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NECESSITY AS THE MOTHER OF INVENTION:
MONETARY POLICY AFTER THE CRISIS

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Necessity as the Mother of Invention: Monetary Policy after the Crisis
Alan S. Blinder, Michael Ehrmann, Jakob de Haan, and David-Jan Jansen
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ABSTRACT

We ask whether recent changes in monetary policy due to the financial crisis will be temporary or permanent. We present evidence from two surveys—one of central bank governors, the other of academic specialists. We find that central banks in crisis countries are more likely to have resorted to new policies, to have had discussions about mandates, and to have communicated more. But the thinking has changed more broadly—for instance, central banks in non-crisis countries also report having implemented macro-prudential measures. Overall, we expect central banks in the future to have broader mandates, use macro-prudential tools more widely, and communicate more actively than before the crisis. While there is no consensus yet about the usefulness of unconventional monetary policies, we expect most of them will remain in central banks’ toolkits, as governors who gain experience with a particular tool are more likely to assess that tool positively. Finally, the relationship between central banks and their governments might well have changed, with central banks “crossing the line” more often than in the past.

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1. INTRODUCTION

The global financial crisis has had a profound impact on the practice of monetary policy in a range of countries. Due to the speed and force of developments in financial markets and of the economy more broadly, monetary policymakers rarely had the luxury of performing extensive *ex ante* analyses of prospective changes in their responsibilities, instruments, or communications. Necessity was often the mother of invention.

The key question today is to what extent these changes will prove to be temporary, primarily motivated by the financial crisis, or whether we are seeing permanent changes in the practice of monetary policy. These are not easy questions to answer in 2016 because the crisis is still recent—indeed, it is arguable that it continues in some countries—and since few, if any, central banks have completed their “exit” from the extraordinary policies induced by the crisis.

In this paper, we aim to shed light on this question primarily via two new (and almost identical) surveys of opinion—one of governors of central banks, the other of academic specialists.¹ We concentrate on what, to us, seem to be the four main sub-questions: Have there been important, and lasting, changes in central bank mandates, monetary policy instruments, central bank communications, and the place of the central bank within the government? In addition to the survey data, we take stock of the findings of the academic literature and, here and there, add our own opinions.

To collect the views of central bank governors and academics, we conducted two surveys between February and May 2016. In the first survey, we contacted the heads of 95 central banks via e-mail with a questionnaire consisting of 13 questions.² In all, 55 questionnaires were returned to us, for a gratifying (these days) response rate of 58%. Concerning

¹ In related survey work, Siklos (2016) reports results for 39 central banks, while Carré *et al.* (2013) report results for 15 central bankers and 31 (mainly European) economists. Siklos (2016) examines to what extent central banks have changed their communication strategy since 2007. He concludes that while differences between inflation targeting and non-inflation targeting central banks persist, these differences have become smaller. He also finds that inflation targeters put more emphasis on communicating about macro-prudential policies than non-inflation targeters. This result is in line with our finding that inflation targeters are more likely to adopt macro-prudential policies than non-inflation targeters. Carré *et al.* (2013) analyse to what extent the pre-crisis consensus on monetary policy making has changed since the crisis. In line with our findings, they report that central bankers are generally less eager than academics to permanently adopt changes in monetary policy introduced in response to the financial crisis.

² The questionnaires are available in an appendix. We did not contact the heads of National Central Banks from the euro area, nor the Presidents of the regional Federal Reserve Banks.

backgrounds, 16 of the completed questionnaires came from governors of banks in advanced economies (AE), 32 from BIS members, 20 from institutions that used inflation targeting prior to the financial crisis and 12 from countries that were hit by the financial crisis according to the database of Laeven and Valencia (2013) (Table 1).³

For the second survey, we sent a similar questionnaire to 401 academic economists from the relevant research programs of the NBER and the CEPR.⁴ We received 159 questionnaires, which corresponds to a disappointing response rate of just below 40%. Of the responding academics, 101 currently reside in the U.S. (though many of those are not native Americans), while 31 are located in the euro area, 14 are in the U.K., and 13 are in a range of other (mainly European) countries. It is worth emphasizing that while the academic sample is dominated by respondents from the U.S., the euro area, and the U.K., the central bank sample is not. For this reason, we sometimes report tabulations that try to “match” the geographies better. We also tracked the backgrounds of our responding academics. Most have been trained in the United States: 84% hold a U.S. PhD. Around a quarter have previously worked in a central bank. In contrast to the central bank governors, most academic respondents (82%) are residents and citizens in countries that were hit by the financial crisis.

Two methodological points about surveying in general, and surveying central bank governors in particular, bear emphasis—as we know from questions we have received from readers and seminar participants. The first is that survey instruments must be brief and the questions easy for respondents to answer else the response rate will be extremely low. Our academics’ questionnaire could be completed easily in five minutes, maybe in three, and yet the response rate didn’t reach 40%. Second, you cannot ask central bank heads sensitive questions, even if you guarantee confidentiality (which we did). They are a tight-lipped group that knows how to keep secrets. So we restricted ourselves to questions that, we imagined, central bankers would probably be willing to answer in public.⁵

With that in mind, here are our key findings: Necessity has indeed been the trigger for many central bank inventions—central banks in crisis countries are much more likely to have resorted to new policies, to have had discussions about their mandates, to have communicated

³ These subgroups overlap, of course.

⁴ We include three NBER Programs: Economic Fluctuations and Growth, International Finance and Macroeconomics, and Monetary Economics. We also include three CEPR Programme Areas: International Macroeconomics and Finance, Monetary Economics and Fluctuations, and Macroeconomics and Growth.

⁵ We think we succeeded. We didn’t get many blanks.

more and to have received criticism. But the thinking has changed more broadly—for instance, central banks in non-crisis countries are also likely to have reconsidered their mandate or to have implemented macro-prudential measures. Based on the surveys, we hypothesize that central banks in the future will have broader mandates, use macro-prudential tools more widely, and communicate more than before the crisis. Even though there is not yet an agreement about the future use of unconventional monetary policy tools, we think that most of them will remain in central banks’ toolkits, in particular because central bank governors who gained experience with a particular tool are considerably more likely to assess that tool positively. Finally, the relationship between the central banks and their governments might well have changed, with central banks “crossing the line” more routinely in the future. But this is conjecture; only the future will tell.

Table 1. Details on survey response

	Received	Response rate
Governors	55	57.9%
Africa	8	
Americas	11	
Asia and Oceania	18	
Europe	18	
Advanced economy ^a	16	
BIS member	32	
Inflation targeter ^b	20	
Country affected by crisis ^c	12	
Academics ^d	159	39.7%
Euro area	31	
United Kingdom	14	
United States	101	
Other countries	13	
Female	18	
U.S. PhD	134	
Central bank experience ^e	41	
Monetary economist ^f	81	
EME background ^g	17	
Full crisis exposure ^h	131	

Notes: ^a Based on IMF WEO classification. ^b Countries that introduced inflation targeting before 2007. Based on Hammond (2012). ^c According to the Systemic Banking Crisis database by Laeven and Valencia (2013). ^d Country classification refers to place of main residence. ^e Prior work experience in central banks, at least at the Economist level, not including research visits or consultancies. ^f Member of NBER program *Monetary Economics* or CEPR program *Monetary Economics and Fluctuations*. ^g Residence or citizenship in an emerging market economy. ^h Residence and citizenship in countries that were affected by the crisis. *Source:* Authors’ calculations based on survey conducted in 2016.

Having said that, it is important to recognize that the *world* of central banking—which stretches far beyond the Federal Reserve, the European Central Bank (ECB), the Bank of England, and the Bank of Japan—did not change nearly as much as many academic discussions (which concentrate on these four) might lead you to believe. In particular, in many countries, unconventional monetary policies were not considered, and central banks have not been under extensive scrutiny and criticism. On the other hand, those four central banks cover almost half of the world’s GDP (World Bank, 2015), making them especially interesting “special cases.”

Finally, our results suggest that there are some important differences between the views of academics and central bank heads. First, while many scholars typically support keeping most of the unconventional policies in central banks’ toolkits, central bank governors are considerably more skeptical, often saying that it is “too early to judge.” While those central bank governors who have gained hands-on experience with unconventional tools tend to assess these tools more positively, the cautious tone of many central bank governors about the future use of unconventional tools suggests that they still perceive a lot of uncertainty about their costs and benefits. Second, although governors and academics agree that central bank communication has become more frequent since the crisis, and that these changes are here to stay, or might even go further, there are differences on the usefulness of forward guidance as a policy and a communication tool. Academics have a strong preference for data-based forward guidance, whereas the most popular form of forward guidance among central bank governors is purely qualitative. Third, whereas central governors feel that they did not receive a lot of criticism for acting politically or crossing the line into the political realm during the crisis, most academic respondents think that central banks were criticized for crossing the line into politics.

2. CENTRAL BANK GOALS

The global financial crisis challenged important elements of the pre-existing consensus that monetary policy should be aimed at price stability and should use just one instrument: a short-term policy interest rate. But no new consensus has yet been reached. In our view, several elements of the pre-crisis consensus, such as central bank independence and the focus on

long-term price stability, remain valid today. Other elements, however, may have to be rethought.

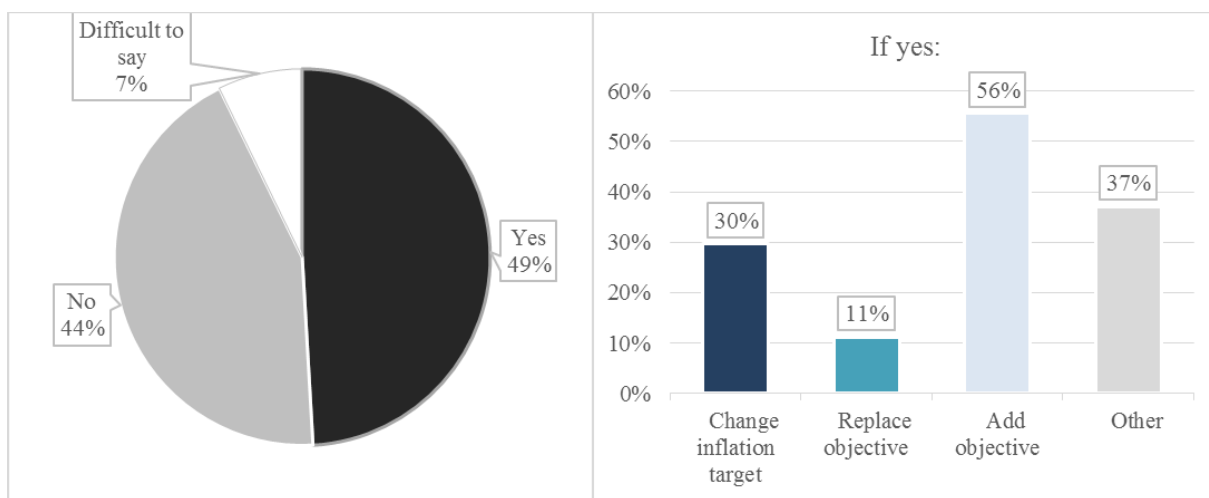


Figure 1. Discussions about the central bank mandate outside of the central bank

Notes: The left-hand chart shows whether, according to central bank governors, a discussion took place outside the central bank about changing the mandate. The right-hand side chart shows the changes that were discussed (in % of the respondents who answered “Yes”). The explanations provided in the survey indicate that when governors answer “other”, they mostly refer to discussions on adding financial stability. *Source:* Authors’ calculations based on a survey conducted in 2016.

To assess central bankers’ view on whether their mandates had changed, we asked two questions in our survey. The first pertained to *external* opinions and influences: “*Did the world financial crisis of 2007-2009 and/or its aftermath create discussions in your country but outside your central bank about whether it would be desirable to modify the bank’s mandate in any way? If “Yes,” were those discussions about: (please check as many as apply)*”. As the left-hand chart in Figure 1 shows, the answers to the “yes or no” question literally comprised a bottle half full and half empty. Exactly half the governors answered “yes,” which surprised us a bit on the low side.

We asked the same two questions about discussions *within* central banks: “*Did the world financial crisis of 2007-2009 and/or its aftermath create discussions inside your central bank about whether it would be desirable to modify the bank’s mandate in any way? (please check one)*” and “*If “Yes,” were those discussions about: (please check as many as apply).*” (See Figure 2.) Here we found—again, perhaps surprisingly—a bit more interest in changing the mandate within than outside the central bank. (Aren’t central bankers stodgy about change?)

Answers from academics were broadly similar to a question that asked, “*Did the world financial crisis of 2007-2009 and/or its aftermath lead you to think that it would be desirable to modify the mandate of your country’s central bank in any way? (please check one)*” and “*If “Yes,” would these modifications apply to: (please check as many as apply).*” Notice that the question here is about *desirability*—a somewhat sterner test than just having discussions. The academics were a bit *less* enamored of changing their central banks’ mandate (54%); see Table A1 in the Appendix for details.⁶

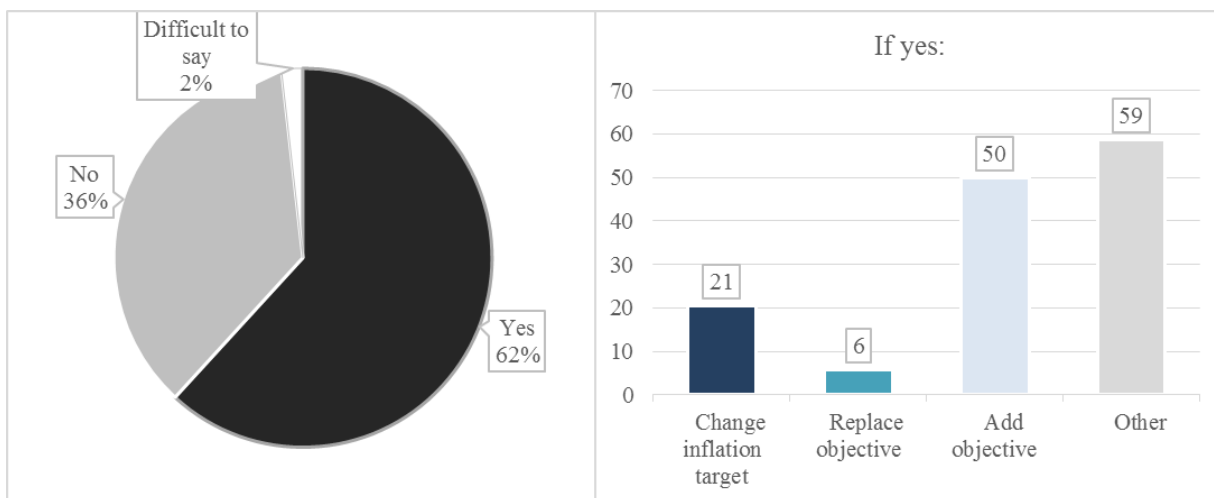


Figure 2. Discussions about the central bank mandate inside the central bank

Notes: The left-hand chart shows whether, according to central bank governors, a discussion took place inside the central bank about changing the mandate. The right-hand side chart shows the changes that were discussed (in % of the respondents who answered “Yes”). The explanations provided in the survey indicate that when governors answer “other”, they mostly refer to discussions on adding financial stability. *Source:* Authors’ calculations based on a survey conducted in 2016.

To dig a bit deeper, we tried to explain the answers of the governors (where we have substantial cross-country variation) based on country and central bank characteristics, and those of the academics (where we only have little cross-country variation) based on individual characteristics. We created dummy variables equal to one if there has been a discussion inside/outside the central bank about its mandate, and if the academic finds it desirable to modify the mandate, and modeled each as a probit.

For the governors’ answers, we considered the following explanatory variables:

- A dummy indicating advanced economies, according to the IMF classification;

⁶ We used the possibly-ambiguous wording “your country” without telling the academics whether that meant their country of residence or their country of origin. But the questionnaire did instruct them, “*If your country of residence is in the euro area, please interpret this phrase as referring to the European Central Bank.*” So we imagine most used their country of residence.

- Trade openness, measured as the ratio of exports and imports to GDP (Source: World Bank);
- A dummy indicating countries hit by the financial crisis, according to the database of Laeven and Valencia (2013);
- A dummy indicating inflation targeters, based on Hammond (2012);
- A dummy for countries with flexible exchange rates, according to the IMF Annual Report on Exchange Arrangements and Exchange Restrictions;
- The level of central bank independence in 2010, according to Bodea and Hicks, (2015); and
- The change in their measure of central bank independence between 1995-2007 and 2008-2010.⁷

Limited as we are by the small sample size, we first run *univariate* regressions (reported in Table A2 in the Appendix). Based on these results, we select a small set of regressors to include in *multivariate* regressions. Table 2 reports marginal effects from two probits using three regressors. We find a 38 percentage point higher likelihood that there had been *external* discussions about the central bank mandate in countries that were hit by the crisis. That is not surprising, but there is no significant effect on *internal* discussions (the marginal effect is about half as large and not statistically significant). Likewise, the marginal effects of being an advanced economy or an inflation targeter are insignificant for either external or internal discussions.

Table 2. Determinants of discussions about central bank mandates

	Mandate discussions outside the central bank	Mandate discussions inside the central bank
Advanced economy	0.151 (0.140)	-0.069 (0.147)
Hit by crisis	0.384*** (0.148)	0.207 (0.158)
Inflation targeting	-0.058 (0.133)	-0.179 (0.130)
Observations	55	55
Pseudo R ²	0.119	0.042

Notes: The table reports marginal effects of a probit model that explains governors' responses as to whether or not there has been a discussion about the central bank mandate. Numbers in parentheses denote robust standard errors. *** identifies statistical significance at the 1% level. *Source:* Authors' calculations based on survey among central bank governors conducted in 2016.

⁷ The number of observations in regressions using central bank independence variables drops due to missing data for some countries.

With the academics' responses, we have a much larger sample size, and so run only multivariate regressions, including the following (mostly sourced from respondents' CVs as provided on their websites):

- Female (dummy variable for female respondents)
- Year of PhD, a proxy for age
- Dummy for a PhD from a U.S. university, to proxy for the type of education
- Central bank experience: A dummy for respondents who, at some point in their career, have worked in a regular position in a central bank, at the Economist level or above
- Monetary economist: A dummy variable for members of the NBER or CEPR monetary program
- Emerging market background: A dummy equal to one if the respondent resides in an EME, or has EME citizenship⁸
- Full crisis exposure: A dummy equal to one if the respondent *both* resides in *and* is a citizen of a country hit by the crisis⁹
- "Country" fixed effects for the United States (benchmark category), the UK, the euro area, and other countries

To save space, and because there are only few significant variables, the results for academics are reported in Table A3 in the Appendix. Having had central bank experience makes respondents 18 percentage points more likely to have reconsidered the central bank's mandate. Residents of the euro area or the United Kingdom are 28 and 44 percentage points more likely than their U.S. counterparts to answer affirmatively.

Discussing the mandate is one thing, but what changes are governors and academics thinking about? Looking at the second part of our questions to the governors (the right-hand panels of Figures 1 and 2), the change most frequently discussed, both internally and externally, is adding a financial stability objective to the mandate.¹⁰ Changing the inflation target was also mentioned by a number of governors. (Academic respondents were a bit *more* enamored of changing (presumably raising) the inflation target than central bankers; see Table

⁸ We collect EME residence and EME citizenship in one variable, as there is only 1 respondent who resides in an EME. By adding the citizenship criterion we identify another 16 respondents with some EME background.

⁹ As with the EME background variable, we combine a residence and citizenship criterion in one variable to get more observations. There are only 5 respondents who reside in a country that was not hit by the crisis. By adding the citizenship criterion we identify another 23 respondents who were not fully exposed to the crisis, as their country of citizenship was not hit by the crisis.

¹⁰ One respondent mentioned adding economic growth and two referred to nominal income targeting.

A1 in the Appendix.) That these two answers showed up most prominently is hardly surprising. After all, there has been considerable academic and policy debate over each—which we now briefly summarize.

2.1. Increase the inflation target?

Price stability remains the primary objective of most central banks, and our survey results show that this consensus was untouched by the crisis. Price stability is most often defined as an inflation rate around 2 per cent, but a discussion on the optimal level has been triggered by suggestions that central banks raise their inflation targets (see, for example, Blanchard *et al.*, 2010; Ball, 2014).

There is general consensus that central banks should aim for a low but positive inflation rate for several reasons. First, a little inflation may make it easier for firms to reduce real wages in the face of declining demand and sticky *nominal* wages (Akerlof *et al.*, 1996).

Second, a low rate of inflation provides some insurance against deflation, which is generally regarded as a more serious problem than inflation. Deflation raises the real cost of servicing debt, perhaps forcing debtors to sell assets or default on their loans. It can therefore create a vicious cycle of rising real debt burdens and financial distress, which in turn may cause more downward pressure on prices.

Third, there are upward biases in most official estimates of inflation. Mis-measurement may result from, e.g., inadequate adjustments for quality improvement, difficulties in incorporating new goods into the indexes, changes in consumers' shopping patterns that may favor discount retailers, and the classic substitution bias (Billi and Kahn, 2008).

Finally, at very low levels of inflation, nominal interest rates will also be very low, limiting a central bank's ability to ease monetary policy in response to economic weakness. Once the policy rate reaches the lower bound, which may be below zero, conventional monetary easing becomes impossible.

This last point is the focus of the current discussion. Before the financial crisis, it was widely believed that 2 per cent inflation was sufficient to minimize the probability that the lower bound would be a constraint and that, if it occurred, the likely damage would be small. The aftermath of the crisis has changed those views. Whether central banks should raise their inflation targets to account for the risk of hitting the lower bound hinges on 1) how serious

this risk is; 2) how high the lower bound is; 3) the welfare costs of hitting the bound; and 4) the costs (including loss of credibility) of transitioning to a higher inflation target. Furthermore, it is important to distinguish between two different concerns: avoiding the effective lower bound in the first place, and boosting the economy once the bound is binding. We take these up in turn.

Several papers quantify the risks of hitting the lower bound by simulating New Keynesian models of the economy. Generally, they find that the problem is not serious enough to justify a higher rate of inflation. (One well-known example is Reifschneider and Williams, 2000.) One reason is that the welfare costs of such episodes are low (Coibion *et al.*, 2012). But proponents of raising the inflation target argue that the risks are greater than these models suggest—because, for example, inflation and both nominal and real interest rates were much higher in the simulation periods than they are likely to be going forward (Ball, 2014; Krugman, 2014). So smaller shocks will suffice to push the policy rate to its lower bound.

Despite its theoretical importance to this and other issues, recent empirical studies have not come up with a uniform empirical definition of the natural rate of interest. Well-known estimates by Laubach and Williams (2015) suggest that the natural rate in the U.S. fluctuates over time but exhibits a downward trend, reaching about 2 per cent in 2007 and plummeting to zero (where it remains) by 2010. Hamilton *et al.* (2015), however, emphasize the large uncertainty around such estimates.

When Blanchard *et al.* (2010) proposed to raise the inflation target, the lower bound was thought to be no lower than zero. Now, we think it is negative, which leaves central bankers more room to operate. Furthermore, the crisis has shown that the central bank still has viable tools once the lower bound on nominal interest rates is hit—including forward guidance, large-scale purchases of securities, and exchange rate interventions. If such unconventional tools are highly effective, the benefits of raising the inflation target would be much lower.

Having said that, what are the costs of raising the inflation target? Two types of costs are discussed in the literature, namely the costs of higher inflation *per se* and the loss of central bank credibility from *raising* the inflation target. Since the first is well-trodden territory (cf., Mishkin, 2011), we'll concentrate on the second—which is the one relevant to post-crisis changes.

In particular, raising the inflation objective may threaten a central bank's credibility, which is widely believed to be among central banks' most important assets. For example, a survey by Blinder (2000) some years ago found that a large majority of central bankers viewed their credibility as "of the utmost importance" (the highest possible ranking) Why? Because (in order of importance) credibility helps a central bank (a) keep inflation low, (b) change tactics when necessary, and (c) retain support for independence. Perhaps more central banks would opt for higher inflation targets if they were starting from scratch today. But they are not. Raising the inflation target may generate expectations that it will be raised again. This worry, we believe, is a major reason why most central bankers do not wish to raise their inflation objectives.

Another important open issue is how changing the inflation target would influence inflation expectations. The experience of New Zealand (which has raised its inflation target a couple of times) may shed some light on this issue. Lewis and McDermott (2015) apply the Nelson-Siegel (1987) model to inflation expectations data in New Zealand to generate inflation expectations curves fitted over various time horizons. Such curves suggest that changes to the inflation target change inflation expectations significantly. One striking example: Inflation expectations rose an estimated 0.45 percentage point when the target midpoint was increased 0.5 percentage points in 2002. However, Kumar *et al.* (2015) find that inflation expectations of New Zealand business managers are not at all well anchored despite twenty-five years of inflation targeting. As Blinder (2015, p. 209) put it in discussing their paper, "it reminds us that most people are not obsessed about the central bank."

To summarize, the crisis has shown that central banks have instruments at their disposal even at the lower bound—which, by the way, is lower than previously thought. Both of these "new facts" weaken the case for raising the inflation target. Add credibility concerns, which are paramount with many central bankers, and it becomes clear why discussions of raising inflation targets have remained mostly academic. As we saw in Figure 2, few central banks have considered the idea.

2.2. What role for financial stability?

While central bankers' attitudes toward the *inflation* mandate seem to have changed little post-crisis, attitudes toward bringing *financial stability* into the mandate have changed a lot.

One thing we have surely learned—and should have learned from Japan decades earlier—is that sustained price stability is no guarantee of financial stability. Dangerous financial imbalances can build up under the calm surface of price stability. In fact, several authors have argued that monetary policy played an important role in creating the crisis by keeping interest rates too low for too long (cf. Taylor, 2009), which fueled an asset price boom and spurred financial intermediaries to increase leverage and take on excessive risks (Borio and Zhu, 2008).

Before the financial crisis, many central banks, especially the inflation targeters, thought they should take financial stability into account only if it affected the medium term outlook for price stability. (Some still believe this.) For example, the central bank should respond to asset price declines only after a bubble had burst (Cukierman, 2013; Cecchetti, 2016). But several authors (e.g., Cecchetti *et al.*, 2000 and Borio and White, 2004) argued, even before the crisis, that monetary policy should “lean against the wind” because it interacts with important drivers of financial imbalances. That meant, in particular, being willing to raise interest rates to prevent asset-price bubbles.

Nowadays, in stark contrast, many central bankers see financial stability as an important objective in its own right because the costs of financial crises are large and their consequences are problematic for both price stability and monetary transmission (Laeven, 2016). Our survey results on mandates show this concern quite clearly.

Early in the crisis period, Mishkin (2008) and Blinder (2008) took a more nuanced position, arguing that not all asset price bubbles are alike. In their view, credit-driven bubbles centered on banks can be highly dangerous. When loans go sour, balance sheets of financial institutions deteriorate, and lenders cut back on credit supply, thereby depressing business and household spending. In contrast, equity bubbles—driven by overly optimistic expectations, but not by leverage—pose much less risk to the financial system. A prime example is the dot.com bubble of the late 1990s, which left barely a mark on the real economy. Mishkin (2011) argues that it is much easier to identify *credit* bubbles than to identify *asset-price* bubbles—the latter being a standard objection to using interest-rate policy to “lean against the (bubble) wind.”

Likewise, Borio (2014) argues empirically that policymakers should be able to identify the build-up of financial imbalances in real time with a sufficient lead, even out of sample.¹¹ These findings imply that credit bubbles might be taken as leading indicator of a crisis. Borio (2014) also notes that taking financial imbalances into account calls for extending the policy horizon of monetary policymaking beyond the typical two years because the build-up of systemic risks often takes longer than that.

But it would be incorrect to conclude—from our survey results or anything else—that there is a new consensus that *monetary policy* should play a key role in maintaining financial stability. Opponents of leaning against the wind raise three main objections.

First, many doubt that, Borio notwithstanding, financial imbalances can be identified with reasonable confidence in time to respond pre-emptively with monetary policy. To cite just one such example, Klomp (2010) concludes that while high credit growth, negative GDP growth, and high real interest rates are important leading indicators of a banking crisis, none of them has a significant impact in more than 60 per cent of banking crises.

Second, is monetary policy really the proper instrument to deal with financial imbalances? Svensson (2016), for example, argues that the effect of leaning against the wind on credit growth may be small and could be of either sign. One reason is that the stock of nominal debt has considerable inertia—only a fraction of the stock of mortgages turns over each year. Furthermore, even if tighter monetary policy rate slows down the rate of growth of nominal debt (the numerator), it also slows down the rate of growth of nominal GDP (the denominator). So the debt-to-GDP ratio might even rise (see, for instance, Robstad, 2014). In addition, the evidence suggests that interest rates would have to be raised substantially to curb risk taking (Laeven, 2016).

Third, and finally, Svensson (2016) argues that the full costs of a crisis could be *higher* under a policy of leaning against wind. Why? Because leaning against the wind will make the economy weaker *before* the crisis. Svensson shows that this result is quite robust and holds for a variety of alternative assumptions. In addition, of course, the diagnosis could be wrong and no crisis occurs.

¹¹ Some BIS studies suggest that the best indicators of financial imbalances and financial cycles are deviations of credit and asset prices (especially property prices) from historical trends (cf. Drehmann *et al.* 2011). Also some research outside the BIS suggests that credit is a reasonably good leading indicator. For instance, Jorda *et al.* (2011), who examine the behaviour of the ratio between bank credit and GDP during 200 recessions and the preceding expansions in 14 advanced economies going back to 1870, conclude that a stronger increase in this ratio during the boom tends to lead to a deeper subsequent downturn.

Clearly, opinions differ widely over *whether* and *how* central banks should be responsible for financial stability. Some central banks, or perhaps their governments, believe the bank should be in charge of both macro-prudential policy *and* monetary policy so the two policies can be coordinated more efficiently. Figure 3 shows the extent to which central banks are, in fact, in charge of macro-prudential instruments according to Claessens *et al.* (2016). Most central banks are either fully in charge of all macro-prudential policies or not involved at all. Among advanced countries, the latter is more common than the former.

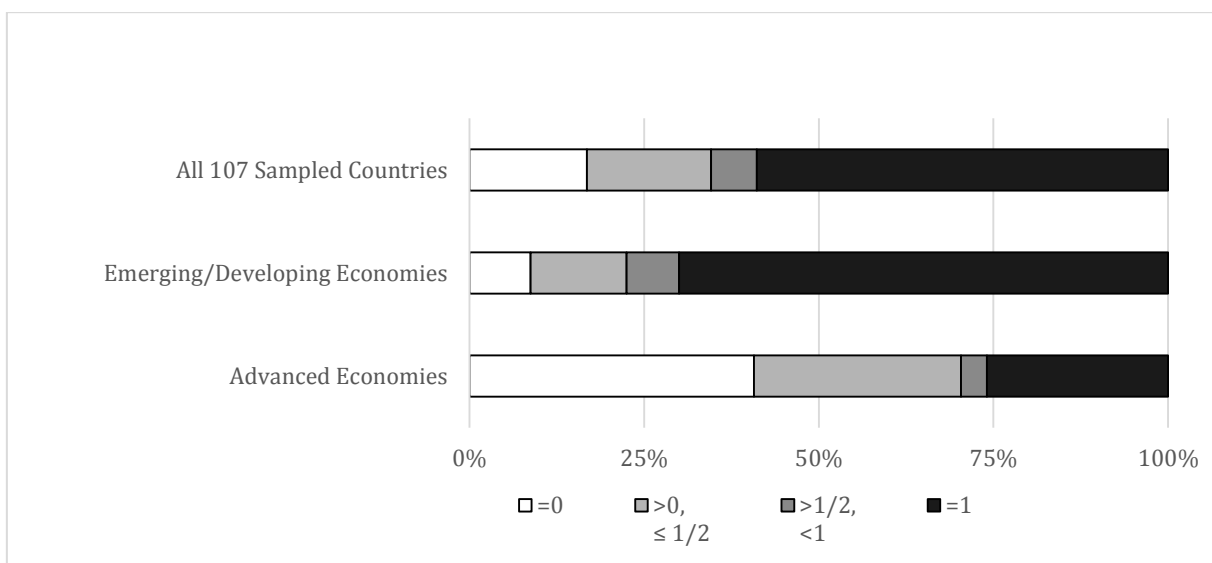


Figure 3. Central bank responsibility for macro-prudential policy

Notes: The graph shows the frequency distribution of the share of macro-prudential instruments for which central banks are responsible (zero, half or less but more than zero, more than half but less than one, and one).
Source: Claessens *et al.* (2016)

According to Fed Chair Janet Yellen (2014), “macro-prudential policies, such as regulatory limits on leverage and short-term funding, as well as stronger underwriting standards, represent far more direct and likely more effective methods to address these vulnerabilities” than monetary policy.¹² In other words, yes, we’re ultimately responsible for financial stability, but not by using monetary policy.

Our survey results (displayed in Table 3 below) show that almost 80% of governors report that their institution used some form of macro-prudential policy in recent years. What are these “other” (than interest rates) macro-prudential instruments? Figure 4 shows the five

¹² The most extensive study to date on the *effectiveness* of macro-prudential policies is by Claessens *et al.* (2016). Using a newly compiled database for a large number of countries over the 2000-13 period, with information on 12 macro-prudential instruments, they report that policies such as limits on leverage and dynamic provisioning are effective restraints, especially when growth rates of credit are very high. But they provide less supportive impact in busts.

instruments that were most actively used in 2013, according to the database of Cerutti *et al.* (2015).

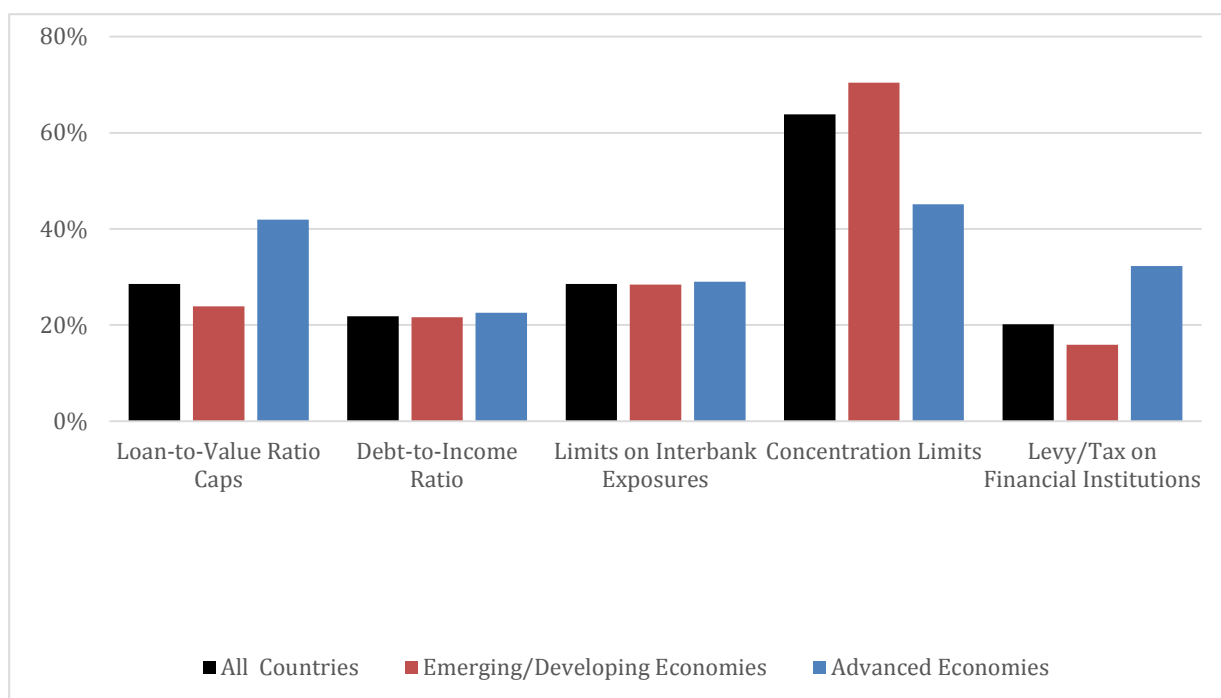


Figure 4. Most actively used macro-prudential instruments

Source: Cerutti *et al.* (2015)

If we were to suggest, or imagine, a *future* consensus on financial stability, it might be this: Central banks should pay more attention to the build-up of financial imbalances, notably credit bubbles. But macro-prudential policies, not monetary policy, should be the first line of defense. In normal situations, conventional monetary policy should focus on price stability, while macro-prudential instruments are used to lean against excessive credit expansion.

This leaves open the issue of “who”—whether the central bank should be given a macro-prudential mandate, or whether this is best done by a separate body, restricting the central bank to conduct monetary policy. There is consensus that separate tools are required for the different tasks, but it is also important to consider the strategic interactions between different policy makers when assigning a role to the central bank, an issue discussed in Davig and Gürkaynak (2015).

3. THE EXPANDING TOOLKIT OF MONTARY POLICY

3.1. Leaving the “old normal” behind

As the financial crisis deepened, the first reactions of central banks were conventional and in line with the standard textbook prescription: Interest rates were cut, perhaps at first slowly, but in the end, decisively. For instance, in a coordinated action intended to grab financial markets’ attention, the world’s leading monetary policy authorities reduced policy rates by 50 basis points in early October 2008. By 2009, many of the world’s larger economies were getting close to the (apparent) lower bound on nominal interest rates. It was time to leave the “old normal”.

One solution, adopted by some, was to decide that the lower bound was not zero (more on this below). But changes in the monetary policy toolkit did not stop at the interest rate paid on bank reserves. Our survey inquired about three other novel measures: quantitative easing (QE), forward guidance, and the macro-prudential measures just discussed.¹³ As shown in Table 3, forward guidance has been used by more than 50% of the central banks that responded to our survey. Quantitative easing—either using government debt or a broader class of assets—has been used less frequently, although some of the responding governors have given it thought.

We now discuss (negative) policy rates, QE, and macro-prudential tools in more detail, leaving forward guidance for Section 4.

Table 3. Unconventional policies and instruments in reaction to the crisis

	Adopted	Considered but rejected	Not considered
Policy rate(s) near zero (N=49)	28.6	0.0	71.4
Negative interest rates (N=50)	12.0	10.0	78.0
QE using government debt (N=49)	20.4	6.1	73.5
QE using other assets (N=48)	12.5	14.6	72.9
Forward guidance (N=47)	51.1	10.6	38.3
Macro-prudential policy (N=47)	78.7	2.1	19.2

Notes: Figures denote percentage of the number (N) of responding central bank governors. *Source:* Authors’ calculations based on survey among central bank governors conducted in 2016.

¹³ Although our questionnaire did not include helicopter money as an instrument, some respondents do mention it as a potential instrument. A further point, which we could barely do justice here in a discussion focused on monetary policy, is the role of the central bank in micro-prudential supervision, which is also alluded to by some respondents.

3.2. One day, the bottom *did* drop out: negative policy rates

Prior to the crisis, a zero lower bound on nominal interest rates seemed almost axiomatic: Cash, yielding a zero return, would dominate any short-term financial asset with a negative rate, thereby constraining any nominal interest rate to be positive. After decades during which rates were nowhere near zero, interest in (and worries regarding) the lower bound resurfaced in the 1990s, as Japan continued to struggle with low growth and deflation. Presciently, Paul Krugman (1998) asked: “could a liquidity trap happen to the European Monetary Union?” Ten years later, this question was no longer hypothetical. Since then many central banks have approached, and several have breached, the “zero lower bound.”

How comfortable have central bankers become with policy rates near or even below zero? Our survey shows there is still some hesitance. For the full list of unconventional instruments, we asked:

Once conditions return to normal, do you think each of the following should remain a potential instrument of monetary policy, remain an instrument but in modified form, be discontinued, or that it is too early to judge?

Regarding policy rates near or below zero, the results are shown in Table 4.

Table 4. Policy rates in the new normal

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
Policy rate(s) near zero (N_G=32, N_A=157)				36.3***	12.6***
Remain potential instrument	43.8	69.2	73.3		
Remain, but in modified form	3.1	0.0	2.6		
Be discontinued	9.4	0.0	18.5		
Too early to judge	43.8	30.8	5.8		
Negative rates (N_G=32, N_A=156)				27.1***	14.9***
Remain potential instrument	21.9	38.5	52.6		
Remain, but in modified form	0.0	0.0	2.6		
Be discontinued	25.0	7.7	31.4		
Too early to judge	53.1	53.9	13.5		

Notes: Figures denote percentage of respondents (either central bank governors or academic economists). *** denotes significance at the 1% level, calculated using Chi-square tests for the independence of the responses of governors and academics. N_G and N_A denote the number of responding governors and academics. *Source:* Authors’ calculations based on survey conducted in 2016.

When asked about the potential future use of policy rates *near* zero, more than 40% of the governors say it is “too early to judge.” This finding is somewhat surprising, and may suggest that some still see zero as very much a lower bound. In fact, in response to the question on *negative* rates, only 22% would still use them should circumstances arise. Only around 22% of the responding governors have considered negatives rates in recent years, while 10% decided not to implement them (see Table 3). The academics are, perhaps naturally, less cautious. More than 70% think rates near zero should be used again, and more than 50% feel negative rates should be in the tool-kit (Table 4). These differences between governors and academics are among the starkest that we find in the survey responses, no matter whether we focus on all governors in the sample or on those from advanced economies (which provide a closer comparator group to our sample of academics), as the χ^2 statistics in the table attest.

Digging a bit deeper, initially many central banks seemed uncomfortable with going all the way to zero in 2008-2009. The Federal Reserve stopped its rate cutting in a range between zero and 0.25%. When the Bank of Canada reduced its overnight rate target to 0.25% in April 2009, it stated that “the Bank judged [this] to be the effective lower bound for that rate.” Around the same time, there was discussion of whether the ECB would be comfortable with policy rates even going below 1%. However, as conditions continued to deteriorate, further cuts were deemed necessary, and policy rates near zero became the norm rather than the exception in crisis-stricken economies.

For some, zero was not low enough. In July 2009, Sveriges Riksbank lowered its repo rate to 0.25%, which pushed the deposit rate for banks below zero. As of fall 2016, there is a short list of countries that also pay (in some shape or form) negative rates on central bank lending facilities. These negative rates are generally not used in isolation, but constitute part of a larger set of unconventional instruments designed to stimulate growth and return inflation to target.

Most prominently, the ECB has posted a negative deposit rate since mid-2014 and currently charges banks 0.4% on excess reserves. In January 2016, the Bank of Japan started applying a rate of -0.1% on current accounts held at the central bank. The lowest rates so far have been in Denmark and Switzerland, where deposit rates reached minus 0.75%.

How low could rates go? We now understand that nominal rates can go negative because cash must be transported, stored, secured, and insured. These costs are non-negligible,

especially for large-scale payments, but neither are they infinite. So far, cash demand has not increased dramatically in countries with negative rates, most likely because retail deposit rates are still positive. However, at some point, further lowering of rates may induce people to undertake the switch, especially if interest rates are expected to remain below zero for prolonged periods. According to Swiss National Bank Governor Thomas Jordan (2015, pp. 236-7), “the effective lower bound is below minus 75 basis points, but it’s very difficult to say exactly where it is.”

3.3. Mixed views on QE

When the crisis erupted in 2007, there was little experience with using the central bank balance sheet as a policy instrument. The exception was Japan, where the Bank of Japan had purchased government bonds on a regular basis between 2001 and 2006 in order to increase the level of bank reserves. However, the literature on this particular QE program remained far from conclusive on its effectiveness (Spiegel, 2006).

Nevertheless, and although the timing and details differed, four of the world’s largest central banks used QE-type policies in response to the financial crisis.¹⁴ The Fed and the Bank of Japan both launched their initial programs in late 2008, while the Bank of England announced its in January 2009. The Fed would eventually initiate three different QE programs between 2008 and 2012 (four if you include “Operation Twist”). The Bank of Japan also modified its approach along the way, most recently by introducing a quality dimension to its purchases—the so-called QQE approach. The Bank of England has perhaps been most constant in its approach. Throughout the crisis it has continued to work within the framework of its Asset Purchase Facility which, among other features, puts any risk of loss squarely on HM Treasury. The ECB was the laggard; it waited until January 2015 before starting a full-scale QE program.¹⁵

What do our survey results say about QE? Most academics would keep QE as a potential instrument for monetary policy (see Table 5). Some 68% say QE using government debt should remain an instrument, while around 11% would retain it in modified form. There is

¹⁴ We use the term QE in a broad sense. Central banks have at times used a different terminology to describe their policies. For instance, Ben Bernanke (2009) described what came to be called “QE1” as “credit easing” rather than quantitative easing.

¹⁵ The Securities Market Program (SMP), designed to address dysfunctional markets in 2010, resembled QE; but its purchases were sterilized.

less enthusiasm for QE using assets other than government debt, but still roughly half of the academics think it should remain in the toolkit.¹⁶

Table 5. Should QE still be in the toolkit *after* the crisis?

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
QE using government debt (N_G=34, N_A=157)				42.1***	27.9***
Remain potential instrument	35.3	53.9	68.2		
Remain, but in modified form	5.9	0.0	10.8		
Be discontinued	20.6	7.7	17.8		
Too early to judge	38.2	38.5	3.2		
QE using other assets (N_G=31, N_A=155)				32.7***	32.1***
Remain potential instrument	29.0	40.0	52.9		
Remain, but in modified form	0.0	0.0	11.0		
Be discontinued	29.0	0.0	29.7		
Too early to judge	41.9	60.0	6.5		

Notes: Figures denotes percentage of respondents (either central bank governors or academic economists). *** denotes significance at the 1% level, calculated using Chi-square tests for the independence of the responses of governors and academics. N_G/N_A denotes number of responding governors/academics. *Source:* Authors' calculations based on survey conducted in 2016.

The central bank heads in our survey are far more cautious in their interests in QE going forward. Only 41% think QE in government debt should remain an instrument, while 21% think it should not, and 38% reserve judgment for now. Note, however, that governors of central banks in advanced economies are considerably more positive in their assessment. Some 54% feel QE should remain in the toolkit, while less than 8% think it should not. The sentiment for QE in assets other than government debt is a bit weaker, but not by much. The χ^2 statistics in Table 5 show that this is another area where central bank and academic beliefs differ significantly (regardless of whether we compare the academics to the full sample of governors, or to the restricted set of those from advanced economies).

Thus QE has both supporters and detractors. Many critics, both outside and inside the central banking community, have pointed to a list of potential side effects. The lower interest rates associated with QE could lead investors to “reach for yield,” thereby increasing risk taking and impairing financial stability. Lower yields on government bonds also reduce pressure on governments to reduce budget deficits. Inequality rises along with rising asset values. There is also the question of whether QE pushes central banks across the line into the

¹⁶ Work on future forms of QE is underway. Reis (2015), for instance, argues that managing the central bank’s balance sheet can help stabilize inflation and economic activity during a future fiscal crisis, though there are still limits to what QE can achieve.

political sphere. (More on this in Section 5.) One difficulty in making judgments about these downsides now is that such potential side effects may take time to materialize. Another is that we have yet to experience the full exit from QE anywhere. So the overall judgment on QE must be deferred.

The academic literature initially focused on the direct effects of QE on financial markets, especially on interest rates. Here, the evidence is mostly positive: Many papers find evidence for declining yields in response to (announcements of) purchase programs. At times, the estimated effects are sizeable, especially concerning the initial programs in the U.S. and the U.K. For instance, Gagnon *et al.* (2011) conclude that U.S. longer-term rates dropped by up to 150 basis points around QE1 announcements, while Joyce *et al.* (2011) conclude that announcements of gilt purchases by the Bank of England in 2009 and 2010 reduced U.K. yields by 100 basis points. Most of the later papers find somewhat smaller (but still non-trivial) effects for QE1 and especially for QE2 (D'Amico and King, 2013, Krishnamurthy and Vissing-Jorgensen, 2011). Williams (2014) rescales the various estimates to a purchase of \$600 billion and reports effects ranging between 10 and 100 basis points, a very wide range with, in addition, wide confidence intervals. For the ECB's SMP program, Eser and Schwaab (2016) find large announcement effects on yields of the five targeted euro area countries. For actual purchases, there are still significant effects, as yields decline by around 3 basis points for purchases equal to 1/1000 of the outstanding debt. Altavilla *et al.* (2015) report that the ECB's QE has significantly lowered yields for a broad set of market segments, with effects that generally rise with maturity and riskiness of assets. For instance, long-term sovereign bonds yields declined by about 30-50 basis points at the 10-year maturity and by roughly twice as much in higher-yield member countries such as Italy and Spain. Andrade *et al.* (2016) find that the announcement of the ECB's purchases program reduced sovereign yields on long-term bonds while also raising share prices of banks that held more sovereign bonds in their portfolio.

More recently, the debate has shifted to the transmission of QE from financial markets to the real economy. For example, several Fed policymakers have noted that the transmission channels of QE to the real economy are not well understood (cf. Rosengren, 2015; Williams, 2014). In a recent review essay, Williamson (2015) bemoans a lack of research that "establishes a link from QE to the ultimate goals of the Fed" and notes that "casual evidence

suggests that QE has been ineffective in increasing inflation.” More academic work is clearly needed.

That said, there is increasing evidence that asset purchase programs have modest but not negligible effects beyond financial markets—on quantities like GDP and inflation.¹⁷ For instance, Engen *et al.* (2015) find a peak effect on inflation of 0.5% and a peak effect of unemployment of 1.25 percentage points in the Fed’s macroeconomic FRB/US model. Chung *et al.* (2012) find slightly larger effects, and emphasize that QE prevented the U.S. economy from falling into deflation. Using simulation from a large Bayesian VAR-model, Churm *et al.* (2015) conclude that the second round of purchases by the Bank of England increased GDP by between 0.5% and 0.8%, while inflation was affected by at most 0.6 percentage points. Using a similar methodology, Weale and Wieladek (2016) estimate that announcing purchases of 1% of GDP affects U.S. GDP by 0.58%, while the effects for the U.K. are only 0.25%. In a follow-up study, Wieladek and Pascual (2016) examine the real effects of the ECB’s QE and conclude that in absence of the first round of QE, real GDP and core CPI in the euro area would have been 1.3%-points and 0.9%-points lower, respectively. The effect is roughly 2/3 times smaller than those of asset purchase programs in the UK and the US. These are substantial effects.

But the effects of QE almost certainly depend on the context. As one prominent example, the Fed’s purchases of mortgage-backed securities (MBS) under QE1 took place in a distressed—indeed almost moribund—MBS market. But subsequent QE programs did not. Hence we should expect stronger effects from QE1 than from QE2, QE3, etc. Analogously, Goodhart and Ashworth (2012) argue that more recent asset purchases by the Bank of England were subject to diminishing returns, given that gilt yields had already fallen to very low levels. A similar point was raised when the ECB started its full-fledged QE program in 2015, as various euro area government bonds were then trading at record low yields. More broadly, how can one disentangle the effects of, say, QE and forward guidance when the two are promulgated together? As a further complication, communication on future rates is often accompanied by guidance on future QE.

¹⁷ See also IMF (2013), in particular Table 3 of the Appendix, and de Haan and Sturm (2016) for overviews of recent studies.

3.4. Macro-prudential instruments: here to stay, but in what form?

Given that most of our survey respondents have considered broadening the central bank’s mandate to include financial stability, it should come as no surprise that many see a continuing role for macro-prudential instruments. Roughly three-quarters of the respondents, academics as well as governors, believe the macro-prudential element will remain a permanent feature in the new normal. Only a small percentage of respondents think the use of these instruments should be discontinued (Table 6). Some in this latter group find it puzzling that a question on macro-prudential instruments is included in our survey, as they do not think it should be a responsibility of the central bank, while others find the concept too vague to begin with. Strikingly, as the paltry χ^2 statistic shows, the views of academics and governors on this issue are statistically indistinguishable.

Underneath this agreement, however, there is probably less agreement over what forms macro-prudential policy should take—which is hardly surprising at this early stage. One instrument that is mentioned relatively often are restrictions on consumer lending, such as loan-to-value ratios or debt-to-income ratios. But apart from that, there are many diverse opinions. Indeed, some central bank governors indicate that measures that were initially considered have been discontinued, suggesting that a consensus on the precise nature of macro-prudential instruments has not yet been reached.

Table 6. What role would macro-prudential policy continue to play?

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
Macro-prudential policy (N_G=47, N_A=144)				1.1	1.3
Remain potential instrument	76.6	71.4	71.5		
Remain, but in modified form	8.5	14.3	8.3		
Be discontinued	2.1	0.0	5.6		
Too early to judge	12.8	14.3	14.6		

Notes: Figures denotes percentage of respondents (either central bank governors or academic economists). N_G/N_A denotes number of responding governors/academics. *Source:* Authors’ calculations based on survey conducted in 2016.

3.5. Relevant factors in the adoption and evaluation of central bank policies

The survey has shown that central banks differ a lot when it comes to adopting and evaluating unconventional monetary policies. As in the previous section, we estimated some probit

models to understand these differences. We constructed a set of dichotomous left-hand variables for the adoption of instrument i (where i is: interest rates near zero, negative rates, QE with government debt, QE with other assets, forward guidance, macro-prudential policies, and “other”).¹⁸ To explain these seven choice variables, we use the same country and central bank characteristics as in the previous section—once again starting with univariate regressions (see Table A2 in the Appendix), which we use as a guide for parsimonious multivariate regressions. Results are in Table 7.

We find that advanced economies, countries that were hit hard by the crisis, and countries with an inflation targeting strategy are more likely to have adopted the various instruments—but with some exceptions. For instance, it is quite remarkable that countries that were *not* hit by the financial crisis are as likely to have introduced macro-prudential policies as countries that were. Perhaps the view that macro-prudential policies are needed to maintain financial stability is widely shared. Or perhaps some central banks introduced macro-prudential measures early and efficiently, thereby managing to avoid a severe crisis.

Table 7. Determinants of instrument adoption

	Adopted rates near zero	Adopted negative rates	Adopted QE with govt debt	Adopted QE other assets	Adopted forward guidance	Adopted macro prudential	Adopted other tools
Advanced Economy	0.300*** (0.076)	0.193*** (0.058)	0.201** (0.087)	0.076 (0.097)	-0.052 (0.148)	0.099 (0.135)	0.042 (0.161)
Hit by crisis	0.122 (0.097)	0.092* (0.056)	0.200** (0.083)	0.102 (0.087)	0.416*** (0.127)	-0.142 (0.148)	0.107 (0.170)
Inflation Targeting	0.125 (0.102)	-0.157* (0.080)	-0.015 (0.101)	-0.102 (0.105)	0.338*** (0.105)	0.260** (0.126)	-0.088 (0.144)
Observations	55	55	55	55	55	55	55
Pseudo R ²	0.285	0.400	0.262	0.114	0.181	0.083	0.014

Notes: The table reports marginal effects of a probit model that explains governors’ responses as to whether or not a certain policy instrument has been adopted. Numbers in brackets denote robust standard errors. */**/** identifies statistical significance at the 10%/5%/1% level. *Source:* Authors’ calculations based on survey among central bank governors conducted in 2016.

Table 8 relates the evaluation of a particular instrument to its introduction: Is the truth closer to “try it, and you’ll like it” or the reverse? The dependent variable in these seven probit models is a dummy equal to one if the central bank intends to keep instrument i in its toolkit (“remain” an instrument or “remain, but in modified form”) but zero if the governor indicates that the instrument will be discontinued or that is too early to judge. The results are not only

¹⁸ The alternative is *either* that the central bank considered introducing the instrument but rejected it or did not even consider it. We grouped these together.

clear—having used a certain instrument leads to a more positive assessment of it¹⁹—but also large. For instance, having implemented QE using government debt makes a positive evaluation 25 percentage points more likely; having used forward guidance raises the likelihood of a positive assessment by 43 percentage points.

Table 8. Determinants of instrument evaluation

	Evaluation of rates near zero	Evaluation of neg. rates	Evaluation of QE govt debt	Evaluation of QE oth. assets	Evaluation of forward guidance	Evaluation of macro prudential	Evaluation of other tools
Adopted respective tool	0.411*** (0.057)	0.166 (0.114)	0.254** (0.124)	0.153 (0.136)	0.434*** (0.067)	0.403*** (0.029)	0.352*** (0.069)
Observations	55	55	55	55	55	55	55
Pseudo R ²	0.268	0.0476	0.0561	0.0243	0.188	0.429	0.286

Notes: The table reports marginal effects of a probit model that explains governors’ responses as to whether or not they think a certain policy instrument should remain, or remain in modified form in the central bank toolkit. Numbers in brackets denote robust standard errors. **/*** identifies statistical significance at the 5%/1% level. *Source:* Authors’ calculations based on survey among central bank governors conducted in 2016.

We have also run multivariate regressions, which also include whether or not *other* instruments have been adopted (see Table A4 in the Appendix). The results suggest that, in most cases, only the “own effect” is significant (that is, adoption of a particular instrument makes a positive assessment of this instrument more likely). But there are some exceptions. One notable example is that adopting interest rates near zero makes a positive assessment of negative rates more likely. Another example: Adopting QE with government debt makes a positive assessment of QE using other assets more likely. In both cases, having gone part of the way makes it more likely that an additional step is viewed positively.

Looking at the academics (see Table A3 in the Appendix), our regressions once again identify only a few significant regressors. Respondents who have previously worked in a central bank tend to evaluate QE using other assets more positively and forward guidance more negatively; those with an EME background look less favorably on forward guidance and macro-prudential tools. Even the country patterns are not very pronounced, with the exception of near-zero or even negative rates, which are less favorably assessed by euro area respondents. One interesting contrast to the governors’ results is that, among academics, having implemented negative rates makes a positive assessment of them *less* likely.

¹⁹ Although the general conclusion remains, some of these coefficients and their significance are sensitive to how we treat non-respondents (non-respondents are set to zero both for the regressor and the regressand; results of alternative treatments are available on request).

4. CENTRAL BANK COMMUNICATION

4.1. On the frequency of central bank communication

When we wrote our earlier survey of the literature on central bank communication (Blinder *et al.*, 2008), none of us expected that, only few years later, the practice of central bank communication would be subject to some of the profound changes we have seen since the global financial crisis. We emphasized then that central bank communication can be a powerful monetary policy tool—a point that would be dramatically demonstrated during and after the crisis by a number of examples in which central bank *talk* had substantial effects, even without being accompanied by central bank *action*.

We asked our survey respondents: “*In your view, did the crisis induce the central bank to communicate with the public more or less than it did prior to the crisis?*”. Similarly, we asked our academics: “*In your view, did your country’s central bank communicate with the public more or less during and after the crisis than it had before?*” An overwhelming majority of both groups (more than 80% of governors (and more than 90% of those from advanced economies) and more than 90% of academics) feel that communication intensified (Table 9). No central bank governor reports to have communicated less during and after the crisis. In brief, greater communication seems to be an established fact.

Table 9. The role of central bank communication during the crisis

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
CB has communicated with the public... (N_G=55, N_A=159)				14.8**	2.9
Much less	0.0	0.0	3.1		
Somewhat less	0.0	0.0	0.6		
No change	14.6	6.3	3.1		
Somewhat more	34.6	37.5	52.8		
Much more	49.1	56.3	39.0		
Difficult to say	1.8	0.0	1.3		

Notes: Figures denotes percentage of respondents. ** denotes significance at the 5% level, calculated using Chi-square tests for the independence of the responses of governors and academics. N_G/N_A denotes number of responding governors/academics. *Source:* Authors’ calculations based on survey conducted in 2016.

4.2. Some extreme examples of communication

In July 2012, ECB President Mario Draghi's famous "whatever it takes" remarks in London changed the financial world. Prior to those words, markets had started pricing currency convertibility risk into the government bonds of several stressed euro area countries. Traders and others started wondering out loud whether these bonds would eventually be repaid in euros or in re-introduced national currencies. Mr. Draghi's strong statement ("Within our mandate, the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough."²⁰) and the subsequent announcement of the ECB's Outright Monetary Transactions (OMT) Program were sufficient to calm markets without a single euro being spent under this program (see Figure 5).

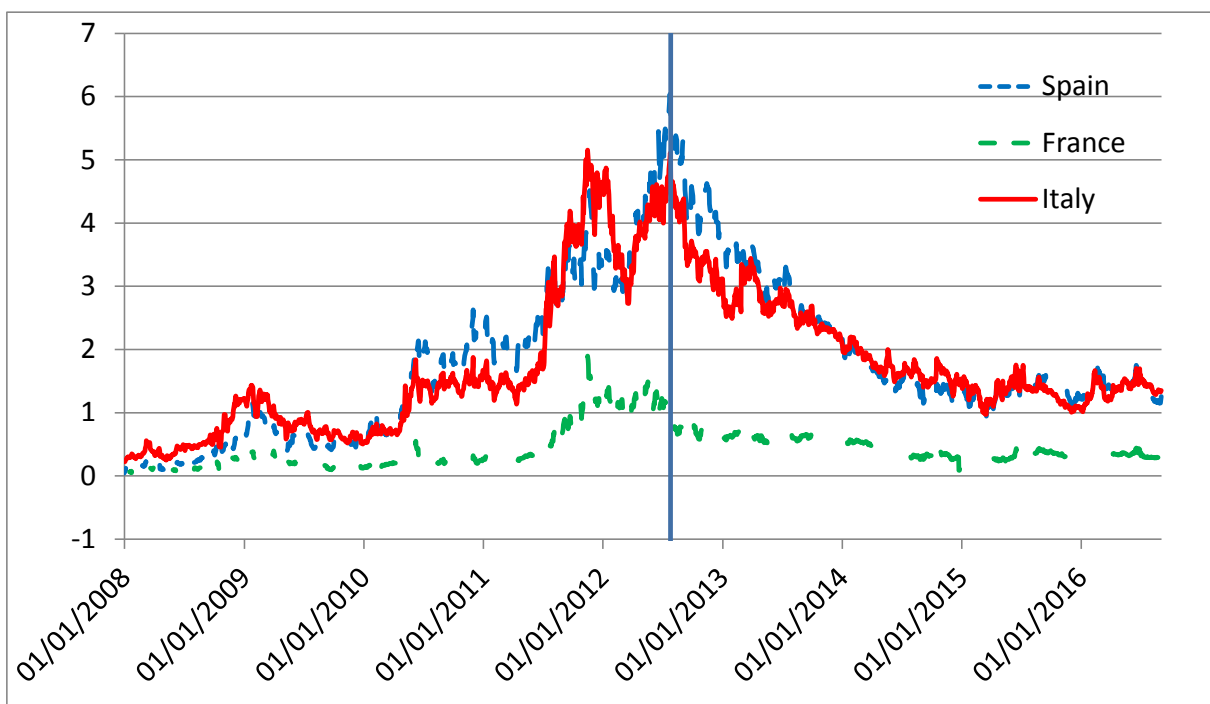


Figure 5. Government bond spreads

Notes: The figure shows 10-year government bond spreads relative to Germany (in percentage points); the bold vertical line denotes the day of Draghi's "whatever it takes" speech. *Source:* ECB

Another example became known as the "taper tantrum". In spring 2013, Fed Chairman Ben Bernanke's first statements about a likely deceleration in QE asset purchases ("tapering") led to (presumably unintended and undesired) strong reactions in financial markets, not only in the United States but globally, with stock markets declining and sovereign yields increasing in

²⁰ See <https://www.ecb.europa.eu/press/key/date/2012/html/sp120726.en.html>.

several advanced economies, and emerging markets experiencing a reversal of capital flows and currency depreciations. Yet the Federal Reserve did not actually begin tapering its asset purchases until January 2014.

These two examples are extreme, but they illustrate the potential potency of central bank communications—which at times apparently are effective even without supporting action. In general, however, we think that, in order to be credible, communication needs to be backed up by actions—or at least by the ability of the central bank to act if required (Blinder *et al.*, 2008).

4.3. Profound changes in central bank communications

As central banks resorted to unconventional monetary policies, they entered unfamiliar and highly complex terrain, with concomitant needs to explain their novel policies more fully than ever before. This is a prime example of what we mean by necessity being the mother of invention. Indeed, one of these unconventional tools, forward guidance, relies *entirely* on communication. But more communication was also required regarding other policies.

The crisis, the deployment of unconventional monetary policies, and the broader (sometimes tacit) mandates made discussions surrounding the actions of monetary policy committees more controversial than ever. And that, in turn, affected the way central banks communicated. The need for more and better communication was exacerbated by the increasingly public debate over such controversial areas as the possible distributional effects of UMP, or the role of the central bank in bailing out financial institutions—or, in the case of the euro area, entire governments. For all these reasons and others, there have been many changes in central bank communication practices since the crisis. To list only a few of the most important ones:

- Both the Federal Reserve and the Bank of Japan introduced a formal inflation objective in early 2012. Historically, inflation objectives had been introduced following periods of high and volatile inflation in an attempt to stabilize inflation at lower levels and to anchor inflation expectations. In contrast, the inflation objectives in the United States and Japan were introduced following periods of low inflation (Ehrmann, 2015).
- The Fed has expanded its communication toolkit in various other ways: Since April 2011, the FOMC chair holds regular press conferences, and since 2012, the Summary of Economic Projections contains a forecast for the Fed’s policy rate, in the form of a “dot plot” that

collects the judgements of the individual FOMC members of the appropriate level of the policy rate over three calendar years and the longer run.

- The Bank of England now releases the minutes of its policy meetings and the Inflation Reports at the same time as its policy decisions.
- A number of central banks have aired substantially more internal disagreement since the crisis. The most prominent such example may be the ECB, which saw its earlier principle of one-voice communication seriously challenged in light of the considerable disagreement among its Governing Council members, and started releasing regular accounts of monetary policy discussions as of January 2015.

All of these changes go in the same direction—towards more transparency—a trend which is in line with the evolution we had already observed in our 2008 article and with the survey results summarized in Table 9 above.

Having seen such profound changes in the practice of central bank communication, it seems natural to ask to what extent these changes are here to stay. Or will they be scaled back once normalcy is restored? Our take is that many of the more structural changes are here to stay. It will be close to impossible, and most likely also undesirable, to stop holding press conferences or publishing minutes. In a similar vein, we would not expect the Federal Reserve or the Bank of Japan to abolish their inflation objectives, though their levels might possibly be adjusted (see Section 2).

This belief is supported by the results of our survey (see Table 10). We asked both governors and academics: *“If you answered anything other than “no change” or “difficult to say” [... to the question on whether there have been changes to communication since the crisis], do you think these changes in communication should remain, be reversed, or be taken even further once conditions return to normal?”* Only a minority of our respondents—both governors and academics—sees much chance that the changes in central bank communications will be taken back. In fact, a somewhat larger minority (about 20%, but only 7% for governors in advanced economies) expect further changes towards more communications. Differences in responses between governors and academics are small and statistically insignificant.

Table 10. The role of central bank communication after the crisis

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
The crisis-related changes in central bank communication will... (N_G=45, N_A=114)				6.2	7.1
Revert back completely	2.2	0.0	1.8		
Revert back somewhat	11.1	20.0	16.7		
Remain	51.1	53.3	55.3		
Go even further	20.0	6.7	21.9		
Too early to judge	15.6	20.0	4.4		

Notes: Figures denotes percentage of respondents. N_G/N_A denotes number of responding governors/academics. *Source:* Authors' calculations based on survey conducted in 2016.

Table 11 provides the results of our regression analysis of the governors' responses (univariate regression results are again reported in the Appendix, Table A5). Due to the nature of the underlying variable, we ran *ordered* probit regressions in this case, and report the marginal effects for the highest response category (the central bank has communicated "much more"; the changes will "go even further") in Table 11. Central banks that have had internal discussions about their mandate seem to also have increased their external communication efforts, as did those banks that adopted macro-prudential tools or were hit by the crisis. Surprisingly, the adoption of forward guidance has *not* affected the extent to which communication activities have been expanding.²¹

Table 11. Determinants of changes in central bank communication

	Communicated more	Will communicate more
Had internal mandate discussions	0.215* (0.119)	-0.005 -0.118
Adopted macro-prudential tools	0.265** (0.133)	-0.067 -0.696
Hit by crisis	0.220* (0.131)	-0.059 (0.612)
Observations	54	38
Pseudo R ²	0.123	0.005

Notes: The table reports marginal effects of an ordered probit model that explains governors' responses as to the change in central bank communication during the crisis and the expected future developments. Coefficients are for the highest category (i.e., "much more" and "go even further"). Numbers in brackets denote robust standard errors. */** identifies statistical significance at the 10%/5% level. *Source:* Authors' calculations based on survey among central bank governors conducted in 2016.

²¹ We could not identify statistically significant determinants for the forward-looking assessment. Nor was the regression analysis for the academics (see Table A3 in the Appendix) informative.

4.4. Forward guidance

The most prominent change in central bank communications has been the more widespread use of forward guidance (FG), especially when interest rates are constrained at their (perceived) lower bound. Under FG, the central bank communicates not only about the current setting of monetary policy, but makes explicit statements about the future path of policy. While FG predates the crisis, most prominently in New Zealand, it has become much more common since. The reason is straightforward. Monetary policy works not only through the current setting of policy instruments, but also through expectations about the future course of policy, which affects, among other things, the yield curve. Management of these expectations can therefore be a powerful tool once the central bank has already lowered short-term rates as much as it can (or wants to).

Academic theories often translate FG into true *commitment* on behalf of the central bank (cf. Eggertsson and Woodford, 2003). In the terminology of Campbell *et al.* (2012), FG is “Odyssean.” In practice, however, FG does not commit the central bank to anything (Moessner *et al.*, 2016). Rather, it falls under Campbell *et al.* (2012)’s classification as “Delphic,” that is, FG merely *forecasts* the central bank’s future behavior, with at most a *conditional* commitment that depends on macroeconomic developments. Of course, conveying that conditionality to markets has proven challenging.

Following Filardo and Hofmann (2014), FG can be classified into three different categories

- *Qualitative FG* does not provide exact indications as to when or under what conditions the central bank would change its policy rate. For example, in July 2013, the ECB stated that, “The Governing Council expects the key ECB interest rates to remain at present or lower levels *for an extended period of time*”. [italics added]
- *Calendar-based FG* expresses the likely future path of policy rates as a function of calendar time. For example, the Bank of Canada used calendar-based guidance in 2009 and 2010, when it stated that “conditional on the inflation outlook,” it will “hold the current policy rate until the end of the second quarter of 2010.” The Federal Reserve made similar calendar-based statements intermittently over the years 2011-2015.
- *Data-based FG* states how future changes to policy rates depend on specific new economic information. For example, at one point the Fed maintained that its low policy rates were appropriate “as least as long as the unemployment rate remains above 6.5 per cent, inflation

between one and two years ahead is projected to be no more than a half percentage point above the Committee’s 2 per cent longer-run goal, and longer-term inflation expectations continue to be well anchored.”

As we saw earlier in Table 3, forward guidance of some type was adopted by roughly half of the central banks in our sample. It was considered but eventually rejected by another ten percent of the responding central bank heads. We asked the governors this follow-up question: “*Forward guidance is often classified as being either calendar based (or “time contingent”), data based (or “state contingent”), or purely qualitative (that is, providing neither a time frame nor economic conditions). Which type(s) of forward guidance has your bank employed?*”

Roughly speaking, the three broad types were (almost) equally common (see Figure 6). The frequencies add up to 150% because the question allowed for multiple answers, and several central banks switched among various types of guidance. This monetary policy tool is still in its early, experimental phase; to come to a view about the future of forward guidance in the central bank toolkit, we need to understand how it has worked in practice.

Several studies have assessed the effectiveness of FG, in three different dimensions (Filardo and Hofmann, 2014). The first is whether FG lowered expectations about the future path of policy rates—its most obvious intention. Here the evidence, while mixed, is mostly favorable. For the United States, the intended effect is confirmed by Campbell *et al.* (2012), Moessner (2013; 2015) and Woodford (2013)—but less so by Filardo and Hofmann (2014). For Canada, Woodford (2013) finds supportive, but overall weak evidence in favor, whereas the results in Chehal and Trehan (2009) suggest that the effects were not long lasting.²² For Sweden, Woodford (2013) shows meager effects on longer-term rates, perhaps because of a weaker commitment than in Canada.

²² This need not be read as evidence against the effectiveness of FG, given that the Bank of Canada always stressed the conditionality of its FG.

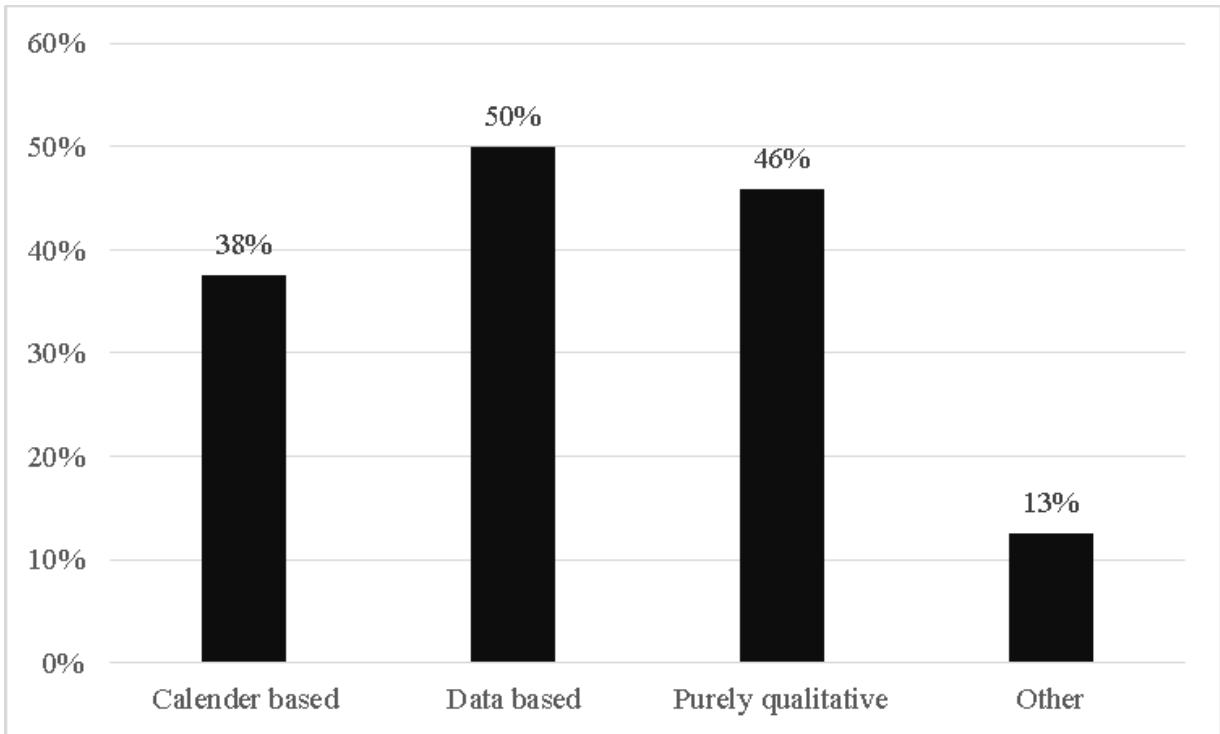


Figure 6. Types of forward guidance used in recent years (*Vertical axis denotes % of responding central bank heads*).

Notes: Based on replies of 24 governors whose central bank used forward guidance. Multiple answers were possible, and a total of 35 answers were received. *Source:* Authors' calculations based on survey conducted in 2016.

A second issue is whether FG changed how markets respond to macro news. Under calendar-based FG, markets should give less emphasis to the flow of macroeconomic news than otherwise. In line with this notion, Swanson and Williams (2014) and Feroli *et al.* (2016) find that the responses of medium- and long-term yields to macroeconomic announcements were muted once the Federal Reserve's FG was in place.

To summarize, there seems to be more evidence pointing to FG being effective than not. However, it is important to note that the various empirical studies are subject to substantial identification problems. Even event studies are contaminated by the fact that FG was typically used in conjunction with other UMPs. Furthermore, even if we conclude that FG has been effective, it was not without problems. Notably, FG had to be adapted over time in most circumstances, e.g. by moving from calendar-based to data-based FG, or by broadening the data-based criteria. It is therefore important to assess the pros and cons of the different types of forward guidance.

Feroli *et al.* (2016) provide a critical discussion of calendar-based FG. While the muted market responsiveness to news under calendar-based FG suggests that FG was credible, it also implies that market conditions did not ease in response to negative news, which hampered the accommodation of negative shocks. However, by the same token, positive macro news would not lead to premature and unwarranted tightening. More generally, calendar-based FG can put a central bank in a quandary when economic developments change in an unexpected manner. In such cases, the bank must choose between sticking with its earlier guidance, which may no longer be appropriate, or changing course, with possibly adverse consequences on its credibility. Yes, strong conditionality is “the answer,” but as previously noted, it may be hard to get markets thinking that way.

A different trade-off arises under data-based FG. If the central bank provides a relatively simple state contingency that is easy to communicate, its message might turn out to be *too simple* in the end, requiring the bank to “renege.” On the other hand, if it lists a multitude of indicators to be considered when making its judgement, accurate and intelligible communication of the contingency might prove impossible. Either sort of error can damage a central bank’s credibility.

These problems are not entirely hypothetical. The Federal Reserve’s initial data-based FG, emphasizing the unemployment rate, proved problematic. While the FOMC had said it would not even consider raising rates until unemployment fell to 6.5%, the markets came to (mistakenly) view 6.5% as a trigger for rate hikes. Then, when unemployment did drop below 6.5%, it did so partly for the wrong reason—an unexpectedly large decrease in labor force participation. So the Fed judged that lift-off was not yet advisable. Eventually, the FOMC removed the unemployment threshold from its FG.

Similarly, when the Bank of England achieved its unemployment threshold more quickly than anticipated, the Monetary Policy Committee adjusted its FG to include a much broader set of conditions. Andrew Sentence, a former member of the committee, remarked in that context that “The concept of forward guidance has not delivered. It seems to have been used to support the view that interest rates will not rise, rather than preparing the public and business for inevitable hikes.”²³

²³ <http://www.cityam.com/1407961668/sorry-tale-forward-guidance>

As with other UMPs, the jury is still out on the effectiveness of FG, especially since we have little experience to date with exit from FG. Bank of Canada Governor Poloz (2014) stresses that FG creates a one-way bet for investors, whose market positions can make it more challenging to exit from FG. Especially if one-way FG has been in place for a long time, a large unwinding of market positions may be required. In a related vein, San Francisco Fed President John Williams has argued that markets lost their “muscle memory” for responding to Fed statements during the extended period of extraordinary easing and FG by the Federal Reserve,²⁴ suggesting that some financial market volatility is to be expected when exiting.

Still, strong majorities of both governors and academics judge that forward guidance is here to stay (Table 12). As with other instruments, a substantial share of governors, especially those from advanced economies, finds it too early judge (in contrast to the academic respondents, who don’t). But it is interesting that not a single governor stated that forward guidance should be discontinued.

Table 12. The role of forward guidance after the crisis

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
Forward guidance (N_G=39, N_A=156)				26.0***	30.3***
Remain potential instrument	59.0	50.0	75.6		
Remain, but in modified form	12.8	7.0	11.5		
Be discontinued	0.0	0.0	9.0		
Too early to judge	28.2	42.9	3.9		

Notes: Figures denotes percentage of respondents. *** denotes significance at the 1% level, calculated using Chi-square tests for the independence of the responses of governors and academics. N_G/N_A denotes number of responding governors/academics. *Source:* Authors’ calculations based on survey conducted in 2016.

While a consensus about the overall merits of forward guidance seems to be emerging, there is far less agreement about the specific type of FG that should be pursued (see Table 13). Our survey asked governors and academics alike: “*In the future, which type(s) of forward guidance do you believe would be most effective for your central bank?*”²⁵

²⁴ <http://www.reuters.com/article/us-usa-fed-williams-liftoff-idUSKCN0SX03U20151108?mod=related&channelName=ousivMolt>.

²⁵ Given that academics had not yet been introduced to the different types of forward guidance, we started this question along the same lines as the previous question for central bank governors.

Table 13. Preferred types of forward guidance in the future

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
Forward guidance in the future (N_G=52, N_A=158)					
Calendar based	13.5	25.0	10.8	0.3	2.8*
Data based	26.9	25.0	68.4	27.6***	11.9***
Purely qualitative	38.5	43.8	22.2	5.4**	3.7*
None	11.5	12.5	4.4	3.4*	1.9
Other	15.4	25.0	3.8	8.4***	12.1***
Too early to judge	21.2	25.0	4.4	13.9***	10.4***

Notes: Figures denotes percentage of respondents. */**/** denotes significance at the 10%/5%/1% level, calculated using using Chi-square tests for the independence of the responses of governors and academics. N_G/N_A denotes number of responding governors/academics. *Source:* Authors' calculations based on survey conducted in 2016.

Feroli *et al.* (2016) express a preference for data-based FG, reserving time-dependent FG for unusual circumstances. This view is in line with the opinions of our academics, two-thirds of whom favor data-based FG. But the central bank governors in our survey feel quite differently: Only about a quarter of them favor data-based FG. More favor purely qualitative FG. Repeating the exercise of Section 3, we once again find that governors who gained some experience with a certain type of FG also assess it more positively (see Table 14).

Table 14. Determinants of evaluation of types of forward guidance

	Evaluation of calendar-based FG	Evaluation of data-based FG	Evaluation of qualit. FG	Evaluation of other FG
Adopted respective FG type	0.254*** (0.064)	0.391*** (0.032)	0.495*** (0.048)	0.318*** (0.088)
Observations	55	55	55	55
Pseudo R ²	0.279	0.419	0.368	0.225

Notes: The table reports marginal effects of a probit model that explains governors' responses as to whether or not they think a certain type of forward guidance is effective. Numbers in parentheses denote robust standard errors. */**/** identifies statistical significance at the 10%/5%/1% level. *Source:* Authors' calculations based on survey among central bank governors conducted in 2016.

5. CENTRAL BANKS' PROPER PLACE IN GOVERNMENT

5.1. In the government or out?

Word choices can be revelatory. In many countries, a verbal distinction is made between “the government” and the central bank—as if the central bank is *not* part of the government. Sometimes this separation is even interpreted as a hallmark of central bank independence

(CBI). But CBI has become the international norm only in recent decades. Prior to the 1980s, it was hard to find an independent central bank other than in the United States, (West) Germany, and Switzerland.²⁶ For example, few European central banks other than the Bundesbank and the Swiss National Bank were independent before the Maastricht Treaty required it of prospective members of the monetary union.

At some level, language suggesting that the central bank is outside the government is curious. Congressman Wright Patman, who was chairman of the banking committee of the U.S. House of Representatives back in the 1960s, correctly observed that, “A slight acquaintance with American constitutional theory and practice demonstrates that, constitutionally, the Federal Reserve is a pretty queer duck.”²⁷ It remains true today.²⁸ The American system of government is famous for its multiple layers of “checks and balances,” yet the Fed’s monetary policy decisions stand out as notably unchecked and unbalanced by any legislative, executive, or judicial authority.²⁹ The case of the ECB is even more extreme—at least on paper. Other than regular hearings at the European Parliament, the ECB essentially has no government “above” it. Furthermore, since the ECB’s structure and powers are delineated in a treaty, which is nearly impossible to amend, no government has the ability to change either aspect of ECB governance.³⁰ This situation contrasts sharply with that of the Fed, where the U.S. Congress can change the central bank’s governing statutes any day it chooses.

Traditionally, the issue of whether the central bank is or is not part of the government has been elided by appealing to the doctrine of *central bank independence* in monetary policy. At least in principle, a sharp line separates *monetary policy* from a long list of functions collectively called *fiscal policy*.³¹ According to an unwritten (in most countries) truce, the central bank is granted control over monetary policy while the elected government retains full control over fiscal policy. Importantly, each player tacitly or explicitly agrees not to poach into the other’s territory.

²⁶ See, for example, Cukierman *et al.* (1992) and Crowe and Meade (2008).

²⁷ Quoted in Greider (1987), pp. 49-50.

²⁸ Cf. Levin (2016) and Conti-Brown (2015).

²⁹ However, when it comes to other central bank functions, notably bank supervision and regulation, the Fed is both “checked” and “balanced” by several other authorities.

³⁰ There is, of course, always the possibility—in any democracy—that the central bank’s policies lose popular support, and that weakened support undermines the central bank’s independence.

³¹ That list extends well beyond macroeconomic stabilization policy.

There are good reasons for this division of labor. For example, Alesina and Tabellini (2008) argue that delegation of decision-making authority to non-elected bureaucrats with career concerns (as opposed to politicians) is especially beneficial when the tasks are technical in nature and monitoring quality is difficult. That sounds like monetary policy. Another important consideration is the extent to which the policy is redistributive, and thus relies on value judgments and political legitimacy more than on technical expertise.³²

5.2. The crisis and “the line”

The “line” between fiscal and monetary policy seemed at least modestly clear until the financial crisis. Then central banks around the world were either called upon, or felt compelled, to take many actions they had never (or rarely) taken before. Think, for example, about lending to banks on a massive scale (not entirely unprecedented, but very rare) against collateral that didn’t quite meet Bagehot standards—an action which can easily slide into a “bailout” of an imperiled bank. Or lending to nonbank financial institutions. Or purchasing non-traditional assets such as mortgage-backed securities (the Fed), peripheral country debt (the ECB), and a wide variety of financial instruments (the Bank of Japan)—just the sorts of “unconventional” monetary policy instruments we discussed in Section 3.

Each of these unusual activities shares one attribute in common: There is a non-trivial chance that the central bank, and thus indirectly the country’s taxpayers, will suffer a loss.³³ For this reason, they are often called *quasi-fiscal policies*, a term that suggests that such actions constitute a kind of government spending, which they do in an actuarial sense. Public spending by the central bank crosses the traditional line between monetary and fiscal policy, suggesting to some that the central bank has strayed into the fiscal domain. A number of writers view this as either an inappropriate or a dangerous position for the central bank to be in.³⁴

During the crisis in the U.S., politicians and the public were surprised to learn how much power the Fed actually had. In a famous incident regarding the rescue of insurance giant AIG in 2008, Congressman Barney Frank, who then chaired the House Financial Services

³² See Blinder (1997). This view should perhaps be tempered by recognizing that monetary policies have more redistributive consequences than are normally acknowledged.

³³ As an example of an extreme version of suffering losses, Hall and Reis (2015) discuss the implications of possible (technical) insolvency of the central bank.

³⁴ See, for example, Buitier (2014).

Committee, asked Fed Chairman Ben Bernanke, “Do you have \$80 billion?” Bernanke’s answer—“Well, we have \$800 billion,” an apparent reference to the size of the Fed’s balance sheet at the time—startled Frank. He recalled, “... that’s when many of us, for the first time, understood the full scope of this statute.”³⁵ Frank was referring to the then-obscure but since-famous Section 13(3) of the Federal Reserve Act, which gave the Fed virtually unlimited lending powers under “unusual and exigent circumstances.” Tellingly, when the Dodd-Frank Act passed in 2010, Congress limited that power.

These sorts of actions led to some withering criticisms of the Fed. Consider these words, written in 2010 (while the crisis still raged) by Allan Meltzer, the eminent historian of the Fed:

Never before had [the Federal Reserve] taken responsibility as lender-of-last-resort to the entire financial system, never before had it expanded its balance sheet by hundreds of billions of dollars or more over a short period, and never had it willingly purchased so many illiquid assets that it must hope will become liquid assets as the economy improves. Chairman Ben Bernanke seemed willing to sacrifice much of the independence that Paul Volcker restored in the 1980s. He worked closely with the Treasury and yielded to pressures from the chairs of the House and Senate Banking Committee and others in Congress.³⁶

In Europe, you didn’t have to look far to find stern critics of, e.g., the ECB’s Securities Market Program—which bought sovereign debt securities of periphery countries, thereby exposing itself to possible losses. For instance, it was widely reported that then-Bundesbank President Axel Weber, the heir apparent to the ECB presidency in 2011, took himself out of the running for that post over just this issue.³⁷ Former top Bundesbank/ECB officials such as Otmar Issing and Juergen Stark raised similar objections publicly, with Issing calling the bond-buying program “something very dangerous.”³⁸

Thus, at least a number of astute observers believe that several central banks “crossed the line” into fiscal policy during and after the crisis.

How do today’s central bankers and academic economists see it? Our survey asked them, “*In its crisis-fighting efforts, how much criticism did your [country’s] central bank get for*

³⁵ The quotations are from Wessel (2009), pp.197-198.

³⁶ From Meltzer (2010), p. 1243.

³⁷ Among many news reports that could be cited, see <http://www.spiegel.de/international/germany/merkel-ecb-candidate-german-central-bank-head-axel-weber-resigns-a-745083.html>

³⁸ See, for example, <http://www.express.co.uk/news/world/349354/Ex-ECB-chiefs-criticise-bond-buying>

acting politically or crossing the line into the political realm?”³⁹ This turned out to be one of the areas of greatest disagreement between the two groups.

As Table 15 shows, almost half of the central bankers answered “none,” a view shared by merely 6% of the academics. At the other end of the spectrum, 72% of the academics, but only 31% of the central bank governors, thought that central banks received either “a lot” or “a moderate amount” of criticism for crossing the line into politics. The two groups might have very different concepts of what constitutes “criticism.” Another explanation could be geographical differences. Our central bank heads come from all over the world, but the academics are heavily concentrated in advanced economies. However, as Table 15 shows, when we restrict the sample to the advanced economies’ governors, the differences between academics and governors, though smaller, are still large and statistically significant.

Table 15. How much criticism did the central bank receive?

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
CB has received _____ criticism (N_G=55, N_A=159)				59.8***	16.0***
None	49.1	31.3	5.7		
A little	12.7	25.0	18.9		
A moderate amount	14.6	25.0	30.2		
A lot	16.4	12.5	42.1		
Difficult to say	7.3	6.3	3.1		

Notes: Figures denotes percentage of respondents. *** denotes significance at the 1% level, calculated using Chi-square tests for the independence of the responses of governors and academics. N_G/N_A denotes number of responding governors/academics. *Source:* Authors’ calculations based on survey conducted in 2016.

A look at Table 16 shows that the likelihood to have been criticized “a lot” is substantially larger in crisis-hit countries—hardly a surprise. The adoption of unconventional monetary policy tools also matters. Our initial hypothesis was that embarking on QE would likely lead to more criticism, but this is only the case with other (than government debt) assets. The only other instrument that we find to provoke criticism is the adoption of forward guidance.

Among the academics, the only relevant determinants of criticism are the “country” fixed effects, with academics in the euro area having a 20 percentage point higher propensity to answer that their central bank has received a lot of criticism than their U.S. peers, and academics in the “other” countries a 33 percentage point lower propensity (see Table A3).

³⁹ The bracketed word appeared in the academics’ question, but not in the central bankers’ question.

Table 16. Determinants of criticism

	Criticism received
Adopted QE using government debt	-0.078 (0.071)
Adopted QE using other assets	0.203** (0.081)
Adopted forward guidance	0.192*** (0.073)
Hit by crisis	0.156** (0.079)
Observations	51
Pseudo R ²	0.144

Notes: The table reports marginal effects of an ordered probit model that explains governors' responses as to the amount of criticism that the central bank has received. Coefficients are for the highest category (i.e., "a lot"). Numbers in brackets denote robust standard errors. **/** identifies statistical significance at the 5%/1% level. *Source:* Authors' calculations based on survey among central bank governors conducted in 2016.

5.3. Was central bank independence compromised?

Crossing the line in one direction invites reciprocal crossings in the opposite direction, to wit, political interference with monetary policy. Such interference is hard to measure—indeed, it is probably not even an objective phenomena. (What is interference to a central banker might not be interference to a politician.) And complaining about monetary policy decisions is nothing new; both politicians and citizens have been doing it for centuries. Yet any serious reduction in central bank independence would be a cause for concern because much evidence indicates that macroeconomic performance is better in countries with more independent central banks.⁴⁰ So was CBI really compromised?

Table 17. Central bank independence during the crisis

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
CB independence was _____ during the crisis (N_G=54, N_A=158)				34.8***	15.0***
Gained	13.0	0.0	5.1		
Neither gained nor lost	79.6	93.8	43.0		
Lost a little	1.9	6.3	40.5		
Lost a lot	1.9	0.0	4.4		
Difficult to say	3.7	0.0	7.0		

Notes: Percentages of number of responding governors or academics. *** denotes significance at the 1% level, calculated using Chi-squared tests for the independence of responses of governors and academics. N_G/N_A denotes number of responding governors/academics. *Source:* Authors' calculations based on survey among central bank governors conducted in 2016.

⁴⁰ See Klomp and de Haan (2010) and de Haan and Eijffinger (2016).

We asked the same exact question of our central bankers and our economists: *How much independence do you believe your central bank either relinquished, saw taken away from it, or gained during the crisis?* Table 17 shows the results.

Despite the high χ^2 statistics, there is more agreement here than meets the eye. Specifically, the share of respondents who believe that central bank independence either did not change or was reduced only “a little” was more than 90% among central bank governors and more than 80% among academics. Thus the clear answer to the question was: Little or none.

These subjective opinions are corroborated by de Haan and Eijffinger (2016) using “objective” data provided by Bodea and Hicks (2015). These authors expanded the Cukierman *et al.* (1992) index of legal central bank independence for 78 countries from the end of the Bretton Woods system until 2010, thereby creating an original data set that codes CBI annually and—importantly for current purposes—covers changes in the last twenty-five years. Table 18 shows the average level of legal CBI before and after the start of the financial crisis for several groups of countries (based on IMF classifications). While the index remained stable for the Fed, the ECB and the Bank of England, the data suggest that, if anything, CBI increased after 2007.

Table 18. Legal CBI before and after the Global Financial Crisis

	1995-2007	2008-2010
Advanced economies	0.63	0.69
Emerging and developing economies	0.59	0.67

Source: de Haan and Eijffinger (2016) using data from Bodea and Hicks (2015), which are available at: <http://www.princeton.edu/~rhicks/data.html>. The classification of countries follows the IMF’s World Economic Outlook.

5.4. Back to the *status quo ante*?

If the crisis moved the line between the realms of fiscal and monetary policy, perhaps inevitably, was the *status quo ante* restored thereafter? Could it be? Should it be? The answer to the first question, at least, varies by country. One reason is that the degree to which the crisis is “over” also varies from country to country.

In the U.S., the financial storm clouds started lifting already in the spring of 2009, after the highly successful stress tests. By late 2010, the crisis could truly be said to be over: Risk

spreads had returned to normal, Federal Reserve lending was back down to pre-Lehman levels, and TARP funds outstanding under the Capital Purchase Program (“the bank bailout”) were down about 85% from peak levels. Today, apart from its huge balance sheet, which still includes over \$1.7 trillion of MBS and agency debt, the Fed has stepped back from all of its unusual activities: the massive lending, the lending to nonbanks, the bailouts, etc. It is now seeking to normalize monetary policy by raising the federal funds rate gradually. Shrinking the balance sheet, the FOMC has decided, can wait.

On the government’s side, the Dodd-Frank Act (2010) clipped the Fed’s wings a bit by reducing its emergency lending powers. But other than that, Dodd-Frank mostly gave the Fed *more* power, especially as a regulator. Furthermore, most Americans assume that policymakers will look to monetary policy, not fiscal policy, the next time the U.S. economy slumps. As a broad generalization then, the monetary-fiscal policy “line” is almost back to where it was before Lehman Brothers failed.

Things are quite different, however, at the Bank of Japan and the ECB, neither of which is yet “exiting,” Nor is the Bank of England, which in response to the outcome of the Brexit referendum decided it had to “re-enter.” For these central banks, it is hence far too early to guess whether the old line between monetary and fiscal policy will be restored.

In particular, just as the ECB seemed to be putting the chaos stemming from the world financial crisis behind it, the European sovereign debt crisis erupted in the spring of 2010. The ECB’s participation in the troika for Greece, along with the European Commission (EC) and the IMF, added an entirely new dimension. The ECB was invited to join the troika in order to advise the EC on matters where it has specific expertise (Cœuré, 2014). While it is, in contrast to the EC and the IMF, not a signatory of the agreements with governments, all three institutions should speak with a single voice in order to bargain effectively with the Greek government. Indeed, several observers have raised questions about the political independence of the ECB in light of this unusual agreement⁴¹ and especially following the ECB’s decision not to increase the ceiling of the Emergency Liquidity Assistance (ELA) to Greek banks in the

⁴¹ ECB president Draghi, in his press conference on 7 March 2013, mentions that the organisational setup of the troika “has raised questions about the political independence of the ECB.”

summer of 2015, after negotiations between the troika and the Greek government broke down.⁴²

It is impossible to predict the long-run consequences of these developments at the current juncture.

5.5. Is central bank independence under threat?

In the last Japanese election (2012), we saw the leadership and policies of the Bank of Japan emerge as major political issues. In the United States, there are now a variety of bills in the congressional hopper that would change the structure, powers, and/or operations of the Federal Reserve—several of which would undermine its independence. In Europe, support for populist parties that generally do not favour central bank independence and want to exit EMU and return to national currencies, or even to follow the UK and exit the EU, is rising.

Table 19. Central bank independence in the near future

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
CB independence is threatened	(N_G=55, N_A=159)			75.4***	25.4***
None	61.8	50.0	13.2		
A little	10.9	12.5	46.5		
A moderate amount	7.3	18.8	27.7		
A lot	1.8	0.0	9.4		
Too early to judge	18.2	18.8	3.1		

Notes: Percentages of number of responding governors or academics. *** denotes significance at the 1% level, calculated using Chi-squared tests for the independence of responses of governors and academics. N_G/N_A denotes number of responding governors/academics. *Source:* Authors' calculations based on survey among central bank governors conducted in 2016.

We asked our central bankers and economists virtually the same question: *How much is your central bank's independence threatened now or in the near-term future?* The answers, tabulated in Table 19, are slightly surprising. On an *a priori* basis, one might think that central bank governors would be hyper-sensitive to encroachments on their independence. Yet we see far more concern on the part of academics. About 37% of them believe that CBI is threatened either “a lot” or “a moderate amount,” whereas only 9% of central bankers see things that

⁴² See, e.g., Wyplosz (2015) or “ECB ensnared in politics as it faces vote on Bank of Greece loans, Financial Times, 19 May 2015.

way. At the other end of the worry spectrum, more than 60% of central bankers (50% in advanced economies), but only 13% of academics, see no threat at all.⁴³

Can we say more about the determinants of past or expected changes to independence? Table 20 reports the marginal effects for the lowest category of our dependent variable (i.e. central bank independence was “gained” during the crisis; independence is “not” threatened) from an ordered probit model. One interesting question is whether the amount of criticism that the central bank has received has a bearing on threats to its independence. For parsimony, we transform the corresponding variable into a dummy variable equal to one when the governor has responded that the central bank has received “a lot” of criticism.

Hardly any of our variables help explain *past* changes in independence; having adopted QE using other assets is the only one that has some impact. In contrast, *looking forward*, we have strong evidence that the likelihood that a governor sees no threat to independence is considerably smaller in countries where there was a discussion outside the central bank about its mandate, and in countries where the central bank has received a lot of criticism. For the academics, we cannot identify any patterns in our data (see Table A3).

Table 20. Determinants of changes to central bank independence

	Change in independence	Expected change in independence
Adopted QE using other assets	-0.234* (0.134)	0.090 (0.133)
Had external mandate discussions	0.005 (0.073)	-0.253** (0.101)
Received a lot of criticism	-0.059 (0.153)	-0.309** (0.151)
Observations	49	42
Pseudo R ²	0.0696	0.140

Notes: The table reports marginal effects of an ordered probit model that explains governors’ responses as to the changes in independence that have occurred during the crisis, or are expected. Coefficients are for the lowest category (i.e., “gained” and “none”). Numbers in brackets denote robust standard errors. */** identifies statistical significance at the 10%/5% level. *Source:* Authors’ calculations based on survey among central bank governors conducted in 2016.

⁴³ We remind readers, once again, that a majority of our academics come from the geographical areas of only three central banks: The Fed, the ECB, and the Bank of England.

5.6. Conclusions on governance

Perhaps inevitably, the financial crisis pushed many central banks over the traditional dividing line between fiscal and monetary policy. Was that costly to the central banks? According to our survey results, that depends on whom you ask. Central bank governors do not believe they took a lot of criticism for “crossing the line” into the realm of politics, and most do not feel their independence has been or is now threatened. On the contrary, a strong majority of central bankers (almost 93%) believe their independence was either increased or did not change. Academics see considerably more potential crossing of the line in the future, and are more worried about threats to CBI.

This sharp discrepancy of views was both surprising and reassuring to us. The central bankers are, after all, on the “front lines.” While geography may be playing some role here, the discrepancies remain stark even if we restrict the comparison to advanced economy governors, who provide a better comparator group to our advanced economy academics.

6. SUMMING UP: WHERE DO WE GO FROM HERE?

After reviewing the literature, and documenting the views of central bank governors and academic economists, what do we conclude? To what extent has the crisis changed the face of monetary policy?

In quite a few countries, the crisis seems not to have affected the basic approach to monetary policy in a drastic way. This is most apparent from noting that 70% of central bank governors did *not* consider using interest rates near zero, negative rates, or QE in any form. In that sense, the world of central banking has not changed nearly as much as concentrating on the Fed, the ECB, the Bank of England, and the Bank of Japan, or, for that matter, on the academic literature, might indicate.

However, this may well change. In particular, it is striking that many governors and academics have reconsidered their central bank’s mandate since the crisis, mostly with a view to adding financial stability to the mandate. In some cases, the mandate has already been modified, or preparations are being undertaken in that direction. Given the stability in central bank mandates over the years prior to the crisis, this constitutes a notable shift. At the same time, however, there is continuity, as many governors and academics would not consider changing the target level of inflation.

One big change that was already apparent before 2007, but which was sped up by the crisis, is the more active use of communication by central banks. Here we find the strongest agreement between governors and academics—that central banks have communicated much more during the crisis, should certainly continue to do so, and should perhaps go even further. These views are corroborated by the large body of evidence that shows the benefits of communication to monetary policy.

The largest unknown is the precise shape and form of the instrument set. First, much is still unknown about the costs and benefits of recent unconventional policies—an uncertainty reflected in the cautious tone of many central bank governors. More research on forward guidance, QE, and negative rates is therefore needed, especially once we can assess how central banks managed their “exits.” Second, although many people see macro-prudential policy as the wave of the future (or even of the present), there is no broad agreement on what forms macro-prudential policy would actually take—which is hardly surprising at this early stage. As our central bankers frequently said, it is too early to judge.

Overall, it seems conceivable that monetary policy in the near future will work with a broadened mandate, which it seeks to fulfil using an extended set of instruments, whilst communicating more actively. Whether this combination leads to “crossing the line” with the government more often remains to be seen—and is important.

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Appendix:

Table A1. Detailed results for changing the mandate of the central bank

	Governors		Academics	Chi-sq.	
	All	AEs		vs. all	vs. AEs
Reconsidered the mandate? (N_G=55, N_A=159)				2.1	1.2
Yes	61.8	62.5	54.1		
No	36.4	37.5	39.6		
Difficult to say	1.8	0.0	6.3		
If yes (N_G=34, N_A=86)					
Change inflation target	20.6	50.0	31.4	1.4	1.4
Replace objective	5.9	0.0	5.8	0.0	0.6
Add objective	50.0	40.0	60.5	1.1	1.5
Other	55.9	50.0	24.4	10.9***	3.0*

Notes: Figures denote percentage of respondents (either central bank governors or academic economists). *** denotes significance at the 10%/1% level, calculated using Chi-square tests for the independence of the responses of governors and academics. N_G and N_A denote the number of responding governors and academics. *Source:* Authors' calculations based on survey conducted in 2016.

Table A2. Determinants of mandate discussion and the adoption of unconventional monetary policies (univariate probit regressions)

	Mandate discussions outside	Mandate discussions inside	Adopted rates near zero	Adopted negative rates	Adopted QE with govt debt	Adopted QE with other assets	Adopted forward guidance	Adopted macro prudential	Adopted other tools	Adopted calendar-based FG	Adopted data-based FG	Adopted qualitative FG	Adopted other FG
Advanced economy	0.271** (0.132)	0.010 (0.146)	0.376*** (0.059)	0.212*** (0.073)	0.275*** (0.077)	0.097 (0.085)	0.174 (0.140)	0.112 (0.141)	0.052 (0.145)	0.163 (0.101)	0.090 (0.134)	1.466*** (0.477)	0.160** (0.080)
Crisis (LV dummy)	0.438*** (0.136)	0.176 (0.161)	0.265** (0.112)	0.194*** (0.075)	0.287*** (0.079)	0.140 (0.085)	0.381*** (0.131)	-0.110 (0.148)	0.125 (0.156)	0.234** (0.095)	0.377*** (0.100)	1.603*** (0.394)	0.066 (0.094)
Inflation targeting	0.169 (0.134)	0.050 (0.137)	0.210** (0.106)	-0.105 (0.099)	0.028 (0.108)	-0.105 (0.099)	0.313*** (0.109)	0.287** (0.120)	-0.079 (0.138)	0.102 (0.103)	-0.094 (0.130)	0.607 (0.393)	0.061 (0.085)
Openness	-0.002** (0.001)	-0.002** (0.001)	-0.002 (0.001)	-0.000 (0.000)	-0.003** (0.001)	-0.001 (0.001)	-0.002 (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.001 (0.001)	-0.004* (0.002)	0.001 (0.001)
Flexible exchange rate	0.176 (0.137)	0.073 (0.141)	0.350*** (0.070)	0.079 (0.085)	0.131 (0.102)	0.003 (0.090)	0.384*** (0.097)	0.161 (0.134)	-0.017 (0.142)	0.253*** (0.083)	0.115 (0.128)	1.243*** (0.444)	0.003 (0.090)
CB independence	-0.362 (0.447)	-0.289 (0.464)	-0.053 (0.433)	0.257 (0.352)	0.095 (0.376)	0.464 (0.381)	0.334 (0.444)	0.035 (0.412)	0.075 (0.463)	0.453 (0.380)	0.445 (0.400)	1.153 (1.307)	0.139 (0.373)
Change in CB independence	0.518 (1.253)	0.242 (1.346)	-0.828 (1.239)	0.808 (0.847)	0.267 (0.927)	1.309* (0.729)	0.317 (1.323)	1.368 (1.137)	1.727 (1.241)	-0.485 (0.983)	1.292 (1.025)	-5.476 (3.705)	-1.211 (1.089)

Notes: The table reports marginal effects of probit models that explain governors' responses as to whether or not there has been a discussion about the central bank mandate (left panel) and whether or not certain policy instruments have been adopted (middle and right panel). Each coefficient comes from a separate regression using the maximum number of observations for each regressor-regressand pair. Numbers in brackets denote robust standard errors. ***/**/* identifies statistical significance at the 10%/5%/1% level. *Source:* Authors' calculations based on survey among central bank governors conducted in 2016.

Table A3. Determinants of academics' responses

	Mandate reconsidered	Evaluation of rates near zero	Evaluation of negative rates	Evaluation of QE with govt debt	Evaluation of QE with other assets	Evaluation of forward guidance	Evaluation of macro prudential	Evaluation of other tools	Evaluation of calendar-based FG	Evaluation of data-based FG	Evaluation of qualitative FG	Evaluation of other FG	Change in communication	Exp. change in communication	Criticism received	Change in independence	Exp. change in independence
Female	0.040 (0.119)	0.090 (0.111)	0.210* (0.127)	0.141 (0.131)	0.157 (0.122)	-0.049 (0.073)	0.108 (0.108)		0.103 (0.070)	-0.004 (0.121)	0.067 (0.096)		0.008 (0.120)	0.001 (0.111)	-0.000 (0.098)	0.001 (0.023)	-0.026 (0.039)
Year of PhD	-0.000 (0.003)	0.009*** (0.003)	0.005 (0.004)	0.001 (0.004)	0.004 (0.003)	0.003 (0.002)	0.004 (0.003)	-0.003 (0.002)	0.003 (0.002)	-0.003 (0.003)	0.002 (0.003)	0.003* (0.002)	0.005* (0.003)	0.002 (0.003)	-0.001 (0.003)	-0.000 (0.001)	-0.002 (0.001)
U.S. PhD	0.113 (0.134)	-0.077 (0.107)	0.107 (0.124)	0.057 (0.110)	0.068 (0.119)	0.103 (0.076)	0.253** (0.111)	-0.066 (0.075)	0.005 (0.085)	0.216** (0.105)	-0.040 (0.093)	-0.002 (0.055)	0.002 (0.101)	0.006 (0.106)	0.089 (0.111)	0.028 (0.037)	-0.014 (0.060)
Central bank experience	0.177** (0.088)	-0.103 (0.071)	-0.057 (0.089)	-0.075 (0.080)	0.177** (0.087)	-0.213*** (0.052)	-0.114 (0.076)	0.023 (0.048)	-0.108 (0.069)	-0.114 (0.081)	0.007 (0.075)	0.061 (0.039)	-0.130* (0.077)	-0.018 (0.086)	-0.000 (0.080)	-0.017 (0.021)	-0.011 (0.035)
Monetary economist	0.057 (0.078)	-0.008 (0.067)	-0.041 (0.079)	0.003 (0.074)	0.059 (0.075)	0.009 (0.059)	0.022 (0.069)	0.088* (0.051)	0.115** (0.054)	-0.044 (0.072)	-0.078 (0.066)	0.085* (0.050)	0.054 (0.070)	0.110* (0.066)	0.017 (0.071)	0.009 (0.020)	0.061* (0.031)
EME background	-0.014 (0.169)	-0.056 (0.147)	-0.219 (0.176)	-0.001 (0.143)	-0.022 (0.179)	-0.229*** (0.079)	-0.417*** (0.151)	0.104 (0.083)	-0.046 (0.113)	-0.069 (0.159)	0.065 (0.148)		-0.222 (0.139)	-0.143 (0.157)	-0.235 (0.153)	-0.040 (0.036)	-0.110* (0.067)
Full crisis exposure	-0.071 (0.139)	0.053 (0.108)	0.109 (0.142)	0.008 (0.118)	-0.223 (0.145)	-0.049 (0.079)	-0.220* (0.122)	0.016 (0.061)	-0.014 (0.104)	0.057 (0.130)	0.072 (0.115)		-0.090 (0.107)	-0.069 (0.109)	-0.090 (0.134)	-0.036 (0.034)	-0.085 (0.056)
Euro area fixed effect	0.275*** (0.103)	-0.288*** (0.076)	-0.176* (0.105)	-0.098 (0.091)	-0.078 (0.101)	-0.103 (0.075)	0.181* (0.095)	-0.006 (0.066)	0.006 (0.064)	-0.223** (0.093)	0.102 (0.083)	0.018 (0.069)	0.064 (0.091)	0.156 (0.098)	0.189** (0.089)	-0.030 (0.028)	0.008 (0.043)
UK fixed effect	0.439** (0.174)	0.187 (0.168)	0.037 (0.157)		0.262 (0.174)	-0.089 (0.085)	0.315* (0.182)	-0.051 (0.092)		0.186 (0.145)	-0.198 (0.145)	0.033 (0.059)	-0.046 (0.104)	0.109 (0.101)	-0.135 (0.122)	-0.011 (0.033)	-0.099 (0.065)
Other countries fixed effect	0.088 (0.146)	0.074 (0.131)	0.111 (0.160)	-0.073 (0.127)	-0.148 (0.154)		-0.089 (0.131)		-0.039 (0.117)	0.021 (0.131)	-0.160 (0.156)	0.108* (0.062)	-0.424*** (0.110)	0.057 (0.123)	-0.334** (0.169)	-0.059 (0.040)	-0.144* (0.077)
Observations	156	156	156	143	156	143	156	126	143	156	156	115	154	108	151	145	151
Pseudo R2	0.0740	0.135	0.0488	0.0307	0.0926	0.230	0.0975	0.0942	0.0998	0.0942	0.0589	0.224	0.0624	0.0371	0.0499	0.0260	0.0439

Notes: The table reports marginal effects of (ordered) probit models that explain academics' responses. Numbers in brackets denote robust standard errors. */**/** identifies statistical significance at the 10%/5%/1% level. *Source:* Authors' calculations based on survey among academics conducted in 2016.

Table A4. Determinants of the evaluation of unconventional monetary policy tools (multivariate probit regressions)

	Evaluation of rates near zero	Evaluation of negative rates	Evaluation of QE with govt debt	Evaluation of QE with other assets	Evaluation of forward guidance	Evaluation of macro prudential	Evaluation of other tools	Evaluation of calendar- based FG	Evaluation of data- based FG	Evaluation of quali- tative FG	Evaluation of other FG
Adopted rates near zero	0.463*** (0.097)	0.183* (0.100)	0.038 (0.150)	0.137 (0.122)	-0.261** (0.127)	0.001 (0.082)	0.248*** (0.094)	--	--	--	--
Adopted negative rates	0.072 (0.136)	0.246 (0.162)	-0.308 (0.237)	--	-0.221 (0.229)	-0.050 (0.136)	-0.129 (0.197)	--	--	--	--
Adopted QE govt debt	-0.094 (0.132)	-0.137 (0.152)	0.492*** (0.169)	-1.143*** (0.316)	-0.143 (0.156)	0.014 (0.087)	-0.144 (0.103)	--	--	--	--
Adopted QE other assets	-0.385** (0.161)	--	-0.349 (0.219)	1.401*** (0.256)	0.054 (0.227)	0.126 (0.144)	0.180 (0.135)	--	--	--	--
Adopted forward guidance	0.079 (0.093)	0.091 (0.077)	-0.058 (0.109)	0.008 (0.102)	0.535*** (0.082)	0.046 (0.095)	0.058 (0.074)	--	--	--	--
Adopted macro prudential	-0.107 (0.098)	-0.108 (0.098)	0.054 (0.114)	-0.018 (0.115)	0.007 (0.107)	0.387*** (0.037)	0.009 (0.081)	--	--	--	--
Adopted other tools	0.115 (0.092)	-0.034 (0.091)	-0.111 (0.114)	-0.054 (0.112)	-0.047 (0.108)	0.010 (0.072)	0.359*** (0.069)	--	--	--	--
Adopted calendar-based FG	--	--	--	--	--	--	--	0.216*** (0.081)	0.030 (0.097)	0.023 (0.144)	0.074 (0.115)
Adopted data-based FG	--	--	--	--	--	--	--	0.073 (0.089)	0.381*** (0.062)	-0.099 (0.126)	0.030 (0.109)
Adopted qualitative FG	--	--	--	--	--	--	--	0.008 (0.097)	-0.009 (0.110)	0.460*** (0.044)	-0.052 (0.101)
Adopted other FG	--	--	--	--	--	--	--	-0.048 (0.108)	-0.058 (0.120)	-0.148 (0.108)	0.286*** (0.083)
Observations	55	49	55	49	55	55	55	55	55	55	55
Pseudo R2	0.358	0.240	0.150	0.162	0.329	0.449	0.423	0.298	0.423	0.389	0.264

Notes: The table reports marginal effects of probit models that explain governors' responses as to whether or not they think a certain policy instrument should remain in the central bank toolkit, or remain in modified form (left panel), or whether or not they think a certain type of forward guidance is effective (right panel). Numbers in brackets denote robust standard errors. */**/** identifies statistical significance at the 10%/5%/1% level. *Source:* Authors' calculations based on survey among central bank governors conducted in 2016.

Table A5. Determinants of communication, criticism and central bank independence (univariate ordered probit regressions)

	Changes in communication	Expected changes in communication	Criticism received	Change in CB independence	Expected change in CB independence
Adopted rates near zero	0.251** (0.117)	-0.208* (0.115)	0.092 (0.082)	-0.171* (0.098)	0.071 (0.152)
Adopted negative rates	-0.129 (0.174)	-0.031 (0.190)	0.034 (0.102)	0.373 (0.231)	-0.127 (0.161)
Adopted QE govt debt	0.103 (0.130)	0.042 (0.130)	0.109 (0.073)	0.017 (0.125)	-0.072 (0.141)
Adopted QE other assets	0.238 (0.178)	-0.181 (0.125)	0.224*** (0.063)	0.082 (0.120)	0.096 (0.181)
Adopted forward guidance	0.364*** (0.081)	-0.077 (0.120)	0.235*** (0.078)	-0.004 (0.081)	0.019 (0.138)
Adopted macro prudential	0.311*** (0.106)	-0.079 (0.110)	0.033 (0.098)	0.099 (0.087)	-0.076 (0.131)
Adopted other tools	0.128 (0.125)	0.227** (0.103)	0.092 (0.086)	-0.006 (0.085)	0.002 (0.128)
Advanced economy	0.130 (0.128)	-0.173 (0.114)	0.086 (0.075)	-0.170* (0.098)	-0.165 (0.119)
Crisis (LV dummy)	0.230* (0.131)	-0.042 (0.123)	0.247*** (0.069)	0.008 (0.117)	-0.086 (0.171)
Inflation targeting	0.010 (0.127)	-0.009 (0.106)	0.013 (0.083)	0.016 (0.074)	-0.156 (0.115)
Openness	-0.000 (0.001)	-0.000 (0.001)	-0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Flexible exchange rate	0.223* (0.125)	-0.227** (0.114)	0.062 (0.083)	-0.171* (0.098)	-0.141 (0.120)
CB independence	-0.766** (0.310)	-0.399 (0.314)	0.712** (0.280)	0.403 (0.286)	-0.530 (0.348)
Change in CB independence	1.567 (1.097)	-1.330 (0.880)	1.663*** (0.642)	1.525*** (0.506)	-0.818 (1.045)

Notes: The table reports marginal effects of ordered probit models that explain governors' responses as to the (expected) change in communications (left panel), the amount of criticism received (middle panel) and the (expected) change in central bank independence (right panel). Coefficients are for the highest category for communication and criticism, and for the lowest category for independence. Each coefficient comes from a separate regression using the maximum number of observations for each regressor-regressand pair. Numbers in brackets denote robust standard errors. ***/** identifies statistical significance at the 10%/5%/1% level. *Source:* Authors' calculations based on survey among central bank governors conducted in 2016.

CENTRAL BANKERS' QUESTIONNAIRE ON MONETARY POLICY

I. CENTRAL BANK GOALS

1. Did the world financial crisis of 2007-2009 and/or its aftermath create discussions *inside* your central bank about whether it would be desirable to modify the bank's mandate in any way? (please check one)

- Yes
 No
 Difficult to say

2. If "Yes," were those discussions about: (please check as many as apply)

- changing the price stability or inflation target
 replacing price stability or low inflation by some other objective
 extending the mandate by adding some other objective to price stability or low inflation
 other (please specify): _____

3. Did the world financial crisis of 2007-2009 and/or its aftermath create discussions in your *country* but *outside* your central bank about whether it would be desirable to modify the bank's mandate in any way? (please check one)

- Yes
 No
 Difficult to say

4. If "Yes," were those discussions about: (please check as many as apply)

- changing the price stability or inflation target
 replacing price stability or low inflation by some other objective
 extending the mandate by adding some other objective to price stability or low inflation
 other (please specify): _____

(continued)

II. CENTRAL BANK INSTRUMENTS

5. During and after the crisis, a number of central banks adopted or considered unconventional policies and/or policy instruments they had not utilized before. Please check below the policies your central bank either adopted, considered but rejected, or did not consider at all:

Unconventional policy or instrument	Adopted	Considered, but rejected	Did not consider
(a) Policy rate(s) near zero	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b) Negative interest rates (e.g., the policy rate or rate on deposits at the central bank)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c) Quantitative easing using government debt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d) Quantitative easing using assets other than government debt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e) Forward guidance about future monetary policy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(f) Macro-prudential policy*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(g) Other**	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* If so, please specify: _____

** If so, please specify: _____

(continued)

6. Once conditions return to normal, do you think each of the following should remain a potential instrument of monetary policy, remain an instrument but in modified form, be discontinued, or that it is too early to judge? (please check one box per policy/instrument)

Unconventional policy or instrument:	(1) Remain an instrument	(2) Remain, but in modified form	(3) Be discontinued	(4) Too early to judge
(a) Policy rate(s) rate near zero	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b) Negative interest rates (e.g., the policy rate or rate on deposits at the central bank)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c) Quantitative easing using government debt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d) Quantitative easing using assets other than government debt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e) Forward guidance about future monetary policy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(f) Macro-prudential policy*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(g) Other**	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* If so, please specify: _____

** If so, please specify: _____

III. CENTRAL BANK COMMUNICATION

7. In your view, did the crisis induce the central bank to communicate with the public *more* or *less* than it did prior to the crisis? (please check one)

- much less
- somewhat less
- no change
- somewhat more
- much more
- difficult to say

(continued)

8. If you answered anything other than “no change” or “difficult to say” just above, do you think these changes in communication should remain, be reversed, or be taken even further once conditions return to normal? (please check one)

- revert back completely
- revert back somewhat
- remain
- go even further
- too early to judge

9. Forward guidance is often classified as being either *calendar based* (or “time contingent”), *data based* (or “state contingent”), or purely *qualitative* (that is, providing neither a time frame nor economic conditions). Which type(s) of forward guidance has your bank employed? (please check as many as apply):

- Calendar based (time contingent)
- Data based (state contingent)
- Purely qualitative (neither time nor state contingent)
- None
- Other (please specify): _____
- Difficult to say

10. In the future, which type(s) of forward guidance do you believe would be most effective for your central bank? (please check as many as apply):

- Calendar based (time contingent)
- Data based (state contingent)
- Purely qualitative (neither time nor state contingent)
- None
- Other (please specify): _____
- Too early to judge

IV. CENTRAL BANKS AND THEIR GOVERNMENTS

11. In its crisis-fighting efforts, how much criticism did your central bank get for acting politically or crossing the line into the political realm? (please check one)

- none
- a little
- a moderate amount
- a lot
- difficult to say

(continued)

12. How much *independence* do you believe your central bank either relinquished, saw taken away from it, or gained during the crisis? (please check one)

- gained independence
- neither gained nor lost
- lost a little
- lost a lot
- difficult to say

13. How much is your central bank's independence threatened now or in the near-term future? (please check one)

- none
 - a little
 - a moderate amount
 - a lot
 - too early to judge
- =====

Name: _____

Institution: _____

Thank you very much for participating in this survey!

The completed questionnaire may be returned to any one of these three addresses:

E-mail	Hard copy	Fax
Dr. David-Jan Jansen d.jansen@dnb.nl	<i>Please mark envelope 'Personal & Confidential'</i> Dr. David-Jan Jansen De Nederlandsche Bank Economics and Research Division PO Box 98 1000 AB Amsterdam The Netherlands	Dr. David-Jan Jansen De Nederlandsche Bank Economics & Research Division +31 – 20 524 2514

ECONOMISTS' QUESTIONNAIRE ON MONETARY POLICY

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This questionnaire refers many times to “your country’s central bank.” If your country of residence is in the euro area, please interpret this phrase as referring to the European Central Bank.

I. CENTRAL BANK GOALS

1. Did the world financial crisis of 2007-2009 and/or its aftermath lead you to think that it would be desirable to modify the mandate of your country’s central bank in any way? (please check one)

- Yes
- No
- Difficult to say

Please specify your country of residence: _____

2. If “Yes,” would these modifications apply to: (please check as many as apply)

- changing the price stability or inflation target
- replacing price stability or low inflation by some other objective
- extending the mandate by adding some other objective to price stability or low inflation
- other (please specify): _____

(continued)

II. CENTRAL BANK INSTRUMENTS

3. During and after the crisis, a number of central banks adopted or considered unconventional policies and/or policy instruments they had not utilized before. Once conditions return to normal, do you think each of the following should remain a potential instrument of monetary policy, remain an instrument but in modified form, be discontinued, or that it is too early to judge? (please check one box per policy/instrument)

Unconventional policy or instrument:	(1) Remain an instrument	(2) Remain, but in modified form	(3) Be discontinued	(4) Too early to judge
(a) Policy rate(s) rate near zero	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(b) Negative interest rates (e.g., the policy rate or rate on deposits at central bank)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(c) Quantitative easing using government debt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(d) Quantitative easing using assets other than government debt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(e) Forward guidance about future monetary policy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(f) Macro-prudential policy*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(g) Other**	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* If so, please specify: _____

** If so, please specify: _____

(continued)

III. CENTRAL BANK COMMUNICATION

4. In your view, did your country's central bank communicate with the public *more* or *less* during and after the crisis than it had before? (please check one)

- much less
- somewhat less
- no change
- somewhat more
- much more
- difficult to say

5. If you answered anything other than "*no change*" or "*difficult to say*" just above, do you think these changes in communication should remain, be reversed, or be taken even further once conditions return to normal? (please check one)

- revert back completely
- revert back somewhat
- remain
- go even further
- too early to judge

6. Forward guidance is often classified as being either *calendar based* (or "time contingent"), *data based* (or "state contingent"), or purely *qualitative* (that is, providing neither a time frame nor economic conditions). Looking ahead, which type(s) of forward guidance do you believe would be most effective for your country's central bank? (please check as many as apply):

- Calendar based (time contingent)
- Data based (state contingent)
- Purely qualitative (neither time nor state contingent)
- None
- Other (please specify) _____
- Too early to judge

(continued)

IV. CENTRAL BANKS AND THEIR GOVERNMENTS

7. In its crisis-fighting efforts, how much criticism did your country's central bank get for acting politically or crossing the line into the political realm? (please check one)

- none
- a little
- a moderate amount
- a lot
- difficult to say

8. How much *independence* do you believe your country's central bank either relinquished, saw taken away from it, or gained during the crisis? (please check one)

- gained independence
- neither gained nor lost
- lost a little
- lost a lot
- difficult to say

9. How much is your country's central bank's independence threatened now or in the near-term future? (please check one)

- none
- a little
- a moderate amount
- a lot
- too early to judge

=====
Name: _____

Institution: _____

Thank you very much for participating in this survey!
The completed questionnaire may be returned to any one of these three addresses:

E-mail	Hard copy	Fax
	<i>Please mark envelope "Personal & Confidential"</i>	
Dr. David-Jan Jansen d.jansen@dnb.nl	Dr. David-Jan Jansen De Nederlandsche Bank Economics & Research Division PO Box 98 1000 AB Amsterdam The Netherlands	Dr. David-Jan Jansen De Nederlandsche Bank Economics & Research Division +31 – 20 524 2514