

SPEECH

## **Dinner Address for the Bank of England-Federal Reserve Bank of New York Conference on Money Markets and Monetary Policy Implementation**

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#### **Introduction<sup>1</sup>**

It is a pleasure to have the opportunity to give the address at tonight's dinner. I would like to start by thanking the Bank of England for hosting this conference on money markets and monetary policy implementation. It's hard to think of a better place to discuss these topics than just steps away from the historic Lombard Street, described in Bagehot's classic book on money markets.<sup>2</sup> I also want to thank all of you for actively participating in today's discussions. One thing I particularly enjoyed about the event was the interaction among market practitioners, central bankers, and researchers. I think the diversity of perspectives that these groups bring contributes to a fruitful dialogue that can help lead to more informed choices and decisions. I will come back to this point. But before I go on, let me remind you that the views I express are my own and may not reflect the views of the Federal Reserve Bank of New York or the Federal Reserve System.

The topic of this conference may not appear particularly glamorous. It is natural to view monetary policy implementation as a technical and humble exercise next to the flashiness of policy formulation, which has policymakers determining the appropriate level of interest rates. However, for those of us charged with carrying out policymakers' decisions, there is keen interest in the mechanics. We have the task of designing and executing operations that ensure that policymakers' instructions are implemented effectively and efficiently, so that their intentions can affect inflation and the real economy. But while monetary policy implementation is just a means to an end, there is no obvious single "right" way to do it, and every central bank's operating framework reflects history, unique institutional constraints and the market environment, which may change over time.

So even though the topic of today's conference may seem to lack glamour, it is significant, particularly now, since monetary policy implementation and the market landscape have undergone profound changes in recent years. Many advanced economy central banks have adopted a number of new tools to implement monetary policy or used traditional tools in new ways or in unprecedented size, in part because economic conditions have necessitated historically low interest rates that have bumped up against the zero bound for almost seven years. One result is that the balance sheets of central banks in many advanced countries are now much larger than the amount of currency in circulation, which raises new questions and, perhaps, challenges.<sup>3</sup>

We have also seen important changes in money markets, which we can define as wholesale markets for low-risk, highly liquid, short-term IOUs—including central bank liabilities, which are among the highest quality assets traded in these markets. For centuries, money markets have played a central role in financial intermediation. These are the markets in which central banks traditionally operate and from which the monetary policy impulse is transmitted. Although their role hasn't fundamentally changed, modern money markets look quite different today than they did during Bagehot's time and even just ten years ago. The pace of change has been remarkable following the financial crisis, mainly because of exceptional monetary policy measures and new regulations. Changes in market structure and regulation have implications for monetary policy implementation, and today's discussion provided some interesting insights on these topics.

This combination of changes in money markets and new policy tools, as well as observations on how central banks' operating frameworks did or didn't work during the financial crisis, suggests that those of us responsible for monetary policy operations should be researching and analyzing how monetary policy will be implemented in the years to come. What are the lessons from the crisis and the long period spent at the zero bound and how do these lessons change our views regarding monetary policy implementation? These are questions that many central banks are currently facing, particularly in advanced economies. They are certainly relevant for us at the Federal Reserve as we begin our own efforts to think about a long-run framework for monetary policy implementation.<sup>4</sup>

In my remarks tonight, I would like to give you my views on the significant issues, and the questions I believe deserve further study. I also want to emphasize how important it is for those of us charged with monetary policy implementation to seek broad engagement on these issues, particularly in our effort to better understand how our money markets function and how best to implement monetary policy in these markets.

## Motivation and Background

Why should we think hard about issues related to monetary policy implementation? After all, central banks could always go back to the frameworks they used before the crisis. In the case of the Federal Reserve, the pre-crisis framework worked well at targeting the federal funds rate and we have high confidence that a similar system could work again in the future. But can we do better?<sup>5</sup> In light of recent experience and changes, are there more effective, transparent, or flexible implementation frameworks that would give policymakers capacity to better steer the economy in the direction they need to satisfy their mandate?

Recent experience suggests that the Federal Reserve's new tools—interest on reserves and term deposits<sup>6</sup>—as well as its application of old tools towards new purposes—fixed-rate reverse repos and large-scale outright security purchases—can be very helpful, but we can probably still learn more about how best to employ them. We can benefit collectively from studying the impact of differences in the implementation of similar tools across central banks.<sup>7</sup> For example, “quantitative easing,” known shorthand as QE, originates with the Bank of Japan's (BoJ) efforts to stimulate inflation in the early 2000s at the zero bound. In this effort, they targeted the money base and conducted temporary operations and short-term securities purchases to accomplish that liability-driven operating objective. Because the maturity structure of the BoJ's assets remained relatively short, the bank was able to run down the size of its balance sheet to a more normal level relatively rapidly when it came time to do so and then raise rates using standard implementation tools. In contrast, in the United States and other countries, including Japan, QE is now associated with targets for longer-term asset purchases and extending portfolio duration, to put downward pressure on long-term interest rates. Policy normalization will need to proceed in a different way than it did in Japan in the mid-2000s if most of the additional assets, and the reserve balance liabilities created as a byproduct of their acquisition, remain on the central bank's balance sheet until they mature in the far future. In this case, waiting for the passive runoff of the additional assets alone may not be a viable interest rate implementation strategy. Depending on the details of the operating framework and money market structure, other tools might be needed—at least for some time—to control overnight interest rates above the zero bound while the size of the balance sheet remains elevated. What we learn about these tools through the period of normalization could prove useful when we think about our long-run framework.

Central bankers around the world have been innovative in developing tools to address recent challenges and to prepare to normalize their operations, and overall, the set of implementation options at our disposal may be much broader than we thought before the crisis. So let's fully explore the operational issues underlying these options. A deeper understanding will help inform the choices policymakers need to make in order to meet their goals.

Now seems like a particularly good time to start such an effort, for several reasons. First, we need to digest the lessons from the recent crisis with respect to monetary policy implementation and money market functioning, and it is best to do so while the experience is still fresh in our minds. Second, while the Federal Reserve has great confidence that our normalization framework will be effective at allowing us to raise money market interest rates when the Federal Open Market Committee (FOMC) determines it is appropriate, we expect to learn a lot about how money markets react to that framework as we move away from the current very low interest rates with a large amount of reserves in the banking system. We can then incorporate knowledge gained during our post-liftoff experience into our thinking.

We have the benefit of not starting from scratch in this effort. There already exists a rich academic literature on monetary policy implementation frameworks, and we saw some relevant examples this morning. This literature dates at least back to the late 1960s, when Bill Poole developed a model that is still being used today.<sup>8</sup> Recent developments have revealed that our money markets are not frictionless, and current research incorporates this reality of market segmentation. Some of the papers we have seen today try to contend with the effects of new regulation,<sup>9</sup> or try to model impediments to trade in the form of preferred habitat frictions<sup>10</sup> or search frictions.<sup>11</sup> These new models provide fresh insights and can also be useful for us in communicating with academics and market experts. These improvements are notable because they represent a significant departure from views that were espoused a few decades ago.<sup>12</sup> Much research before the crisis put too much faith in market efficiency and spent too little time exploring the detailed plumbing of the financial system.<sup>13</sup> Empirical work can also contribute to our thinking about monetary policy implementation. What more can we learn about the relationship between different money markets, such as the spreads between various secured and unsecured rates?<sup>14</sup> How much should we care about volatility in money markets and how does that volatility affect the monetary policy outcome? We saw some interesting work on the topic today.<sup>15</sup>

In the United States, we also have the benefit of internal work, now public, that we undertook previously. The Federal Reserve had started to examine ways to improve its policy implementation framework before the crisis. Analytical work between 2006 and 2008 provides a solid foundation from which to build. As you may recall, in 2006 Congress granted the Federal Reserve the authority to pay interest on reserve balances held by depository institutions, and this authority was originally set to become effective in 2011.<sup>16</sup> We went to work to try to understand how best to employ this new tool. The focus of that work was on operating regimes to target the fed funds rate. Basically, it considered several variants of corridor and floor systems. The financial crisis interrupted this work, and it was not completed as had been intended.

The lessons from the crisis suggest that the implementation framework needs to be considered more broadly. For example, in the 2008 work, we did not think about the zero bound very much. Yet we have now been at or near zero for nearly seven years, and many other countries are in a similar situation. So we need to incorporate these new dimensions, and the lessons from the experience of other central banks, in our analysis. Another thing that was not taken into account enough in the 2008 work was the complexity of U.S. dollar money markets, both on- and offshore. In particular, we did not anticipate that frictions in our money markets would limit the arbitrage that would keep market rates in line with the rate of interest we pay on excess reserves by such an extent, leaving many money market interest rates well below the rate of interest paid on excess reserves (IOER), contrary to what theory would suggest. Meanwhile, we learned a lot about the behavior of money market participants during the crisis, and we continue to observe how money market trading dynamics are evolving in response to changes in the market environment.<sup>17</sup>

The Federal Reserve's balance sheet is much larger than we would have ever anticipated before 2008. To give you an idea, prior to the crisis, a few tens of billions of excess reserve balances was considered a large supply for a floor system.<sup>18</sup> Today, the Federal Reserve, in addition to currency and capital, has around \$3 trillion of liabilities outstanding, most of which are in the form of excess reserves held in the banking system. We have also seen changes in markets since the crisis and expanded the set of our counterparties for certain operations in ways that were not contemplated in our prior work. These developments have implications for determining the appropriate level of reserves in a future framework.

## Looking Ahead

As Ulrich Bindseil noted in his excellent book, even if one thinks that implementation details aren't ultimately very important to the transmission of monetary policy, they may well have implications for important aspects of the financial markets, such as the cost effectiveness of banks' liquidity management, bank business and funding models, and financial stability.<sup>19</sup> So these considerations should influence the type of questions we ask ourselves when it comes to improving the operating frameworks of central banks. We should, of course, consider the traditional parts of an operating framework, for example, possible interest rate targets and the mechanisms used to achieve the target. But recent experience strongly suggests that we need to consider options beyond just a classic interest rate targeting regime that's based on a scarcity of reserve balances. We will need to think about the composition and structure of our balance sheet on both the asset and liability sides.<sup>20</sup> This consideration will be important should large-scale asset purchases (LSAPs) become a more standard tool for central banks, which could happen if lower levels of equilibrium real rates imply an increasing frequency of very low overnight rates. Further, some analysts have argued that there might be a role for balance sheet policies away from very low interest rates in supporting the macroeconomic and macroprudential objectives of central banks.<sup>21</sup>

That said, a large central bank balance sheet relative to currency in circulation raises a number of questions about the monetary authority's footprint in money markets, which some policymakers say presents potential risks to central bank independence.<sup>22</sup> A large footprint may also increase the central bank's role in money markets in ways that are difficult to anticipate and that may prove to be undesirable.<sup>23</sup> One simple principle for monetary policy implementation regimes is to avoid structures where central bank intermediation crowds out activity that private participants can do more effectively and efficiently. Applying this principle is not simple, since expectations of central bank interventions affect private incentives and can produce changes in the structure of markets.<sup>24</sup> So central banks need to be mindful of potential unintended consequences of their implementation regimes. This prudence is well captured in the FOMC's Policy Normalization Principles and Plans, released in September 2014, which note that, in the long run, the Fed's balance sheet should be no larger than necessary for the effective and efficient implementation of monetary policy and should consist primarily of Treasury securities.<sup>25</sup>

We also need to make sure that the impulse of monetary policy is transmitted effectively to the real economy. Given the growing importance of nonbanks in many money markets, especially in the U.S. dollar markets, we should think about the counterparties with whom we interact. Would expanding the types of counterparties that we do business with increase the effectiveness of monetary policy? What are the costs and benefits of interacting with counterparties beyond our traditional set?

Any long-run monetary policy implementation framework should be assessed relative to goals. That assessment may be informed by recent experience. For example, a framework should allow us to achieve an appropriate degree of control over short-term rates, both in normal times and during periods of financial distress. It should also be as robust as possible to potential structural changes in the financial system. The framework should enhance our ability to achieve macroeconomic objectives at very low or even negative interest rates. Further, it might be important to consider the framework's ability to address liquidity strains in money markets and to support overall financial stability.

Other concerns could include the burdens and deadweight losses associated with reserve requirements, the implications of the framework for the efficiency and resilience of money markets and government securities markets, and the framework's ability to help support the efficiency and resilience of payment systems.

## Conclusion

I want to conclude by saying a few more words about the value of engaging broadly with the public, with market participants, with researchers both in central banks and in academia, and with our global central bank counterparts. The issues we will have to tackle are important and complex, and there is much to gain from different points of view. Market participants can provide a deeper understanding of financial market dynamics and shed necessary light on the impact and limitations of monetary policy on a practical dimension. As we saw today, researchers can provide empirical analysis as well as models that help us think about the impact and effectiveness of different tools or policies. Whether they work in central banks or academia, they provide a perspective that we need to take into account when thinking about our long-run framework. And, of course, we can learn from our peers in policymaking and on markets desks at other central banks. We may have tried things that worked very well, or did not work so well, and comparative experience can be extremely valuable. Forums like this, which bring together a range of experts from different areas, can help advance our understanding of the important issues we will have to face.

So, I hope to see more of this type of engagement going forward. We have a unique opportunity to think very broadly about the issues that will confront us in the foreseeable future. We should seek diverse perspectives and be open to new ideas and perspective.

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<sup>1</sup> I would like to thank Deborah Leonard and Antoine Martin for their excellent assistance in the preparation of these remarks and colleagues in the Federal Reserve System and global central bank community for their insightful comments and suggestions.

<sup>2</sup> Walter Bagehot, *Lombard Street: A Description of the Money Market* (London: Henry S. King, 1873). While Bagehot is often remembered for his advice regarding lender-of-last-resort policy, most of his book provides a careful study of money markets, which is our current focus.

<sup>3</sup> Central banks that maintain large foreign exchange reserves may also have balance sheets that far exceed currency in circulation. This is more typical in emerging markets, where domestic currency money markets tend to be less mature.

<sup>4</sup> An extended effort to evaluate potential long-run monetary policy implementation frameworks was announced in the July 2015 FOMC meeting minutes.

<sup>5</sup> For example, some have suggested that the Federal Reserve could target a repo rate, rather than the federal funds rate (see Bernanke, or Gagnon and Sack). Targeting a repo rate could have some benefits, but may entail a number of complications, so more work would be necessary to evaluate the potential consequences of such a change.

<sup>6</sup> Although the Federal Reserve only recently introduced these instruments, versions of interest on reserves and term deposits are standard components of some other central banks' implementation toolkits.

<sup>7</sup> For example, there is much to learn from the experience of the central banks that have implemented negative rates recently. It is important to note that, with the exception of the Swiss National Bank, the implementation of negative rates did not require any changes in these central bank's respective frameworks for policy implementation, although some legal and operational work was required.

<sup>8</sup> William Poole, "Commercial Bank Reserve Management in a Stochastic Model: Implications for Monetary Policy," *Journal of Finance* 23, no. 5 (1968): 769-91.

<sup>9</sup> See Christopher Jackson and Joseph Noss, "A Heterogeneous Agent Model for Assessing the Effects of Capital Regulation on the Interbank Money Market under a Corridor System," Bank of England *Working Papers*, no. 548, September 2015, as well as Morten L. Bech and Todd Keister, "Liquidity Regulation and the Implementation of Monetary Policy," *BIS Working Papers*, no. 432, October 2013. See also Bank for International Settlements Committee on the Global Financial System and Markets Committee, "Regulatory Change and Monetary Policy," *CGFS Papers*, no. 54, May 2015.

<sup>10</sup> See Jim Clouse, Jane Ihrig, Elizabeth Klee, and Han Chen, "The Federal Reserve's Tools for Policy Normalization in a Preferred Habitat Model of Financial Markets," Board of Governors of the Federal Reserve System *Finance and Economics Discussion Series*, no. 2014-83, October 2014.

<sup>11</sup> See Ben Lester and Roc Armenter, "Excess Reserves and Monetary Policy Normalization," Federal Reserve Bank of Philadelphia working paper no. 15-35, August 2015.

<sup>12</sup> For example, Marvin Goodfriend and Robert G. King argued in 1988 that "today's financial markets provide a highly efficient means of allocating credit privately. On the basis of such considerations, we find that it is difficult to make a case for central bank lending and the regulatory and supervisory activities that support it." See "Financial Deregulation, Monetary Policy, and Central Banking," Federal Reserve Bank of Richmond *Economic Review*, May-June 1988.

<sup>13</sup> For example, the work prepared by Federal Reserve staff in 2008 to assess possible use of the authority to pay interest on reserves (IOR) did not deal with the fact that some institutions cannot earn IOR, so it did not contemplate that this rate may not

serve as a firm floor; see <http://www.federalreserve.gov/foia/files/20080411.IoR.FOMC.Options.paper.public.pdf>. More recent work explicitly considers frictions that limit the effectiveness of IOR to serve as a floor and explores other tools that can support money market interest rates. See, for example, Antoine Martin, James McAndrews, Ali Palida, and David Skeie, “Federal Reserve Tools for Managing Rates and Reserves,” Federal Reserve Bank of New York *Staff Reports*, no. 642, September 2013.

<sup>14</sup> In the case of the United States, more research on the relationship between the Eurodollar rate, the federal funds rate, and the repo rate could provide insights on the functioning of our money markets.

<sup>15</sup> See Matthew Osborne, “Monetary Policy and Volatility in the Sterling Money Market,” paper presented at the Bank of England-Federal Reserve Bank of New York conference, “Money Markets and Monetary Policy Implementation,” November 16-17, 2015.

<sup>16</sup> The implementation date was accelerated to October 2008 during the financial crisis to enhance the Federal Reserve’s ability to control short-term interest rates.

<sup>17</sup> To support the implementation of monetary policy and the analysis of money market conditions, the Federal Reserve began collecting transaction-level data on federal funds, Eurodollars, and certificates of deposits from a large set of domestic banks and agencies of foreign banks operating in the United States on April 1, 2014. In February 2015, the New York Fed announced plans to begin using the new data to calculate the daily federal funds effective rate and to begin publishing an overnight bank funding rate based on transactions in both federal funds and Eurodollar markets. See [http://www.newyorkfed.org/markets/opolicy/operating\\_policy\\_150202.html](http://www.newyorkfed.org/markets/opolicy/operating_policy_150202.html) and <http://libertystreeteconomics.newyorkfed.org/2015/04/the-fr-2420-data-collection-a-new-base-for-the-fed-funds-rate.html>.

<sup>18</sup> A staff memo from 2008 suggested that in a floor system the level of excess reserves “might be on the order of \$35 billion but could be larger on some days.” For context, at the time, a number like \$150 billion would have been held up as an extremely large level of excess reserves, well beyond anything we might have seriously considered as the level of reserves needed to implement a floor on rates. See <http://www.federalreserve.gov/foia/files/20080411.IoR.FOMC.Options.paper.public.pdf>.

<sup>19</sup> Ulrich Bindseil, *Monetary Policy Operations and the Financial System* (Oxford: Oxford University Press, 2014).

<sup>20</sup> Central bank assets include securities held outright or under repurchase agreements, as well as credit extensions and foreign currency-denominated assets. Central bank liabilities include currency, reserve balances, term deposits held by depository institutions, and reverse repos.

<sup>21</sup> For example, a large supply of “money-like” assets provided by the official sector could crowd out some short-term private sector liabilities, reducing the amount of maturity transformation in the financial system and improving financial stability. See, for example, Mark Carlson, Burcu Duygan-Bump, Fabio Natalucci, William R. Nelson, Marcelo Ochoa, Jeremy Stein, and Skander Van den Heuvel, “The Demand for Short-Term, Safe Assets and Financial Stability: Some Evidence and Implications for Central Bank Policies,” Board of Governors of the Federal Reserve System *Finance and Economics Discussion Series*, no. 2014-102, November 2014.

<sup>22</sup> Maintaining a large balance sheet in normal times may be perceived as a “slack” variable that invites policymakers to use it for non-monetary policy objectives. See, for example, [https://www.philadelphiafed.org/publications/speeches/plosser/2010/09-24-10\\_swiss-national-bank](https://www.philadelphiafed.org/publications/speeches/plosser/2010/09-24-10_swiss-national-bank).

<sup>23</sup> For a discussion of footprint considerations in the design of the Federal Reserve’s overnight reverse repo operations, see Joshua Frost, Lorie Logan, Antoine Martin, Patrick McCabe, Fabio Natalucci, and Julie Remache, “Overnight RRP Operations as a Monetary Policy Tool: Some Design Considerations,” Federal Reserve Bank of New York *Staff Reports*, no. 712, February 2015.

<sup>24</sup> For example, a money market mutual fund could choose to restrict its investments only to overnight reverse repurchase agreements provided by the Federal Reserve if it believed these instruments would continue to be supplied in the far future.

<sup>25</sup> See <http://www.federalreserve.gov/newsevents/press/monetary/20140917c.htm>.

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