Central Bank Communications: A Comparative Study

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Abstract

Central bank communication has increased significantly over the past two decades and has continued to evolve since the onset of the financial crisis. We first discuss the theoretical and empirically measured merits of central bank transparency. We then survey the communication practices of central banks in ten advanced economies, comparing and contrasting their frameworks across press conferences and statements, the publication of minutes and transcripts, the horizon and scope of the forecasts that they publish and the use of forward guidance in its various forms. While the survey provides a snap shot of central banks' communications at a point in time, where possible we place this in the context of the changing communication environment following the crisis.

The authors work in the Monetary Policy Division. The views expressed are those of the authors and are not necessarily shared by the Central Bank of Ireland or the ESCB. The authors would like to thank John Flynn, Stefan Gerlach and Gillian Phelan for helpful comments.

1 Introduction

Central bank communication has increased significantly over the past two decades and has continued to evolve since the onset of the financial crisis. Historically, central banking has carried a certain mystique, inspiring books such as *Secrets of the Temple* (Greider 1987). Today, however, the Reserve Bank of New York blogs, the Bank of England tweets, the Central Bank of Ireland is on Facebook and Sveriges Riksbank holds live webchats.

In this article we survey the current communications of ten central banks in advanced economies, to compare and contrast the various frameworks.[1] We find that while most central banks use similar communication tools, such as press releases and press conferences, the publication of forecasts and minutes, and, more recently, forward guidance, exactly how these tools are employed differs considerably across central banks. For instance, while all central banks communicate using speeches and press releases, the use and timing of press conferences varies across central banks. There is less consensus on the publication of meeting minutes; only half of the ten central banks publish minutes on a timely basis, with varying levels of detail. Many central banks have changed their approach to "forward guidance" since the onset of the financial crisis in 2008. While some central banks provided interest rate forecasts as far back as 1997, the crisis has led to an increase in the use of "forward guidance" on the expected future path of interest rates by central banks, especially as a tool at the zero lower bound.

This article proceeds as follows: we briefly provide a context for the discussion by reviewing the debate on the merits of central bank transparency in Section 2. Section 3 summarises the key features of ten central banks' current communications practices. The various communications tools are discussed comparatively and in the context of the academic literature. While the analysis provides a snap shot of central banks' communications at a point in time, where possible we try to show the impact of the crisis on the communication frameworks of central banks. Section 4 concludes.

2 The evolution of central bank transparency

Prior to the 1990s, the general view within central banking was that monetary policymakers should "say as little as possible, and say it cryptically" (Blinder *et al.* 2008, p. 2). The shift towards greater transparency was aided by the advent of inflation targeting and the information this conveyed in terms of the policy goals of central banks. In 1993, the Bank of England began publishing its quarterly Inflation Report, which sets out detailed economic analysis and inflation projections on which the Monetary Policy Committee bases its interest rate decisions, a move which influenced the development of other central banks' publications.[2] The Reserve Bank of New Zealand, Norges Bank and Sveriges Riksbank took communications to a new level by introducing a form of forward guidance with the publication of an expected future path for interest rates in 1997, 2005 and 2007, respectively.

The financial crisis has accelerated the shift towards greater transparency and has further increased central banks' communication. As traditional monetary policy tools, particularly interest rates, have been exhausted, central banks have turned to other means to affect the yield curve. Communication has been one of the main tools used in this respect. Nonetheless, central banks remain extremely careful about how, when and what they communicate. There are good reasons for this; poor communication can lead to misunderstandings within financial markets and with the public, with the result that the effectiveness of policy can be weakened considerably.

1 The banks surveyed are: the European Central Bank, Bank of England, Federal Reserve, Bank of Japan, Swiss National Bank, Bank of Canada, Sveriges Riksbank, Norges Bank, Reserve Bank of Australia and Reserve Bank of New Zealand.

2 See Mishkin and Posen (1998).

2.1 Motivation for transparency

Central bank transparency is a means of reducing information asymmetries between policymakers and markets; in this respect, communication can enhance transparency. There is broad consensus in the literature that transparency may help to enhance policy effectiveness (Bernanke *et al.* 1999, Cobham *et al.* 2010) and improve the predictability of monetary policy decisions (Blinder *et al.* 2008). As suggested by the expectations hypothesis of the term structure of interest rates, monetary policy expectations impact not only short-term interest rates but also long-term interest rates. This is well established in the empirical literature and suggests an important role for central bank communications. Influencing market expectations is a key channel through which monetary policy operates, and policy transparency can allow for better anticipation of central bank actions (Woodford 2005). As noted by Bernanke (2004), monetary policy will be more effective and risk in financial markets should be reduced if communication helps financial markets develop more accurate expectations of the likely future course of policy.

By increasing accountability and serving as a form of self-discipline for policymakers, transparency can further enhance policy effectiveness by supporting the credibility of a central bank in meeting its objectives. This in turn can reinforce support for central bank independence. With a high degree of credibility, central banks can even induce changes in interest rates through a change in the target rate *without* conducting open market operations. This is explored in the literature on "open mouth" operations (e.g. Guthrie and Wright 2000, Taylor 2001 and Thornton 2004).

Transparency does not imply that perfect information symmetry is necessary or desirable, however. Mishkin (2007, p. 104), for example, describes transparency as a "virtue" but warns that it can go too far if it complicates communication with the public. As noted by Vayid (2013, p. 4), it is important that there is value in what a central bank communicates. The author makes the distinction between quality and quantity of communications; the former is of course much harder to evaluate than the latter. Following Blinder *et al.* (2008), central bank communications should only be used to the extent that they raise the "signal-to-noise" ratio by increasing the predictability of central bank actions, thus enabling market participants to make more efficient decisions. Caution is also needed to ensure that communication about its objectives and decision-making process does not jeopardise a central bank's flexibility to respond to economic shocks.

Transparency is now largely valued by monetary policy makers. A survey of 94 central banks by Fry *et al.* (2000) shows that 74% consider transparency to be a "vital" or "very important" part of their monetary policy frameworks. Another survey of 84 central bankers by Blinder (2000) indicates that central banks view openness as very important in establishing or maintaining credibility.

2.2 The effects of transparency

A number of researchers have tried to quantify the degree and development of transparency across central banks by constructing "transparency indices". Eijffinger and Geraats (2006) propose an index that comprises political, economic, procedural, policy and operational aspects of central banking. Their index is compiled for nine major central banks and shows a general trend towards greater transparency over time. Dincer and Eichengreen (2009) construct indices of central bank transparency following the work of Eijffinger and Geraats (2006) for 100 countries and use regression analysis to characterise differences in transparency across countries over time. Their results suggest that transparency is associated with less inflation variability, though not with less inflation persistence. In contrast, van der Cruijsen and Demertzis (2007) find that higher transparency is associated with less inflation persistence in their analysis of inflation for eight industrialised countries.

Demertzis and Hallett (2007) develop a model of transparency showing that increases in the degree of transparency would decrease volatility in both inflation and output gap levels, but would not affect the average levels of inflation and output achieved. They test their predictions against a numerical transparency index for nine OECD countries using the Eijffinger-Geraats index (2006) to measure transparency and find that all predictions are verified except for the reduction in output volatility; the latter appears to rise as transparency increases.

Chortareas *et al.* (2002) assess the benefits of transparency, defined with respect to central bank inflation forecasts and forward-looking analysis. Using a dataset for 87 countries, they find that an increase in the detail with which central banks publish forecasts is associated with a lower level and variability of inflation. Their results show a negative, but statistically insignificant, correlation between transparency and output volatility. Nevertheless, they highlight that this provides fairly strong *prima facie* evidence against claims that increasing transparency would increase output volatility.

Geraats (2009) conducts an extensive review of the theoretical literature on central bank transparency and analyses transparency trends throughout the world and across monetary policy frameworks. Three stylised facts about monetary policy transparency over the past decade arise from the study: (i) there has been a substantial increase in the disclosure of information by central banks, especially with respect to policy decisions and macroeconomic analysis; (ii) significant differences exist between the degree of information disclosures across monetary policy frameworks, with inflation-targeting central banks experiencing the highest average level and increase in transparency; and (iii) the increase in transparency has been significantly positively correlated with the initial level of inflation and the level of GDP per capita, while there is a significantly negative correlation between transparency and subsequent inflation.

3 Comparative study of current communications practices of major central banks

In this section we analyse the communications of central banks in ten advanced economies, compare their various communication strategies and build a picture of how the modern central bank communicates with financial markets and the broader public.

Before proceeding, it is important to note that this assessment provides a snap shot of communications as they stand in 2014. It does not attempt to judge the quality of those

Box 1: Recent changes in communication by the Federal Reserve Board

The Federal Reserve has changed its communication significantly in recent decades. Indeed, Federal Reserve Board Chairman Yellen recently referred to changes in its communication as a "revolution".[4] Only in February 1994 did the Federal Open Market Committee (FOMC) first start announcing changes in the target federal funds rate after its meetings, with further changes in communication adopted over the years since. However, the crisis increased the need for communication. Former Federal Reserve Board Chairman Bernanke was also an advocate for communication in central banking. As early as 2007, Federal Reserve communication on forecasts was increased. In addition to this, the Federal Reserve has detailed its monetary policy strategy, the Chairman now holds a press conference after some FOMC meetings and the Federal Reserve has issued "forward guidance" on the expected future path of interest rates.

4 See Yellen (2012) for a discussion.

3 We detail some of the major changes in central bank communications during the crisis but do not conduct a comprehensive analysis of all changes in all surveyed countries.

Box 1: Recent changes in communication by the Federal Reserve Board

The Federal Reserve Act specifies the statutory objectives of maximum employment, stable prices and moderate long-term interest rates. However, the FOMC never explicitly set out its interpretation of this mandate until January 2012, when it issued a statement indicating that it understands price stability as corresponding to a 2% longer-term inflation goal and that it makes its best assessment of the maximum level of employment at any given time, recognising that such assessments are necessarily uncertain and subject to revision. The FOMC also clarified that the personal consumption expenditures index was the inflation measure it focused on. The FOMC reaffirmed this assessment of its strategy in January 2013.

Since 2011, the Chairman holds a press briefing four times a year. Prior to this, a statement was issued after each of the eight annual FOMC meetings. The introduction of regular press briefings was intended to "further enhance the clarity and timeliness of the Federal Reserve's monetary policy communication".[5]

In terms of forecasts, from October 2007 a detailed summary of individual FOMC meeting participants' economic projections was included as an addendum to the meeting minutes which were published three weeks after the meeting. Since April 2011, an advance version of this table on the ranges and central tendencies of the participants' projections is released in conjunction with the Chairman's post-meeting press conference. The survey now also includes participants' projections of the path of the future short-term interest rates that they see as most likely to achieve the Committee's goals.

In addition, the Federal Reserve has been iterating on various forms of forward guidance since December 2008. This is discussed in more detail in Section 3.4.

5 See: http://www.federalreserve.gov/newsevents/press/monetary/20110324a.htm.

communications; this is beyond the scope of the current exercise. Furthermore, as previously noted, there has been a recent shift towards greater communications particularly by central banks in economies most affected by the financial crisis of 2008. Policymakers in these economies have turned to communications as a means of reassuring financial markets that the stance of monetary policy will remain accommodative for as long as warranted by economic conditions. The Federal Reserve is a particularly striking example of this, and Box 1 outlines the changes in its strategy.[3]

3.1 Verbal communication and press statements

Central banks directly communicate with the public through a number of channels. Table 1 sets out the main tools that the ten central banks in our survey use to communicate. All the central banks, for example, use speeches as a means of communicating their views on topics of relevance to monetary policy and explaining in more detail their stance and outlook. All of the central banks also publish a press release after each policy meeting, regardless of whether or not interest rates are changed. These press releases convey the motivation for each monetary policy decision. This allows the public to form a view on the central bank's perception of economic conditions and, to some extent, the central bank's reaction function if there is consistency over time in the central bank's response to changes in economic conditions. Except for the Reserve Bank of Australia, all of the surveyed central banks also hold press conferences after policy-setting meetings or

6 See Vayid (2013) for a discussion.

the publication of certain reports. This provides another opportunity for them to explain in detail their reasoning for the current stance of monetary policy and to convey their views on the outlook for policy given their economic projections and broader expectations. In addition, a number of central banks, including the Bank of England, the Bank of Canada, the Federal Reserve and the ECB observe a "blackout" or "purdah" period in advance of rate-setting meetings during which decision-makers do not speak publicly to ensure that the message from the meeting is communicated as clearly as possible.[6]

3.2 Minutes of monetary policy committee meetings

Monetary policy is set by a committee in all of the surveyed central banks.[7] These committees meet to decide interest rates and other policy measures following a discussion of the economic outlook. The way in which these policy deliberations are recorded and published varies across central banks. Publishing meeting minutes and transcripts adds another layer of transparency to monetary policy.

Five of the central banks surveyed release minutes within a few weeks of policy meetings. Current rules for the ECB and Norges Bank only allow the publication of minutes after thirty years and twelve years, respectively. However, over the past year ECB policymakers have publicly discussed publishing accounts of meetings on a timely basis.[8] Minutes provide insight into the internal deliberations of policymakers in deciding on the stance of monetary policy. Except for the Reserve Bank of Australia, the minutes of the surveyed central banks provide a breakdown of the number of members voting in favour of or against the decision, as well as the names of the members associated with each position. Sveriges Riksbank's minutes go one step further, attributing comments to individual members of the rate-setting committee. Meeting transcripts, which provide much more detail on policy discussions, are released by the Federal Reserve and the Bank of Japan with a lag of five years and ten years, respectively.

There seems to be broad agreement in the academic literature that committee meeting minutes provide useful additional information to market participants and the public. Rosa (2013) finds evidence that the publication of FOMC meeting minutes provides market-relevant information. Boukas and Rosenberg (2006) show that themes in FOMC meeting minutes are correlated with current and future economic conditions. Gerlach-Kristen (2004) shows that the voting record of the Bank of England's Monetary Policy Committee helps predict future policy changes. Similarly, Apel and Grimaldi (2012) find that information in meeting minutes of the Sveriges Riksbank's monetary policy committee is also useful in predicting future policy changes.

Does the publication of minutes change the content of what people will say in monetary policy committee meetings? Meade and Stasavage (2008) find that the decision to publish transcripts of FOMC meetings may have resulted in a reluctance among members to offer dissenting opinions. Issing (2005) and Gersbach and Hahn (2013) note that in a currency union, the publication of individual votes could create pressure on individual members to adopt a more national view. On the other hand, Gersbach and Hahn (2008) argue that the publication of minutes with attributed comments or votes increases accountability and thus strengthens members' incentives to prepare for meetings. Furthermore, a survey of Riksbank monetary policy committee members conducted by Apel *et al.* (2010) indicated that members generally

7 We refer to these generically as "monetary policy committees", although they have official titles in each central bank; for instance, in the Federal Reserve, the monetary policy committee is called the Federal Open Market Committee (FOMC) and in the ECB it is referred to as the Governing Council.

8 ECB Executive Board members Benoît Cœuré and Jörg Asmussen indicated their personal opinions about the publication of meeting accounts in a joint interview with Süddeutsche Zeitung and Le Figaro published on 29 July 2013 (ECB 2013a). Mr Asmussen reiterated his opinion in a speech on 10 September 2013 (Asmussen 2013). President Draghi stated that "we have started working in the Executive Board and we are continuing to work" on the question of accounts at a post-Governing Council meeting press conference on 5 December 2013 (ECB 2013b).

did not support the view that publishing minutes had inhibited the discussion at meetings.

Finally, there are differing opinions about communications by individual members of a policy committee as opposed to the channelling of communications through a single member (e.g. the president or chairman of a board). Bernanke (2004) points out that releasing information on the views of individual members, for example through the publication of minutes, can convey useful information about the diversity of views and the balance of opinion on a committee. However, as Blinder (2007, p. 114) states: "A central bank that speaks with a cacophony of voices may, in effect, have no voice at all." Apel *et al.* (2013) provide an interesting contrast between the collegial committee structure of the Norges Bank, and the individualistic committee structure of the Sveriges Riksbank.[9] While the Norges Bank monetary policy committee members responded in a way agreeing to Blinder's "cacophony problem", Riksbank monetary policy committee members saw the publication of differing views as a way of improving the public's understanding of the economic situation. The authors conclude that there may be a *status quo* bias.

3.3 Macroeconomic forecasts/projections

All of the central banks publish forecasts, analysis and other articles in various formats, such as the Bank of England's quarterly Inflation Report, the ECB's Monthly Bulletin and the Reserve Bank of New Zealand's Monetary Policy Statement.

The main variables for which central banks publish forecasts are headline inflation and GDP.[10] In general, the forecast horizon is between 2 and 3 years. However, the Federal Reserve also provides a longer-term forecast. The ECB has recently increased its forecast horizon, and also broadened the scope of its

Box 2: Recent changes to the publication of ECB projections

In June 2013, the ECB published its macroeconomic projections in the form of midpoints and ranges; prior to this, only ranges were published. As noted in the text accompanying the projections: "The publication of midpoints is expected to enhance transparency and further facilitate the communication of the projection results, while ranges should be seen as a means to reflect the uncertainty surrounding the projections" (ECB 2013c, p. 1). The information content of the ECB projections exercise was expanded in late December 2013 with the publication of forecasts for additional variables. Previously, the ECB only published projections for headline HICP and real GDP and its components. From December 2013, projections for employment, unemployment, measures of core inflation, compensation per employee, labour productivity, government budget balances, government debt and current account balances were published.

In March 2014, the ECB extended the horizon of its projection publications, releasing forecasts for 2016. In previous years, the ECB only released its projections for a new year in the December publication of projections. Although forecasts over such a long horizon are subject to greater uncertainty, publishing forecasts further into the future conveys additional information to the public about the central bank's current expectations for future economic conditions. By releasing the 2016 projections in March of this year, the ECB has lengthened its maximum projection horizon to 2.75 years from 2 years, bringing it more in line with the practice of most of the other surveyed central banks.

9 In this setting, an individualistic committee is one in which members are individually accountable for their voting, and decisions are made by majority voting. In contrast, a collegial committee is one which tries to reach unanimity and in the event of conflicting opinions, it publicly stands unified behind the decision.

10 The Bank of Japan forecasts headline CPI excluding fresh food, while the Swiss National Bank is the only central bank not to provide a forecast of GDP.

projections, which is discussed in Box 2. Most central banks provide a point estimate for their forecasts, sometimes adding a confidence interval around this. In addition, seven of the central banks publish "fan charts" which indicate not only the point forecast but also the degree of confidence attached to this forecast. The Federal Reserve differs somewhat, providing the range of the forecast estimates of individual FOMC members.

Some central banks publish forecasts of other indicators of inflation, the labour market and economic activity. Seven of the surveyed banks publish forecasts of core inflation, which is a narrower and less volatile measure than headline inflation. Five central banks publish forecasts of employment or unemployment, and of these banks, the ECB, Sveriges Riksbank, Norges Bank and the Reserve Bank of New Zealand also publish forecasts of wages or labour costs. These four central banks and the Bank of Canada also forecast some components of GDP and/or potential output or the output gap.

An interesting question is whether an assumption of unchanged monetary policy underlies the forecasts a central bank publishes. The interpretation of projections will be different depending on whether it is assumed that the interest rate moves to address any deviations from target of inflation and, if mandated, output. If the assumption is that monetary policy will be unchanged, then the projection will perhaps indicate inflation above target at some point along the forecast horizon. However, if the forecast incorporates changes in monetary policy, it is less likely that inflation would be significantly above target anywhere in the forecast horizon since it will be assumed that monetary policy will address any deviations to bring inflation back to target. Of the surveyed central banks, the Bank of England, Swiss National Bank and the Reserve Bank of Australia assume unchanged monetary policy, while the others do not.

Some central banks publish a forecast for the interest rate, thus directly providing guidance on its future path. The Reserve Bank of New Zealand (RBNZ), Norges Bank and Sveriges Riksbank all publish interest rate forecasts. The value of these projections is much debated. Winkelmann (2010) shows that the publication of projections by the Norges Bank has reduced financial market participants' revisions of the expected future policy path. Moessner and Nelson (2008) find that the RBNZ's interest rate projections have a statistically significant impact on future rates on the announcement day. However, others suggest that interest rate projections may not provide additional information to market participants. Goodhart and Wen (2011) show that the RBNZ's rate projections are inefficient for horizons greater than two quarters. Mirkov and Natvik (2013) find that policymakers may be constrained in their interest rate decision by their most recently published forecasts.

3.4 Forward guidance

The publication of interest rate projections is one type of "forward guidance", as they provide explicit information on the central bank's expected path of future interest rates. A different form was issued by the Federal Reserve through 2003 and 2004. Usually information is provided following a meeting of the FOMC on the stance of monetary policy for the period until the next meeting, however, at that time the FOMC repeatedly issued statements setting out the likely policy stance for a period beyond the next meeting. For instance, in August 2003 it was announced, "policy accommodation can be maintained for a considerable period".[11] During the crisis, iterations of this type of forward guidance have been used as a tool at the zero lower bound by the Federal Reserve, the Bank of Canada, the ECB and the Bank of England.[12]

The Federal Reserve has been particularly active in this area since 2008, refining and altering the wording of its forward guidance

11 For a discussion, see Contessi and Li (2013).

12 The Bank of Japan was the first central bank to use forward guidance as a tool at the zero lower bound, stating in 1999 that it was committed to a zero interest rate policy "until deflationary concerns are dispelled". See Okina (2000).

a number of times. Table 2 shows the progression of FOMC announcements from a type similar to those in 2003/2004, to date-based forward guidance in August 2011, and then state-contingent guidance in 2012. Date-based guidance simply states that interest rates will remain at current or lower levels (at least) until a certain time. State-contingent forward guidance says that rates will remain unchanged at least until a certain state of the economy is met. Generally, it will link rates to both inflation outcomes and some real economy variable; here the FOMC chose an inflation rate of 2.5%, and an unemployment rate of 6.5%. Interestingly, having clarified its understanding of its mandate as being inflation of 2% in January 2012, the FOMC's state-contingent guidance later that year indicated it would accept inflation above this level in order to achieve lower unemployment.

The forward guidance announcements of other central banks also fall into the three broad categories used by the Federal Reserve. In July 2013 the Governing Council of the ECB issued forward guidance very similar to the FOMC's March 2009 announcement, stating that it expected rates to remain "at present or lower levels for an extended period of time".[13] The Bank of Canada issued date-based guidance in April 2009, stating that rates would remain at current levels until the second quarter of 2010.[14] In July 2013 the Bank of England issued state-contingent forward guidance, tying guidance to an unemployment rate of 7% and an inflation rate of 2.5%. More recently, since unemployment declined more quickly than expected without a pick-up in the wider economy, the Bank of England has changed its forward guidance somewhat, moving away from a hard threshold for one real-economy variable, and towards a broader set of indicators of economic activity.

While forward guidance is an important communication tool, exactly how it is communicated is important. All central banks have made it clear in their statements that their forward guidance is contingent on the inflation outlook, implying that they will respond to inflation if it begins to increase significantly above target, regardless of whether the date or state-contingencies have been met. Nonetheless, the FOMC had difficulty communicating that the state-contingent targets for variables were not triggers at which policy would definitely change, but thresholds before which policy would not change. Transcripts from the FOMC's 2008 meetings show how the FOMC discussed the issue of communicating forward guidance. President Richard Fisher of the Reserve Bank of Dallas said that, once forward guidance was issued, policymakers must "repeat it incessantly and stay on message in order to have it penetrate". It has been argued that the Bank of England undertook a similar strategy once it issued forward guidance in 2013.[15]

It is difficult to assess the success of these forward guidance announcements. Former Federal Reserve Board Chairman Bernanke noted that it was only after the very precise statement in August 2011 that "interest rates and survey measures of policy expectations moved in ways broadly consistent with the guidance".[16] Mark Carney, speaking as Governor of the Bank of Canada in 2012, argued that date-based forward guidance worked since it "reached beyond central bank watchers to make a clear, simple statement directly to Canadians". He also noted that it had an effect since the Bank of Canada placed itself in a position to make a financial loss if this conditional commitment were not met by extending the approximately $30 billion exceptional liquidity programs already in place for the duration of the guidance (Carney 2012).

Academic research on the topic is limited by the relatively new nature of this guidance and the short and turbulent time period in

13 See ECB (2013d).

14 See Bank of Canada (2009).

15 See: http://www.centralbanking.com/central-banking/news/2330888/fed-transcripts-reveal-origins-of-modern-forward-guidance.

16 See Bernanke (2013).

which it has taken place. Raskin (2013) finds that the FOMC's date-based guidance led to a statistically significant and economically meaningful change in investors' perceptions of the FOMC's reaction function. Swanson and Williams (2013) test the sensitivity of Treasury yields to news when at the zero lower bound. They find that up to late-2011, this sensitivity was at levels that suggest that monetary and fiscal policy were likely to have been about as effective as usual. Only in late-2011 does this sensitivity fall. The authors put forward two explanations: first, until late-2011, market participants expected the funds rate to rise above zero within about four quarters, minimising the effects of the zero bound on medium and longer-term yields. Second, the Federal Reserve's forward guidance and large scale asset purchases may have helped offset the effects of the zero bound on medium- and longer-term rates. Moessner (2013) finds that explicit policy rate guidance announcements significantly reduced interest rates and forward interest rates implied by Eurodollar futures and US Treasuries at horizons up to five years, and led to a flattening of the yield curve implied by both.

4 Conclusion

Central bank communication has changed significantly during the course of the crisis. In particular, central banks have begun to communicate in new and different ways. This paper first discussed the merits of transparency as set out in the academic literature both in terms of the motivation and the effect of increased transparency and communication. We then go on to survey ten central banks in advanced economies, comparing and contrasting their communication frameworks across a number of tools, including: press conferences and statements, the publication of minutes and transcripts, the horizon and scope of the forecasts that they publish and the use of forward guidance in its various forms. We place this, where possible, in the context of the changing communications environment following the crisis.

The analysis indicates the breadth and diversity of communication frameworks within modern central banks. Although all central banks communicate using speeches and press releases, the timing of press conferences varies across central banks. There is greater variety between central banks in the publication of minutes, with half of those surveyed publishing them on a timely basis and two publishing them with long lags. Of those central banks that do publish minutes, some provide individual voting records and some attribute individual comments. Similarly, while all central banks publish forecasts, the variables and the horizons of these forecasts differ. Furthermore, the financial crisis has caused central banks to change their strategies in relation to the publication of both minutes and forecasts. The crisis has also changed the approach of many central banks to forward guidance. While some central banks provided interest rate forecasts as far back as 1997, the crisis has led to an increase in the number issuing forward guidance, as well as an expansion of the types of forward guidance communicated. Overall, this innovation suggests that communication tools will continue to evolve in the future as central banks attempt to convey their messages more clearly.

Table 1: Central banks' communications strategies[1]

	European Central Bank	Bank of England	Federal Reserve	Bank of Japan	Swiss National Bank	Bank of Canada	Sveriges Riksbank	Norges Bank	Reserve Bank of Australia	Reserve Bank of New Zealand
Speeches	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post-meeting press releases	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post-meeting and/or post-forecast publication press conferences	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Publication of minutes	Yes (30-year lag)	Yes	Yes	Yes	No	No	Yes	Yes (12-year lag)	Yes	No
Breakdown of # votes for/against rate decision	n/a	Yes	Yes	Yes	n/a	n/a	Yes	Yes	No	n/a
Voting individually attributed	n/a	Yes	Yes	Yes	n/a	n/a	Yes	Yes	No	n/a
Comments individually attributed	n/a	No	No	No	n/a	n/a	Yes	No	No	n/a
Publication of transcripts	No	No	Yes (5-year lag)	Yes (10-year lag)	No	No	No	No	No	No
Forecast horizon	~2.25 – 2.75 years	~3 years	~2-3 years; longer-run	~2 years	~3 years	~2 years	~3 years	~3 years	~2 years	~2-3 years
Forecast profile[2]	Average annual %Δ[3]	Four-quarter %Δ, quarterly	$Q4_{t-1}$ to $Q4_t$ %Δ	Y/Y %Δ	%Δ from previous year, quarterly	Q/Q annualised %Δ	Annual %Δ, quarterly	Four-quarter %Δ	Year-ended %Δ June/Dec	Annual %Δ each quarter
Interval vs. point forecasts	Both[4]	Point	Interval	Interval	Point	Point	Point	Point	Both (interval at longer horizons)	Point
Fan charts[5]	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Alternative scenarios	No	No	No	No	No	No	Yes	Yes	No	No
Publication frequency	4x per year	4x per year	4x per year[6]	2x per year	4x per year	4x per year	6x per year	3x per year	4x per year	4x per year
Headline inflation	Yes	Yes	Yes	No[7]	Yes	Yes	Yes	Yes	Yes	Yes

	European Central Bank	Bank of England	Federal Reserve	Bank of Japan	Swiss National Bank	Bank of Canada	Sveriges Riksbank	Norges Bank	Reserve Bank of Australia	Reserve Bank of New Zealand
Narrower inflation measures	Yes (since Dec-13)	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No[8]
Wages/labour costs	Yes (since Dec-13)	No	No	No	No	No	Yes	Yes	No	Yes
GDP growth	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Components of GDP (at least some)	Yes	No	No	No	No	Yes	Yes	Yes	No	Yes
Output gap/potential output	No	No	No	No	No	Yes	Yes	Yes	No	Yes
Unemployment/ employment	Yes (since Dec-13)	No	Yes	No	No	No	Yes	Yes	No	Yes
Assumption of unchanged monetary policy rate	No	Yes (forecast is also done based on market interest rate expectations)	No	No (each board member makes a forecast incorporateing past policy decisions and the views of financial markets' regarding future policy)	Yes	No	No	No	Yes	No
Market-based rate expectations	Yes	Yes	No	Yes	n/a	No	No	No	n/a	No
Forward guidance during crisis	Yes	Yes	Yes	Yes (used as early as 1999)	No	Yes	Yes	Yes (via publication of policy rate forecasts)	No	Yes (via publication of interest rate forecasts)

Sources: Central banks' websites, Stockton (2012)

Notes:
1 This table summarises the latest communication strategies of central banks.
2 Forecast profiles may differ across variables.
3 Since December 2013, the ECB has included charts showing the quarterly year-on-year projections for headline HICP inflation and real GDP growth with its published projections.
4 Mid-point forecasts have only been published since June 2013.
5 The information reflected in fan charts differs across central banks.
6 In 2012, projections were released 5 times and in 2011 they were released 3 times.
7 The Bank of Japan publishes a forecast for CPI (all items less fresh food).
8 Although the Reserve Bank of New Zealand does not publish measures of "core" inflation, it provides inflation forecasts for tradables and non-tradables.

Table 2: FOMC forward guidance statements, 2008-2012

Date	Statement
Dec 2008	"…weak economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time."
Mar 2009	"…economic conditions are likely to warrant exceptionally low levels of the federal funds rate for an extended period."
Aug 2011	"…economic conditions--including low rates of resource utilization and a subdued outlook for inflation over the medium run--are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013."
Sept 2012	To support continued progress toward maximum employment and price stability, the Committee expects that a highly accommodative stance of monetary policy will remain appropriate for a considerable time after the economic recovery strengthens.
Dec 2012	"…the Committee decided to keep the target range for the federal funds rate at 0 to 1/4 percent and currently anticipates that this exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above 6-1/2 percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored."

Sources: FOMC post-meeting statements

Dec 2008: http://www.federalreserve.gov/newsevents/press/monetary/20081216b.htm.

Mar 2009: http://www.federalreserve.gov/newsevents/press/monetary/20090318a.htm.

Aug 2011: http://www.federalreserve.gov/newsevents/press/monetary/20110809a.htm.

Sept 2012: http://www.federalreserve.gov/newsevents/press/monetary/20120913a.htm.

Dec 2012: http://www.federalreserve.gov/newsevents/press/monetary/20121212a.htm.

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