



HOW SHOULD CENTRAL BANKERS TALK ABOUT FUTURE MONETARY POLICY? LESSONS FROM THE CRISIS AND BEYOND

Donald Kohn
Hutchins Center on Fiscal and Monetary Policy at Brookings

*Note: This chapter will appear in “The Changing Fortunes of Central Banking,”
a book in honor of economist Charles Goodhart.*

Discussion of the likely evolution of the economy and monetary policy settings was an aspect of central bank communication for some time before the global financial crisis (GFC). It most often encompassed forecasts for the economy and inflation that economic agents could translate into an expected path for policy interest rates, but for a few central banks and under some circumstances it had gone further to at least give hints about the central bank’s expected path for its policy. During the GFC and sluggish recovery, forward guidance about future policy settings has become more widespread and more detailed and specific. That is because with the policy rate pinned near its effective lower bound (ELB), little scope existed to alter actual policy in order to affect expectations about future policy actions, and those expectations are critical to the effectiveness of policy. Moreover, at the ELB, meeting their objectives required the monetary authorities to react differently to incoming data and changing forecasts than they had in better times. So central banks have needed to rely on language to shape expectations and communicate that their reaction functions had shifted in particular ways.

I am going to concentrate my discussion on the experience of the United States Federal Reserve. I will put the discussion of the US in the context of some general principles about forward guidance. I will look at how forward guidance about future policy rates has evolved in the US and whether and how it was effective in shaping expectations and boosting demand as intended and how it might evolve further as policy rates slowly lift of the ELB. I am particularly interested in the intersection of the design of forward guidance and uncertainty. Uncertainty in the Knightian sense is far more pervasive than we economists and central bankers were aware of or admitted to in the pre-crisis great moderation period. In my view, that uncertainty, and the associated humility policymakers should feel about their ability to predict the future, should affect and be reflected in the nature of any forward guidance central banks offer on the future path of policy. Unless the limits of knowledge are recognised and acknowledged, repeated revisions of forward guidance could undermine confidence in the central bank and its ability to affect expectations with its words.

Uncertainty would seem to be especially incompatible with date-based forward guidance, which requires not only some sense of how economic relationships will evolve but also when—the timing of such an

evolution. The Federal Reserve took a number of steps toward more explicit date-based guidance when its policy rate was pinned near the ELB. It has backed off several of those as its policy rate has lifted off, but not all of them. In particular, the Federal Reserve still publishes the policy rate path each Federal Open Market Committee (FOMC) participant believes will best accomplish the committee's objectives conditioned on his or her individual expectations for labour markets and prices. The plot of the 'dots' used to indicate each participant's expected policy rate trajectory is a form of date-based guidance and seems to have induced policymakers and their observers to spend as much or more time discussing the timing of policy moves—e.g. next meeting, before the end of the year—as the conditions under which such moves might occur. As rates rise further above the ELB, the FOMC should find ways to convey the uncertainty underlying policymakers' expected path, to downplay implied timing, and to emphasise economic conditions and the potential response of policy to those conditions in its communications. I will conclude with some suggestions of the steps the FOMC might take to exit more fully from the date-based aspect of unconventional monetary policy at the ELB and shift more toward guidance based on forecasts of progress toward its goals.^{1,2}

FORWARD GUIDANCE

Central banks have become increasingly transparent about their views and analysis of key elements of monetary policy over the past few decades. The fundamental tenet behind this has been that markets work better and are more likely to be in synch with and reinforce the effects of central bank policies when economic agents understand how the monetary policymakers are expecting the economy to evolve and how policy is likely to respond. The most important element has been greater transparency about the objectives of monetary policy, in particular an inflation target—either set by governments or, for the ECB and the Fed, chosen by the central bank itself—to implement a legal mandate for price stability.

Forward guidance at the ELB

Until the GFC, central banks generally concentrated on informing observers about their predictions for the economy and inflation relative to their objectives for those variables, allowing market participants to infer the likely course of policy interest rates from the pattern of past central bank behaviour. Most central banks (the Federal Reserve was an occasional exception) shied away from explicitly forecasting their own actions, fearful that such predictions would be misleadingly interpreted as commitments rather than forecasts subject to correction in response to unexpected developments, possibly constraining or complicating the exercise of needed policy flexibility. In addition, as implicit and explicit inflation targeting

1 Although I have not found a direct reference to forward guidance per se in Charles Goodhart's writings, we can infer considerable skepticism about its practical value from two discussions of the interest rate conditioning assumption for central bank forecasts. In the first [Goodhart 2009] he points out a number of drawbacks to the monetary policy committee publishing its expected path for rates as a basis for its forecast: the difficulty of finding a consensus on a large and diverse committee; the risk of the public taking the path as more of a commitment than is intended, giving insufficient weight to uncertainty; problems with market participants giving too much weight to the central bank forecast and insufficient to their own judgments; opening the central bank to criticism when actual rates didn't follow the forecast; and constraining needed flexibility. In the second reference [Goodhart and Lim 2011], Charles and a co-author show that central bank forecasts (and market forecasts for that matter) are systematically biased and have no predictive value past two quarters.

2 The analysis and suggestions of this essay overlap to some extent with those in Feroli et al. 2016. My skepticism about the cost-benefit calculus of central banks giving specific information about expected future policy paths under most circumstances was also voiced in Kohn 2005.

took hold in a period of relatively benign economic conditions, agents seemed to be able to do a good-enough job of predicting central bank actions, and when they didn't policy authorities had plenty of scope to adjust their policy stances to correct and compensate.

As noted in the introduction, in the GFC and its aftermath, with policy rates close to or at their effective lower bounds for an extended period, more central banks started to discuss more explicitly their intentions for their policy interest rate—forward guidance.

Forward guidance is an attractive policy tool at the ELB. Monetary policy works importantly through the effects of expected policy actions on current financial conditions. Central banks have considerable experience over the years with this linkage and with the empirical evidence relating financial conditions to future spending and prices. In that regard, forward guidance about future policy rates is perhaps a more comfortable 'unconventional policy' than asset purchases, which work through term premiums and the central bank's balance sheet size and for which there is little precedent to gauge effects.

Moreover, central banks have needed to convey that their policy reaction functions were changing at the ELB, and forward guidance is a direct way of doing that. Unprecedented economic and policy conditions from 2008 on meant that policy reaction functions would need to adapt and past policy responses to price and activity indicators would not be good guides to likely policy choices.

For example, policy would need to compensate for a period of excessively tight conditions at the ELB when rates could not be cut substantially further and asset purchases by themselves were not enough to make up for this shortfall. Policy strategy would also need to take account of the benefits of speeding the return of output and employment to higher levels and inflation to target after the deep recession to avoid a drop in inflation expectations and to draw discouraged workers back into the labour force. Finally, policy trajectories would need to take account of asymmetric policy loss functions in which the costs of tightening more quickly than turned out to be called for were seen to be much higher and harder to correct near the ELB than the costs of being too slow, the inflation effects of which could always be corrected by a steeper trajectory of rate hikes. These policy influences argue for a reaction function that keeps interest rates lower for longer than might be implied by past responses to changing outlooks for economic activity and inflation and for tightening more gradually.

It is especially critical to achieving the central bank's objectives that at or near the ELB economic agents understand that reaction functions have indeed changed in this direction. If financial market participants start to build in a more rapid increase in policy rates than the policymakers think will be appropriate, the resulting increases in longer-term interest rates, declines in asset prices, and firming of exchange rates will tighten financial conditions and undermine the recovery in the economy and the return of inflation to its target level. Away from the ELB, policy can correct for this by easing unexpectedly, but of course this is not available at the ELB and words are the main way to correct such misperceptions.

Finally, the simultaneous use of multiple tools—asset purchases and current and expected interest rates—suggested that explicit discussion of each might reduce confusion about how each would be deployed and unwound, as happened in the taper tantrum of mid-2013.

Forward guidance comes in many varieties

Broadly, the policy committee can forecast its policy rate based on its projections for the economy, with the understanding that as the economy evolves so too will the trajectory of policy rates—the policy committee will re-optimize. Alternatively, the policy committee can commit to a particular course of action, say keeping rates lower for longer than a re-optimization process would suggest even if the economy follows its expected path. Either the forecast or the commitment can be tied to the passage of time or to evolving economic conditions.

Several economists writing about policy at the ELB have advocated a commitment strategy, in which the commitment is to be ‘irresponsible’ later by deliberately allowing inflation to overshoot its target for a time even after the economy has reached its potential [e.g. Woodford 2012]. The theory is that as agents come to expect the overrun, real interest rates are reduced further, speeding up the return to full employment and the inflation target. To be sure, some central banks have lived with or said they will live with a temporary overshooting of inflation targets. In the UK inflation was temporarily high after the GFC as the price level adjusted to the fall in Sterling and the MPC is predicting another overshoot in the wake of Sterling weakness after Brexit; in the US the Federal Reserve has said that it might expect to overshoot its inflation target temporarily so long as labour market slack persisted (the ‘balanced approach’ to its dual mandate.) And Federal Reserve policymakers have talked about running a ‘high pressure’ economy to repair damage to potential GDP from the GFC, which implies taking risks on the side of an inflation overshoot.

However, with the recent exception of Japan, policy committees have been reluctant to embrace a commitment to overshooting absent one of these special circumstances, fearing that the short term gains were uncertain and would be more than offset later by the costs of unanchoring inflation expectations. So almost all forms of forward guidance used have been conditioned on economic developments following their expected path and have envisioned inflation returning to its target value once the special circumstances have passed. Still, as discussed below, the Federal Reserve’s forward guidance has embodied elements of commitment—at a minimum to a different reaction function than had been followed in the past, and often to the passage of time, though this last commitment has usually been qualified.

Challenges for forward guidance

Monetary policymaking is a complex, subtle undertaking. It should be focused on attaining its objectives as expeditiously as possible consistent with macroeconomic stability. It needs to use all available information about likely progress toward its objectives, and that information should be interpreted through some sense of the underlying structure of the economy and relationships among key variables that is explained to the public. Policy explanations should include discussions of equilibrium values as well as of the forces pushing the economy toward those equilibriums or holding it back.

But, critically, all that is subject to revision as new information arrives in an uncertain world, and any explanations or expectations must take account of that uncertainty. New information will give insight on the evolving state of the economy and also on the end points—where it might be evolving to. The past eight years have been marked by a considerable degree of uncertainty in several dimensions. Among them

are how the interplay of financial factors, including debt-burdened balance sheets and impaired lenders, would affect the recovery from a very deep recession and how markets, households and businesses would respond to unprecedented monetary policy actions. Unusually, the past eight years have also seen a high degree of uncertainty about the degree of labour utilisation and growth rate of potential GDP, the relationship between the level of GDP and the change in inflation, and the level of interest rates consistent with the economy producing at full employment with stable inflation. Estimates of these key variables have been subject to considerable discussion and frequent revision [Bernanke 2016].

We have been in uncharted waters with unreliable anchors—circumstances beyond the experience of policymakers and economic agents. And all this uncertainty and change has occurred at a time when central banks have felt it necessary to supply more guidance about their expectations about the future path of their policy rates.

In addition, with so little history to guide decisions, monetary policy makers have had unusually diverse views and persistent disagreements about the appropriate policy to achieve agreed objectives. Disagreement on the policy committee is constructive, even necessary, to prevent ‘group think’, and any forward guidance should not be allowed to impede the discussion of these disagreements, internally or in the public. But they can interfere with giving a clean read on the path forward.

Finally, forward guidance about future policy rates can damp market reactions to incoming data and reduce volatility. Indeed, reducing market uncertainty is one of the channels through which forward guidance can ease financial conditions more broadly at the ELB and stimulate spending. But the challenge is to allow constructive, countercyclical, market reactions to come through—allow markets to tighten a bit when outcomes exceed the central bank’s expectations and ease when they fall short—and not to remove more uncertainty than is justified by the underlying understanding of the way forward. Reduced volatility can induce risk-taking in the form of higher leverage and greater maturity transformation that might have adverse implications for financial stability when market participants become overly confident they know the path of interest rates [Adrian and Shin 2008, 2014].

In these circumstances, finding the right balance between forecast and commitment, time and economic conditions, confidence and acknowledging uncertainty, and how to preserve the benefits of committee diversity while conveying a reasonably clear message has been challenging.

FEDERAL RESERVE FORWARD GUIDANCE

Evolution

The Federal Reserve’s forward guidance has evolved in response to shifting circumstances and to a little experimentation and learning while doing. Hints about which way the FOMC might be leaning in its policy considerations were incorporated into policy announcements as early as 1999 and into speeches and testimony of its chairman even before that. But these had very short horizons—often just the next meeting. The slow recovery from the recession of 2000-01 with both inflation and interest rates at unusually low

levels presented the FOMC with policy and communication challenges very similar to those it was to face after the GFC. The Committee in 2003 was concerned that market participants were expecting policy interest rates to follow the fairly steep upward path they had typically traced after previous recessions, and it saw the resulting longer-term interest rates and asset prices as running an unacceptable risk of deflation and prolonged high unemployment. So it cautioned market participants not to expect a rapid turnaround in rates after the trough of the recession and it subsequently wanted them to recognise that the committee's view of appropriate monetary policy encompassed an unusually flat upward rate trajectory ('at a pace likely to be measured'). This guidance was conditioned on the economy following its expected path. But market participants came to have firm expectations that 'measured pace' meant $\frac{1}{4}$ point each meeting and the Committee seemed to be locked into a commitment that some members found uncomfortable because it tended to damp market reactions to new information, and they were concerned that the predictability of the path of short-term rates would foster risky behavior in the financial sector, including the maturity transformation of the carry trade.

When its policy interest rate got to the ELB in the fall of 2008, the FOMC once again saw a need to caution economic agents that under the circumstances it expected the rate to stay there a long time—longer than some economists and market participants seemed to anticipate drawing on an historic pattern of sharp recoveries from deep recessions. The FOMC started with vague language about how long economic conditions were likely to warrant really low rates—'some time,' 'extended period.' By August 2011 it felt its vague guidance on how long very low rates would persist wasn't getting through effectively—markets had built in an earlier increase in rates than the FOMC considered to be appropriate for achieving its objectives. Effective communication of its intentions and its desire to promote better growth through more accommodative policy required more specific date-based forward guidance, and it noted that it expected conditions to warrant its highly accommodative policy to be maintained at least through mid-2013. As the recovery languished, the minimum end date was extended (in January 2012) to end 2014 and (in September 2012) to mid-2015. In each case the date was conditioned on the committee's expectations that economic developments would make that policy setting appropriate for that length of time. The January 2012 change in date coincided with the first publication of the dots marking each participant's view of the path of appropriate monetary policy. But the Committee felt that the explicit date in the its policy announcement would be clearer and carry more weight than a scatter of dots from all participants.

In December 2012, date-based forward guidance transitioned to guidance more based on economic conditions. Specifically, the committee said that it anticipated that the exceptionally low funds rate 'will be appropriate at least as long as the unemployment rate remains above 6-1/2 percent, inflation between one and two years ahead is projected to be no more than one-half percentage point above the committee's 2 percent longer term goal, and long-term inflation expectations continue to be well anchored.'³ The use of thresholds instead of only time would be a more explicit rendition of the committee's reaction function and should allow market prices to reflect the effect of changing economic conditions on the likely date of the first rate increase. Still, the FOMC didn't abandon time-based guidance in that it noted in December that these thresholds were consistent with its earlier time-based guidance. In this and

3 The threshold approach had been championed by Charles Evan, president of the Chicago Federal Reserve bank and explained in Campbell et. al. 2012.

subsequent announcements it also indicated that highly accommodative policy would remain appropriate for a ‘considerable time’ after asset purchases ended and the economic recovery strengthens. And it has continued to publish the dots with their explicit time dimension, reinforced in the fall of 2014 by publishing the median of the dots, and emphasising the shifting time-based pattern of participants’ rate expectations in its communications.

Effect

A number of studies have examined the effect of Federal Reserve forward guidance in the past several years on financial markets. Those studies tend to look at the response of interest rates and asset prices in a window around announcements. Isolating the effects is complicated by the fact that in some cases new forward guidance was accompanied by other policy actions, like added asset purchases. In addition, some of the changes may well have been anticipated by markets, so the effects preceded the announcement. Still, the studies show that announcements generally reduced the expected path for the federal funds rate over the next several years—they were effective in that regard, with much smaller, if any, effects on expected rates further out or on private borrowing costs [e.g. Swanson 2016]. The specific date-based guidance seems to have had the largest effects.

But expected policy rates can fall for several reasons. What forward guidance generally has been trying to convey is that policy rates will be lower relative to actual and expected economic conditions than market participants had anticipated—that the reaction function and policy strategy have shifted. But expected rates can also decrease if market participants believe the central bank has an advantage in forecasting and the more accommodative forward guidance conveys information that the economy and prices will be weaker than market participants had projected. In the latter case the central bank’s words can depress demand, so the effectiveness of forward guidance at the ELB depends on the dominance of the expected shift in reaction function [Woodford 2012].

The studies that have tried to ascertain the effects of the Federal Reserve’s forward guidance on economic outcomes and market perceptions of the reaction function have generally found that it has been somewhat successful. Two model based studies have detected positive effects on output and inflation [Del Negro et al. 2012, Becker and Smith 2015]. Two other studies have used the configuration of forecasts of interest rates, activity, and prices in surveys of primary dealers and economists more generally to ascertain perceptions of the FOMC’s reaction function. One found that forward guidance, along with asset purchases, has been effective at getting through the message that the Federal Reserve was putting more emphasis on economic slack than it had before the GFC [Engen et al. 2015]. The other found that market economists expected lower levels of unemployment for any given level of inflation [Femia et al. 2013].

So forward guidance has worked in the sense of signaling a different reaction function than market participants had been expecting and one more in keeping with achieving the Federal Reserve’s objectives. It has also tended, however, to damp volatility and market reactions to incoming data, though this could be at least partly a consequence of the constraints of the ELB, where rate risks are one-sided [Feroli et al. 2016; Williams 2016].

Forward guidance does not appear to have materially constrained policymaking—to have reduced flexibility to make needed policy adjustments. That, however, may be partly due to the circumstances that have prevailed; in particular, the repeated downward revisions in expected growth, in the unemployment rates consistent with stable inflation, and in the likely value of the policy interest rate at equilibrium, implied a later and flatter rate trajectory. That is, the FOMC never was tempted to raise interest rates before its commitment to keep them near zero had expired.

But the persistent changes in the date-based forward guidance and then in the path for the funds rate implied by participants' rate expectations, may have damaged the Federal Reserve's reputation and confidence in its analysis [Feroli et al.]. Even the economic conditions based guidance of the thresholds proved a poor guide to policy action: The unemployment rate was a full 1-1/2 percentage points below the threshold when rates were first raised. And casual observation would suggest that much of the discussion of monetary policy in the media centers around the dates on which policy might be tightened—the next meeting, how many times before yearend—often driven by the configuration of the dots, not the underlying forces shaping policy. Even the chair's carefully reasoned speeches about policy strategy are examined mostly for any clues about near-term rate prospects.

It is difficult to give useful forward guidance in an uncertain economic environment. A diverse committee is trying to shape the expectations of a market that itself is driven by diverse investors influenced by herding and other behaviour not necessarily linked to a sober assessment of monetary policy strategy considerations. Market participants want to know with more specificity and commitment what the monetary policymakers will do and when they will do it than the policymakers themselves can usefully tell them [Kohn 2005].

CONCLUSIONS AND RECOMMENDATIONS

Date-based forward guidance was effective at the ELB in changing expectations and assessments of the Federal Reserve's reaction function. And it has a place when interest rates and asset prices reflect market expectations greatly at odds with those of the central bank and central bank options to deal with those expectations are limited by the ELB. But it is difficult to convey with the appropriate degree of uncertainty and can constrain needed policy flexibility. And it has some possible costs in damping reactions to the implications of incoming data for the outlook, promoting excessive risk taking, and reducing confidence in the central bank when it is frequently revised. So, time references should be rare and mostly vague or general, in keeping with the limit of our knowledge.

The most useful information for economic agents is a sense of the policy strategy and the policy committee's view relating that strategy to its expectations for the evolution of the economy. That reaction function is hard to convey in a few sentences or in a formula using a limited set of actual or forecasted variables. Reaction functions are best spelled out in monetary policy reports, testimonies, and speeches, where conditionality or commitment can be explained along with the policymakers' understanding of the economic dynamics.

The Federal Reserve has appropriately backed off specific time-based guidance as policy rates have lifted off the ELB. But elements of time based guidance persist in general references in its announcements ('gradual,' 'some time'). And those dots keep focus in the markets and in the public statements of some FOMC participants on dates rather than conditions for rate adjustments.

I start from the presumption that the dots are here to stay; removing them would be seen as a step back in transparency and, appropriately presented, they can be aids to understanding. My recommendations to the Federal Reserve center on reducing the remaining weight on time-based forward guidance to align it better with underlying uncertainty and on increasing the attention to helping people understand the reaction function.

1. Stop publishing the median of the dots; it is not necessarily a good representation of the committee's center of gravity given the small size of the FOMC, and it greatly increases attention to a narrow path for rates.
2. Find some way to indicate uncertainty around the expectations for appropriate policy. That is not easy because those dots represent as many as 19 different forecasts each with its own uncertainty, but it is vital to come up with some way of indicating the broad range of possibilities in an uncertain world. The fan charts that the MPC at the Bank of England uses in its inflation report graphically illustrate the range and subjective probability of possible outcomes, albeit drawn from a very different type of forecasting exercise.
3. Deemphasise the implied path for rate increases over the next year or two in the official pronouncements of the Federal Reserve and the press conferences of the chair. To be sure shifts in the dots have been useful to understanding and highlighting underlying changes in FOMC participants' assessment of the economy and inflation, but more useful would be a direct discussion of those changes with reduced emphasis on the specific time path of policy.
4. Similarly, in their speeches and media appearances, FOMC participants should agree to downplay the time dimension of policy—whether rates should go up next meeting, or how many times they might rise this year—and instead highlight their read on the economic circumstances that should trigger rate changes and how they see the situation developing economically. They should refocus the discussion to what good forward guidance should be about—the strategy of monetary policy. The financial cable networks won't like it, but the Federal Reserve and the markets will benefit.
5. The dots are part of a broader projection exercise in which each FOMC participant gives a projection of inflation, unemployment, and growth. The FOMC should identify—not by name—which dots go with which economic forecasts. This would, in effect, give observers an opportunity to infer individual participants' reaction functions; it should help economic agents to infer the Committee's reaction function more accurately than simply looking at median of multiple forecasts.
6. Finally, the Federal Reserve should use the semi-annual monetary policy report to better explain and focus on its broad strategy. I have previously advocated that the MPR include the material that has gone to the FOMC on policy rules [Kohn and Wessel 2016]. For some time, as an input to its

policy process, the Committee has been shown the results of a number of policy rules based on both incoming data and economic forecasts. And this material has been accompanied by explanations of why the current and expected settings of monetary policy might deviate from the rules. My proposal to present this discussion was intended to counter legislative proposals to require the Federal Reserve to publish and a policy rule, explain any time it deviated, and subject those deviations to review by a Congressional agency. But it would also serve as a jumping off place for a discussion of broad strategy, which might help focus more attention there and less on the date of the next policy action.

REFERENCES

- Adrian, T. and H.S. Shin 2014. 'Procyclical Leverage and Value-at-Risk', *The Review of Financial Studies* 27(2): 373-403.
- Adrian, T. and H.S. Shin 2008. 'Financial Intermediaries, Financial Stability and Monetary Policy'. Paper presented at the Federal Reserve Bank of Kansas City Economic Policy Symposium, Jackson Hole WY, August.
- Becker, T. and A.L. Smith 2015. 'Has Forward Guidance Been Effective?' *Federal Reserve Bank of Kansas City Economic Review* Q3: 57-78.
- Bernanke, B. 2016. 'The Fed's Shifting Perspective on the Economy and its Implications for Monetary Policy', *Ben Bernanke's Blog*, August. www.brookings.edu/blog/ben-bernanke/2016/08/08/the-feds-shifting-perspective-on-the-economy-and-its-implications-for-monetary-policy/
- Campbell, J.R., C.L. Evans, J.D.M. Fisher, and A. Justiniano. 'Macroeconomic Effects of FOMC Forward Guidance', *Brookings Papers on Economic Activity*, Spring 2012.
- Del Negro, M., M.P. Giannoni and C. Patterson 2012. 'The Forward Guidance Puzzle', *Federal Reserve Bank of New York Staff Reports* no. 574. Revised December 2015.
- Engen, E.M., T. Laubach and D. Reifschneider 2015. 'The Macroeconomic Effects of the Federal Reserve's Unconventional Monetary Policies', *Board of Governors of the Federal Reserve System Finance and Economics Discussion Series* 2015-005.
- Femia, K., S. Friedman and B. Sack 2013. 'The Effects of Policy Guidance on Perceptions of the Fed's Reaction Function', *Federal Reserve Bank of New York Staff Reports* no. 652.
- Goodhart, C.A.E. and W.B. Lim 2011. 'Interest Rate Forecasts: A Pathology', *International Journal of Central Banking* 7 (2): 135-171.
- Goodhart, C.A.E. 2009. 'The Interest Rate Conditioning Assumption', *International Journal of Central Banking* June: 85-108.
- Feroli, M., D. Greenlaw, P. Hooper, F.S. Mishkin, and A. Sufi 2016. 'Language after Liftoff: Fed Communication Away from the Zero Lower Bound'. Paper presented at the University of Chicago US Monetary Policy Forum, New York, February.
- Kohn, D. and D. Wessel 2016. 'Eight Ways to Improve the Fed's Accountability'. Bloomberg View, February. www.bloomberg.com/view/articles/2016-02-09/eight-ways-to-improve-the-fed-s-accountability
- Kohn, D. 2005. 'Central Bank Communication'. Proceedings of the Annual Meeting of the American Economic Association, Philadelphia, January.
- Swanson, E.T. 2016. 'Measuring the Effects of Federal Reserve Guidance and Asset Purchases on Financial Markets'. www.ericswanson.us/papers/facts3.pdf
- Williams, J.C. 2016. 'Discussion of 'Language After Liftoff: Fed Communication Away from the Zero Lower Bound''. Proceedings of the University of Chicago US Monetary Policy Forum, New York, February.
- Woodford, M. 2012. 'Methods of Policy Accommodation at the Interest-Rate Lower Bound'. Paper presented at the Federal Reserve Bank of Kansas City Economic Policy Symposium, Jackson Hole WY, August.