarterly frequency (in particular, national accounts data; inflation data is often released monthly). So, to be transparent central banks should provide up-to-date forecasts for inflation and output every quarter. In addition, considering the lags in monetary policy transmission, these forecasts should cover a medium-term horizon of about two years ahead to be a useful guide to monetary policymaking. The number of central banks

<sup>2</sup>Despite its quantification, the ECB’s definition of price stability is not very precise, even after the clarification in May 2003 that the ECB aims for euro area HICP inflation ‘below, but close to 2%’.

<sup>3</sup>For a more comprehensive analysis of trends in monetary policy transparency, see Geraats (2009).

<sup>4</sup>For the latter, the relative frequency is 44% and 38%, respectively, and 69% for central banks without an explicit targeting framework, based on a 2006 sample of 98 central banks (Geraats 2009).

that publish quarterly medium-term forecasts for inflation and output has been quite limited, although it has increased significantly to nearly one-fifth of central banks in 2006 (see Table 1). However, more than half of inflation targeters have adopted this practice, which indicates its usefulness for this forward-looking monetary policy framework. A large majority of inflation targeters present their macroeconomic projections in the form of fancy fan charts, which show the development over the forecast horizon and illustrate the underlying uncertainty, including potential skewness. Another way to indicate the uncertainty and conditionality of projections is to show their paths under different scenarios. These are sophisticated communication tools that are particularly useful under heightened uncertainty. The Swedish Riksbank is a good example that has used both methods very effectively. Other central banks, including the ECB, would benefit from also incorporating these methods of communicating uncertainty.

Since the effects of monetary policy crucially depend on expectations, transparency about the monetary policy stance also involves publication of the projected policy path, which is done by a few central banks, including the Czech Republic, New Zealand, Norway and Sweden. Although a majority of central banks nowadays promptly announce adjustments in the levels of their policy instruments, much less information is disclosed about the decision-making process itself. Only a small fraction of central banks provide voting records of their monetary policy decisions, although this practice has significantly increased during the last decade (see Table 1) and is more common among inflation targeters, where one-third of central banks release voting records (Geraats 2009). The balance of votes provides a key descriptive statistic about the procedure of monetary policy decision-making. It indicates the uncertainty surrounding the decision (presuming all monetary policymakers share the same objectives). For instance, a close vote suggests that the appropriate monetary policy stance was hard to divine from macroeconomic indicators, whereas a unanimous vote shows much less ambiguity. As a result, the private sector could use the number of dissents to learn the monetary policy reaction function more efficiently, enhancing medium-term predictability. In addition, the direction of dissents gives an indication of the policy inclination and provides a predictive statistic for upcoming policy decisions, thereby improving short-term predictability of monetary policy (as shown for the United Kingdom by Gerlach-Kristen (2004)). Some central banks (including the ECB) decide ‘by consensus’, potentially violating statutory requirements that decisions be made by a simple majority, but also depriving the private sector of useful descriptive and predictive statistics about monetary policymaking.<sup>5</sup>

To sum up, Table 1 shows that central banks have increasingly been talking numbers about monetary policymaking. This is in marked contrast to the past practice of providing statements requiring central bank watchers to exhibit exquisite skills in reading tea leaves.

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<sup>5</sup>For a further discussion of this issue, see Geraats, Giavazzi and Wyplosz (2008).

## 4 Measuring Central Bank Credibility

The achievement of monetary policy objectives could be evaluated ex post through macroeconomic outcomes. But considering long lags in monetary policy transmission, it is important to have real-time indicators of a central bank's success. In particular, to assess the central bank's ability to maintain price stability, medium to long term private sector inflation expectations provide a key statistic. A popular measure is the 'break-even' inflation rate implied by the yield differential between nominal and inflation-indexed government bonds. It is available at very high frequency and backed by the (often high) stakes of financial market participants. However, it also incorporates inflation risk premia and liquidity premia, so it is an imperfect proxy for market expectations of inflation, especially during financial market disruptions, when financial market efficiency is likely to break down due to limits to arbitrage. In addition, over short horizons the break-even inflation rate also reflects upcoming 'unavoidable' inflation (e.g. due to unanticipated food and energy price developments) that is beyond the control of the central bank due to the length of the monetary policy transmission process.<sup>6</sup> To overcome this, the five-year forward break-even inflation rate five years ahead is often used, capturing the average from 5 to 10 years into the future.

Figure 1 shows the five-year forward break-even inflation rate five years ahead for the euro area from February 2004 to September 2010. Although the break-even inflation rate exhibits significant short-run fluctuations, it declined from over 2.4% in mid 2004 to around 2.15% in mid 2005, and then remained relatively stable until early 2007. It rose gradually during the financial turmoil starting mid 2007, until a sharp drop from September to November 2008 during the financial market crash following the bankruptcy of Lehman Brothers. Long-term forward break-even inflation has since been quite volatile in the euro area and it exhibited an upward trend to well over 2.5% in April 2010 before subsiding to around 2%.

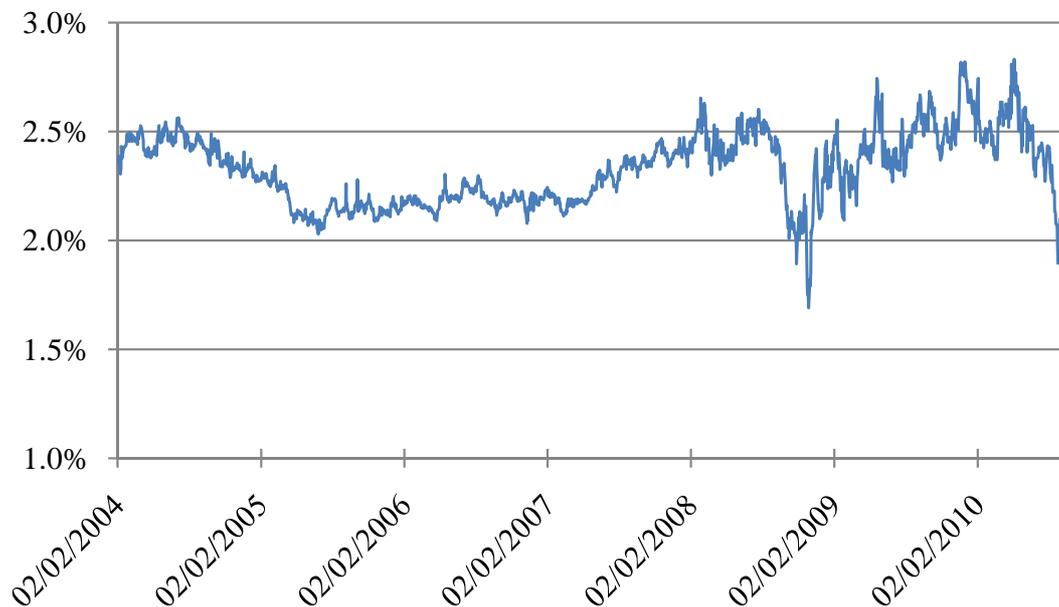
However, it is important to be cautious interpreting break-even inflation rates because movements may not be due to changing inflation expectations but to shifting risk premia, especially during financial market turbulence. For instance, the large drop in long-term forward break-even inflation during the fourth quarter of 2008 could be attributed to the decline in nominal yields due to flight-to-safety demand for bonds, and a rise in real rates stemming from the lower liquidity of index-linked bonds.<sup>7</sup> Interestingly, an alternative measure, the five-year inflation-linked swap rate five years ahead, which is usually pretty close to the corresponding break-even inflation rate, did not experience such a large drop

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<sup>6</sup>In the euro area, inflation-indexed bonds have an indexation lag of three months, so break-even inflation also reflects inflation realized in the past quarter. In addition, the bonds are linked to euro area HICP excluding tobacco. So, they do not completely compensate for euro area HICP inflation.

<sup>7</sup>See also ECB *Monthly Bulletin*, November 2008, Box 3.

Figure 1: Long term euro-area break-even inflation



Note: Five-year forward rate five years ahead of euro area zero coupon break-even inflation; seasonally adjusted. Sample: 02-02-2004 - 21-09-2010. Source: ECB Statistics

during the fourth quarter of 2008. While the long-term forward inflation-linked swap rate appeared to be more reliable than break-even inflation, it has also been quite volatile since mid 2008, suggesting it is not immune to financial market turmoil either.<sup>8</sup>

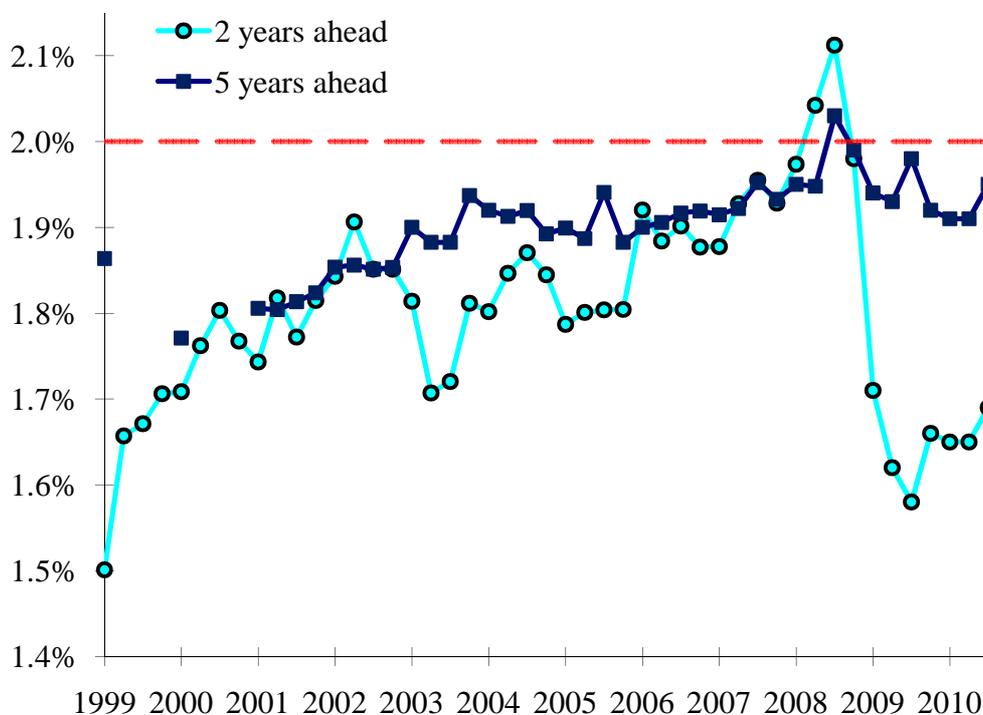
This problem of market-based inflation expectations is avoided by using survey expectations of inflation. Figure 2 shows the mean point estimate of euro area HICP inflation in two and five years time according to the ECB Survey of Professional Forecasters (SPF) from 1999Q1 to 2010Q3. Five-year ahead inflation expectations have increased from around 1.8% in 2000 to over 1.9% in 2010, briefly reaching 2.03% in 2008Q3, above the 2% limit of the ECB definition of price stability. Two-year ahead inflation expectations have mostly been lower but much more volatile,<sup>9</sup> with a notable spike above 2% in 2008, when average euro area inflation was 3.3%, before a big drop in 2009, when euro area inflation sank to 0.3%. In fact, there is a significant positive correlation between two/five-year ahead SPF inflation expectations and past euro area HICP inflation, as is shown and further discussed by Geraats (2010). The sensitivity of medium term SPF inflation expectations to past inflation outcomes suggests that euro area inflation expectations are not well-anchored.

A disadvantage of using the SPF mean point estimate for inflation is that it only cap-

<sup>8</sup>See ECB *Monthly Bulletin*, December 2009, Box 4.

<sup>9</sup>The average has been 1.8% and 1.9%, with a standard deviation of 0.12 and 0.05, for two-year and five-year ahead SPF inflation expectations, respectively.

Figure 2: Medium term survey expectations of euro area inflation



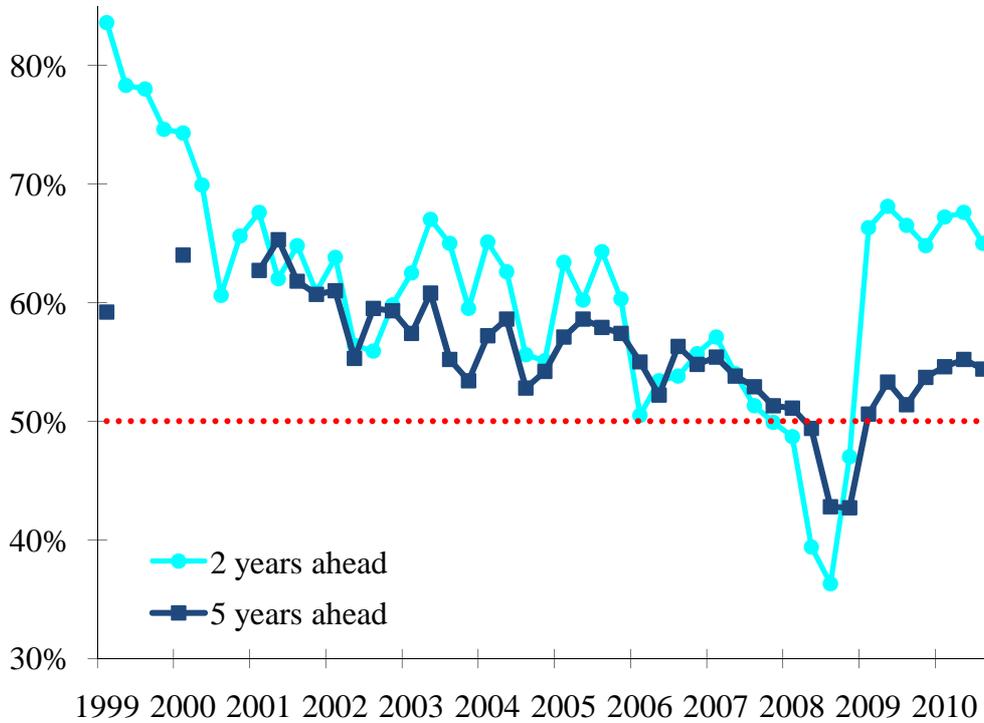
Note: Average two- and five-year ahead point estimates for euro area HICP inflation. Sample: 1999Q1-2010Q3 for two years ahead; 1999Q1, 2000Q1 and 2001Q1-2010Q3 for five years ahead. Source: ECB Survey of Professional Forecasters

tures the first moment of inflation beliefs, but ignores higher moments.<sup>10</sup> Fortunately, this problem can be overcome because the ECB Survey of Professional Forecasters also asks its participants to assign probabilities to ranges of inflation outcomes. The aggregate SPF probability distribution for inflation can be used to compute the likelihood that SPF respondents collectively attach to an outcome of euro area HICP inflation between 0% and 2%, consistent with the ECB's quantitative definition of price stability. Following Geraats et al. (2008) and Geraats (2010), this SPF inflation probability for two and five years ahead provides a quantitative measure of the credibility of the ECB in meeting its primary objective in the medium term.

Figure 3 shows that there has been a downward trend in ECB credibility during the last decade. The SPF probability of 0-2% euro area HICP inflation in five years has declined

<sup>10</sup>In addition, it ignores the dispersion of inflation estimates among SPF respondents. The standard deviation declined gradually until 2008, indicating increasing consensus while medium term SPF inflation expectations rose to over 2%, making it even more worrisome (see Geraats 2010).

Figure 3: ECB credibility



Note: SPF probability of euro area HICP inflation of at least 0% and less than 2.0%. Sample: 1999Q1-2010Q3 for two years ahead; 1999Q1, 2000Q1 and 2001Q1-2010Q3 for five years ahead. Source: ECB Survey of Professional Forecasters and author's calculations.

from over 60% in 1999 to around 55% in 2010, with an all time low in the fourth quarter of 2008 of 42.7%. The latter means that according to the collective judgment of SPF respondents, there was a less than even chance of the ECB delivering price stability in the medium term. The two-year SPF probability of 0-2% inflation has fallen even further from more than 80% at the start of 1999 to 36.3% in the third quarter of 2008, before picking up markedly to around 65% in 2010.<sup>11</sup>

The SPF inflation expectations and inflation probabilities are clearly inversely related, with a correlation coefficient of -0.92 and -0.89 for the two-year and five-year ahead measures, respectively. Nevertheless, the credibility measure based on the inflation probabilities reveals valuable information not captured by inflation expectations. For instance, during 2008 there was just a small blip in five-year ahead SPF inflation expectations above 2%, but the drop below 50% in the five-year ahead SPF probability of 0-2% inflation was

<sup>11</sup>Note that the 2008Q3 SPF was conducted in mid July, so its outcome was not affected by the acute financial crisis that erupted mid September 2008 after the Lehman bankruptcy.

more persistent and pronounced, signaling a more worrisome loss of ECB credibility. The credibility measure based on SPF inflation probabilities has the advantage that it captures not just the first moment but also higher moments, thereby providing a richer indicator of inflationary beliefs.

In principle, higher order moments are also captured by the inflation risk premium that is part of break-even inflation. Thus, it would be expected that the credibility measure based on five-year ahead SPF inflation probabilities is more strongly correlated with the five-year forward break-even inflation rate five years ahead than five-year ahead SPF inflation expectations, as is shown to hold by Geraats (2010). However, break-even inflation is also affected by market risk premia unrelated to inflation, which could give misleading signals. For instance, during the fourth quarter of 2008 (in the aftermath of the Lehman bankruptcy), the five-year forward break-even inflation rate five years ahead was clearly below average,<sup>12</sup> suggesting that inflationary fears had subsided, while the five-year ahead SPF probability of 0-2% inflation was well below 50%, indicating that ECB credibility was worrisomely low. In addition, break-even inflation could exhibit sharp fluctuations that may be completely unrelated to inflationary beliefs (e.g. from 2.2% to 1.7% during the last two weeks of November 2008, before bouncing back to 2.4% in mid December 2008). Although the break-even inflation rate (and inflation-linked swap rate) is available more timely and at higher frequency, the credibility measure based on SPF inflation probabilities has the advantage of not being affected by unrelated risk premia or financial market disruptions, therefore providing a more reliable signal, especially during times of financial turmoil.

Our discussion has also shown that the ECB's credibility of achieving its objective of price stability over the medium term was at its lowest at the height of the financial crisis in the second half of 2008. In fact, despite the continued financial turbulence during the first half of 2008, the ECB had increased its policy rate from 4% to 4.25% in July 2008, before starting to reduce it in October 2008 (a few weeks after the Lehman bankruptcy), reaching a level of 1% in May 2009.

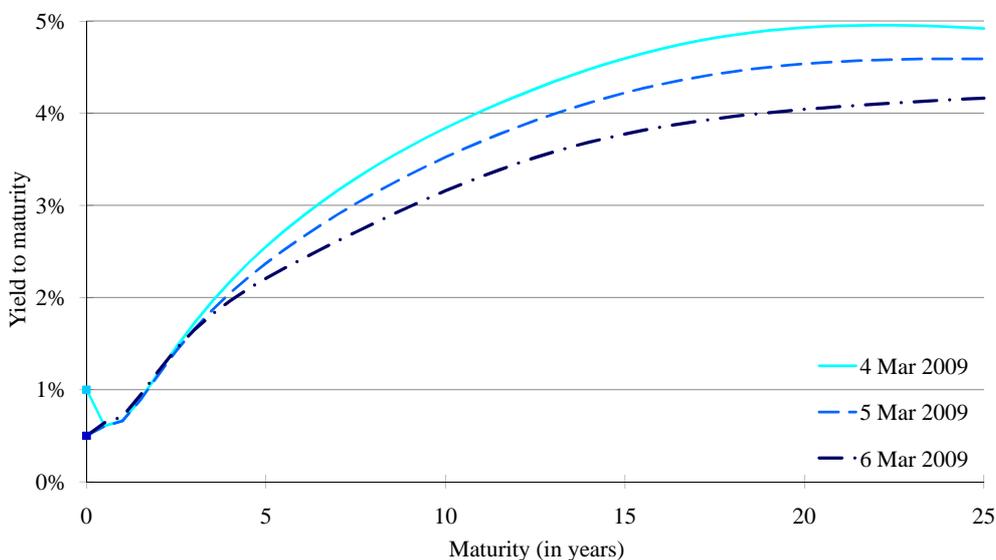
It is interesting to compare this to the Bank of England, which started cutting its policy rate in December 2007 from 5.75% to a level of 0.5% in March 2009. Although the UK also experienced a sharp rise in inflation to 3.6% in 2008, the Bank of England did not suffer from an increase in medium term inflation expectations, as measured by its quarterly survey of external forecasters, which provides two-year ahead and since 2006 also three-year ahead inflation expectations. These have remained quite stable around the Bank of England's inflation target of 2% HICP inflation, with the exception of 2009 when they dropped to their lowest levels at 1.5% and 1.8%, respectively, in the second quarter.

To construct credibility measures for the Bank of England, the survey's inflation prob-

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<sup>12</sup>This also holds for mid October 2008, when the 2008Q4 SPF was conducted.

Figure 4: UK nominal gilt yield curve - announcement of quantitative easing



Note: Spot curve of nominal zero coupon yields derived from conventional UK gilts. The Bank of England announced quantitative easing on 5 March 2009. Source: Bank of England

abilities for 1-3% HICP inflation two and three years ahead are used.<sup>13</sup> These measures had been around 87% and 86%, respectively, until they suddenly dropped in 2009 to 62% and 72%, respectively, in the second quarter, after which both returned to around 80%. Using the two-year inflation probabilities for comparison, credibility has been both higher and more stable for the Bank of England than for the ECB during the last decade.<sup>14</sup> This may be attributable to the lower level of monetary policy transparency of the ECB, as argued by Geraats (2010).

Despite the large reduction in the policy rate to 0.5%, survey inflation expectations and the Bank of England's own inflation forecasts fell below its inflation target, which prompted the adoption of unconventional monetary policy measures. The unexpected announcement of quantitative easing by the Bank of England on 5 March 2009 had an impressive effect on financial markets. It involved purchasing up to £75bn conventional gilts (later expanded to £200bn) with a residual maturity between 5 and 25 years (later over 3 years), financed by the issuance of central bank reserves. As shown in Figure 4, the yield curve shifted down significantly over this maturity range when quantitative

<sup>13</sup> Although the Bank of England has a point target for inflation, it is natural to choose the 1-3% range, since the Bank is required to write an open letter to the Chancellor of the Exchequer if HICP inflation deviates more than one percent-point from its target of 2%.

<sup>14</sup> To be precise, the mean and standard deviation are 85.0% and 6.0 for the Bank of England, and 61.3% and 9.2 for the ECB, using the two-year inflation probabilities from 1999Q1 to 2010Q3.

easing was announced. In just two days, long term nominal gilt yields fell by about 70 and 90 basis points at a maturity of 10 and 20 years, respectively. This was purely an announcement effect since the first gilt purchases were not until 11 March.<sup>15</sup> Clearly, central bank communications can be very effective.

Interestingly, from 4 to 6 March, real yields dropped by about 30 and 50 basis points for 10 and 20 year maturities, respectively, and break-even inflation declined by about 40 basis points for both maturities.<sup>16</sup> So, while politicians and the popular press in the UK were decrying that ‘printing money’ would lead to hyperinflation, statistics derived from financial markets judged quantitative easing more favorably and conducive to price stability.

## 5 Financial Stability Communication Issues

When the subprime mortgage crisis spread to the interbank market in August 2007, the ECB responded swiftly to mitigate money market distress by conducting a series of liquidity interventions. The ECB has emphasized that such liquidity operations are conducted to preserve the proper functioning of money markets, but that they do not influence the determination of the monetary policy stance.<sup>17</sup> It is important for the effective implementation of monetary policy that interbank rates remain close to the ECB’s main policy rate, the main refinancing rate (or ‘refi rate’). To be more precise,

“[T]he Governing Council sets the level of the minimum bid rate in the Eurosystem’s weekly MROs [main refinancing operations], which constitutes the main signal of the monetary policy stance. In the MROs, the ECB aims to supply the liquidity necessary for the banking system to operate smoothly, in such a way that very short-term market interest rates remain appropriately aligned with the policy stance signalled by the Governing Council. [...] [A]n excessively wide or volatile spread would undermine the clarity of the signal provided by the minimum bid rate and, ultimately, the credibility of the operational framework in its implementation of Governing Council decisions.”  
(ECB *Monthly Bulletin*, February 2008, p. 69)

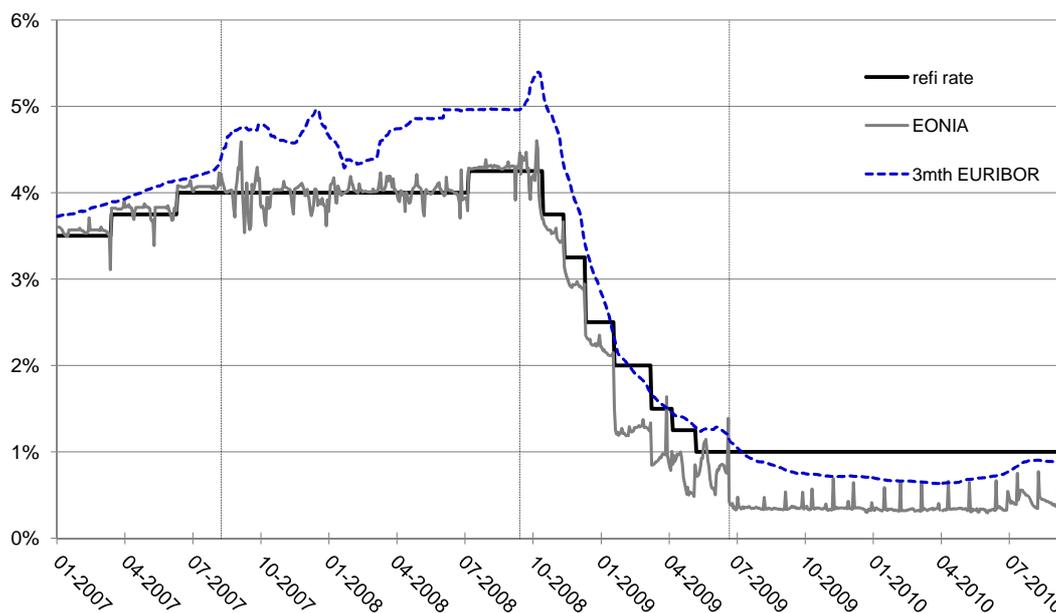
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<sup>15</sup>The Bank of England also reduced the Bank Rate from 1% to 0.5% on 5 March 2009, but this had largely been anticipated by financial markets.

<sup>16</sup>This is based on real zero coupon yields derived from UK index-linked gilts. In contrast to the ECB, the Bank of England conveniently provides daily UK data for the real interest rate and inflation term structure on its web site.

<sup>17</sup>ECB President Trichet in the introductory speech at the hearing at the Economic and Monetary Affairs Committee of the European Parliament in Brussels on 26 March 2008.

Figure 5: Euro area money market turbulence



Note: Refi rate refers to minimum bid or fixed rate for ECB main refinancing operations. Vertical lines shown at 09-08-2007, 15-09-2008 and 25-06-2009. Sample: 02-01-2007 - 20-09-2010.

Source: ECB and [www.euribor.org](http://www.euribor.org)

However, since October 2008, when the ECB started reducing the refi rate, the euro area overnight interbank rate (EONIA) has been persistently below the refi rate, as shown in figure 5. It has been hovering between the refi rate and the interest rate on the ECB's standing deposit facility, often much closer to the latter. This gives rise to the pertinent question whether the refi rate still appropriately reflects the ECB's monetary policy stance.

Although there has been no change in the ECB's key interest rates (consisting of the refi rate and the interest rates on the deposit and marginal lending facilities) since May 2009, euro area money market rates indicate there has been an effective policy easing. There has been a significant decrease in EONIA, which settled around 0.35% (quite close to the deposit facility rate of 0.25%) from July 2009 until July 2010, when it started rising to around 0.45%, still well below the 1% refi rate (see figure 5). It looks like the ECB has conducted monetary policy by stealth through liquidity operations.

Table 2 provides some basic statistics showing the inaccuracy of the ECB's monetary policy signal for very short-term market interest rates. Before the money market turmoil, there was on average a small positive spread between EONIA and the refi rate of about 6 basis points, with a standard deviation of roughly equal size, which implies the refi rate was an unbiased estimate of EONIA. During the initial period of money market turbulence starting on 9 August 2007, the ECB conducted extensive liquidity operations

Table 2: Inaccuracy of ECB monetary policy signal

Difference between EONIA and ECB refi rate (in percent point)	Mean	Standard deviation
Pre-turmoil (02-01-2007 – 08-08-2007)	0.058	0.063
Initial money market turmoil (09-08-2007 – 12-09-2008)	0.008	0.124
Post-Lehman policy easing (15-09-2008 – 24-06-2009)	-0.367	0.272
Monetary policy by stealth (25-06-2009 – 20-09-2010)	-0.629	0.076

Note: ECB refi rate refers to minimum bid or fixed rate for main refinancing operations.

Sample: 02-01-2007 - 20-09-2010. Source: www.euribor.org, ECB and author's calculations.

to stabilize EONIA close to the policy rate (see ECB 2008). It was remarkably successful keeping EONIA centered around the refi rate, with an average difference of less than one basis point, which is much smaller than during the pre-turmoil period, although volatility nearly doubled.

In response to the financial crisis that erupted after the bankruptcy of Lehman Brothers on 15 September 2008, the ECB started to cut its policy rate and carry out its main refinancing operations through a fixed-tender procedure with full allotment at the refi rate (as of 15 October 2008), providing unlimited liquidity on demand. The ECB also introduced fixed rate full allotment longer-term refinancing operations with a maturity of one to six months at the refi rate. These 'enhanced credit support' measures ensured abundant liquidity supply during the post-Lehman policy easing. This pushed EONIA on average 37 basis points below the refi rate, although it was highly volatile with a standard deviation of 27 basis points.

After the official policy rate cuts had come to a halt with the refi rate at 1%, the ECB expanded its enhanced credit support using one-year longer-term refinancing operations with full allotment at the refi rate, the first of which lead to a large liquidity injection on 24 June 2009 of €442 billion, which was partly hoarded by banks in the ECB's standing deposit facility at a rate of 0.25%. EONIA has been relatively stable since then, with its volatility close to the pre-turmoil period, but its level on average 63 basis points below the refi rate.<sup>18</sup> So, EONIA has been systematically, significantly below the official policy rate since July 2009, amounting to a stealthy policy rate cut. Clearly, the ECB has failed to achieve its "fundamental goal of ensuring that the very short-term interbank money market rates are close to the policy rate decided by the ECB's Governing Council" (ECB 2008, p. 89). Although the ECB has acknowledged the large discrepancy between EONIA and the refi rate (e.g. ECB 2010, p. 69), it has not addressed the credibility problem this

<sup>18</sup>The mean and standard deviation are -0.646 and 0.062 when excluding the more volatile period since 01-07-2010, which featured -0.551 and 0.085, respectively.

creates for its framework of monetary policy implementation.

It is not only the overnight interbank rate that has been persistently below the official policy rate, but also the three-month interbank rate (EURIBOR), which banks use as an important benchmark for short-term retail rates affecting households and firms. Three-month EURIBOR gradually declined to around 0.65%, before inching up to about 0.90% during the European sovereign debt turmoil that erupted in the spring of 2010 (see figure 5). So, the fictive rate cut has provided greater stimulus than the official policy rate of 1% suggests.<sup>19</sup> The ECB's 'enhanced credit support' has clearly influenced its de facto monetary policy stance, which is no longer adequately described by the refi rate. The ECB should clarify which interest rate now provides the best descriptive statistic for its monetary policy stance.<sup>20</sup>

Again, it is useful to compare this to the Bank of England. The UK overnight interbank rate (SONIA) had also been persistently below the Bank rate during the post-Lehman policy easing, but since March 2009 it has remained very close to the Bank rate of 0.5%.<sup>21</sup> The three-month interbank rate (LIBOR) gradually declined during the implementation of quantitative easing from about 2% to 0.6% in September 2009 and remained close to the Bank rate until it moved to around 0.75% in May 2010 during the European sovereign debt turmoil. So, the Bank of England has largely succeeded in stabilizing short-term money market rates around its policy rate.

Another financial stability communication issue is the ECB's Securities Markets Programme, which was announced on 10 May 2010 and involves sterilized purchases of euro area public and private debt securities to alleviate the European sovereign debt turmoil. The ECB provided no operational details in advance, leaving financial markets in the dark about the amount or the range of debt securities to be purchased. In fact, the only data the ECB has released about its Securities Markets Programme is the amount purchased each week and the value of its holdings (about €60 billion as of mid September 2010). This dearth of information is in contrast to the ECB's Covered Bond Purchase Programme, which operated from July 2009 until June 2010 and involved the purchase of €60 billion of euro-denominated covered bonds issued in the euro area. Key technical details, includ-

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<sup>19</sup>President Trichet argued in response to a question at the ECB press conference of 8 July 2010 that money market rates are "not signalling monetary policy intentions at this stage" because of the unlimited supply of liquidity. However, this ignores the fact that fixed-rate full-allotment main/longer-term refinancing operations effectively put a ceiling on average interbank rates (similar to a standing lending facility), so the choice of the fixed rate affects *average* interbank rates that are central to the monetary policy transmission mechanism and therefore determine the monetary policy stance.

<sup>20</sup>An interesting option is the practice of the Swiss National Bank to specify the monetary policy stance in terms of three-month LIBOR.

<sup>21</sup>The mean and standard deviation of the difference between SONIA and Bank Rate are -0.29 and 0.29 from 15-09-2008 until 04-03-2009, and -0.05 and 0.03 since quantitative easing (up to 20-09-2010).

ing the total purchase amount and eligibility, were telegraphed to financial markets well in advance,<sup>22</sup> and a short Monthly Report was published. The secrecy surrounding the Securities Markets Programme is particularly glaring because the purchase of distressed debt securities exposes the ECB to much greater credit risks than high quality covered bonds. Despite the potential for large losses, the lack of transparency makes it hard to hold the ECB accountable for its operation of the Securities Markets Programme.

It is interesting to compare this to the Asset Purchase Facility of the Bank of England, which was initially set up in January 2009 to make sterilized purchases of high-quality private sector assets to foster financial stability, but was subsequently modified for monetary policy purposes in March 2009 to implement the Bank's quantitative easing. The Asset Purchase Facility features exemplary transparency, including advance announcements of operational details, the publication of a Quarterly Report and the release of detailed data of completed purchases.<sup>23</sup> The Bank of England is clearly talking numbers, unlike the ECB.

Nevertheless, the Bank of England has experienced its own communication issues related to financial stability. The Bank's announcement (joint with HM Treasury and the Financial Services Authority) on 14 September 2007 that liquidity support would be provided to Northern Rock promptly triggered a bank run. The latter only ended after the government had guaranteed all existing deposits at Northern Rock.<sup>24</sup>

The financial turbulence festering from the summer of 2007 and the acute financial crisis in September 2008 after the Lehman bankruptcy have shown the desirability of greater transparency about financial instruments, financial institutions and financial interconnections. Some challenges for each of these aspects of financial stability are discussed in turn.

A key problem is that many consumers and investors unwittingly relied on very risky financial instruments. Consumers deciding about a mortgage need to have clarity about the costs and risks involved. Although this is relatively straightforward for fixed-rate mortgages, the uncertainties involving the payments for adjustable-rate mortgages may be effectively communicated using scenarios that cover a wide range of plausible interest rate paths, with a baseline scenario based on market expectations. Another issue is that many investors mistakenly believed that AAA-rated securities carried low credit and liquidity risks. To better convey the underlying uncertainties it would be useful to have separate ratings for each or provide regularly updated value-at-risk measures to differentiate AAA-rated subprime CDO's from US Treasury Bills. In general, transparency about financial

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<sup>22</sup>See the ECB press release "Purchase programme for covered bonds", 4 June 2009.

<sup>23</sup>All available at <http://www.bankofengland.co.uk/markets/apf/index.htm>.

<sup>24</sup>Although the UK has deposit insurance, at the time it covered just 100% of £2k and 90% of £33k, with a delay in funds availability of many months, making it rational for many customers to withdraw their deposits from Northern Rock.

instruments and their risks is essential for consumers and investors to make well-informed decisions.

Financial institutions have long been subject to supervision and regulation. Traditionally, a distinction has been made between liquidity and solvency risks that are inherent to the business of banking due to maturity and rate mismatches of assets and liabilities. However, the recent financial turmoil has shown that with mark-to-market accounting, liquidity problems of a financial institution could turn into solvency problems due to fire sales of risky assets in illiquid markets. So, more attention should be devoted to liquidity. It would be sensible to have countercyclical capital requirements that are based on both credit and liquidity risks. Limits on leverage to curb excessive risk-taking are also vital. Another issue is that some financial institutions have (purposely) hidden risks through off-balance sheet activities and the shadow banking system. Transparency is key in this respect, but by no means easy to achieve because private information is rife and incentives remain (e.g. through bonus structures and limited liability) to seek out loopholes for risky activities. This poses a huge challenge for the construction of adequate statistics for financial stability.

Although financial supervision and regulation have largely focused on financial stability at the micro level, this is not sufficient to guarantee financial stability at the macro level due to financial interconnections. The liquidity problems of one financial institution could lead to fire sales into illiquid markets that affect many other institutions, leading to cascading and contagion effects. Another issue is that there may be frictions between financial stability at the micro and macro level. For instance, mortgage-backed securities allow banks to reduce their risk exposure and thus improve micro-financial stability. But by transferring risks to others, banks become prone to adverse selection and moral hazard problems, seeking out risky mortgages with high returns and neglecting to monitor mortgages they issued, thereby undermining macro-financial stability. Similarly, at the micro level credit default swaps are useful hedging instruments to insure against the default risk of bond holdings, but when they are held 'naked' without owning the underlying bonds, they could become potentially destabilizing speculative instruments at the macro level. Also, bailing out a financial institution is likely to induce moral hazard and to encourage others to engage in riskier behavior. Although 'constructive ambiguity' has been suggested to overcome this problem, this is not a credible solution for institutions that are considered too big or too interconnected to fail. Clearly, there is a need for macro-prudential regulation and supervision to limit systemic risks. This requires better information about the complex web of interconnections that characterizes our global financial system, and the development of effective real-time indicators and predictive statistics for systemic risks is likely to be challenging.

Whether considering transparency about financial instruments, institutions or interconnections, the ex-post disclosure of negative information could be harmful. For instance, revealing that AAA-rated subprime CDO's are not as good as gold is likely to worsen their liquidity risk. Proclaiming that a bank has liquidity problems could become self-fulfilling by triggering a bank run. And highlighting fragilities in the financial system may reduce market trust and liquidity, and thereby raise systemic risk. Instead, it is important not to wait with communicating until problems arise, but to develop a framework of regular data releases that allows investors and institutions to make better informed decisions and gives them an incentive to refrain from risky activities that could imperil financial stability.

## 6 Conclusions

Central banks have increasingly been talking numbers about monetary policymaking. In particular, this has taken the form of a quantification of the primary objective, numerical macroeconomic forecasts, and to a lesser extent voting records. To convey uncertainty about the macroeconomic projections, fan charts and scenario analysis are very effective communication tools. In addition, the publication of the balance of votes provides a concise way to communicate uncertainty about the monetary policy stance.

To assess the central bank's success in achieving price stability, medium term private sector inflation expectations provide an important real-time indicator. Although the 'break-even inflation' implied by the yield on nominal and index-linked bonds gives a high-frequency measure of market perceptions, it is also affected by financial market disruptions and risk premia unrelated to inflation. Survey expectations of inflation do not have this drawback, but they fail to capture higher moments of inflationary beliefs that may provide important signals during heightened uncertainty. This problem can be overcome by constructing a measure of central bank credibility using survey probabilities for inflation outcomes consistent with price stability. This reveals that ECB credibility was worrisomely low at the height of the financial crisis in the second half of 2008.

The announcement of quantitative easing by the Bank of England in March 2009 illustrates that central bank communications can be highly effective and that unconventional monetary policy measures need not harm the credibility of the central bank.

The liquidity operations of the ECB appear to have been monetary policy by stealth during the second half of 2009 as short-term interbank rates have declined well below the ECB's official policy rate, which no longer provides a good descriptive statistic of the de facto monetary policy stance.

Financial stability communications should cover both financial instruments, institutions and interconnections, and highlight risks. Furthermore, the release of financial in-

formation may be detrimental ex post but beneficial ex ante. So, it is important to commit to regular communications relevant for financial stability.

Last but not least, this paper has argued that central banks should not just be talking numbers, but focus more on numbers that talk in no uncertain terms about uncertainty.

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