

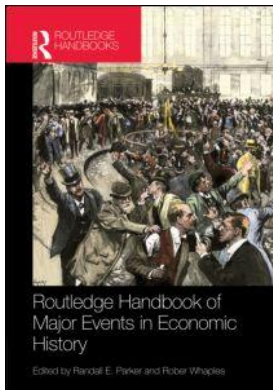
This article was downloaded by: 10.3.97.143

On: 02 Dec 2023

Access details: *subscription number*

Publisher: *Routledge*

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: 5 Howick Place, London SW1P 1WG, UK



## **Routledge Handbook of Major Events in Economic History**

Randall E. Parker, Robert Whaples

### **Monetary policy in 2008 and beyond**

Publication details

<https://www.routledgehandbooks.com/doi/10.4324/9780203067871.ch32>

W. Douglas McMillin

**Published online on: 28 Jan 2013**

**How to cite :-** W. Douglas McMillin. 28 Jan 2013, *Monetary policy in 2008 and beyond from:*  
Routledge Handbook of Major Events in Economic History Routledge

Accessed on: 02 Dec 2023

<https://www.routledgehandbooks.com/doi/10.4324/9780203067871.ch32>

**PLEASE SCROLL DOWN FOR DOCUMENT**

Full terms and conditions of use: <https://www.routledgehandbooks.com/legal-notices/terms>

This Document PDF may be used for research, teaching and private study purposes. Any substantial or systematic reproductions, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The publisher shall not be liable for an loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

## 32

MONETARY POLICY IN  
2008 AND BEYOND<sup>1</sup>

*W. Douglas McMillin*

The financial crisis that began in 2007 led to serious impairment of the functioning of financial markets worldwide and contributed significantly to the recession of 2008–2009 experienced by the world's major economies. Monetary policymakers responded initially in a conventional way by cutting interest rate targets and by making borrowing from existing lending facilities more attractive, but, as the crisis intensified and the recession deepened, monetary policy makers began to employ more unconventional tactics. This chapter discusses the monetary policy actions undertaken by major central banks during the crisis and some of the implications of the crisis for post-crisis monetary policy.

### Central bank response

#### *Channels of monetary policy and policy tools*

Before discussing central bank responses to the crisis, it is useful to briefly describe how the effects of monetary policy are transmitted to the economy and the policy tools of central banks. Monetary policymakers set a target for a short-term (often overnight) interest rate like the federal funds rate and then use open market operations (the purchase and sale of securities) to adjust the volume of reserves in the banking system and move the actual value of the short-term rate to the target level. As described in the liquidity-premium hypothesis of the term structure of interest rates, longer-term interest rates are averages of current and expected future short-term interest rates plus a liquidity premium that reflects the higher interest rate risk of the longer-term security. A decrease in the short-term interest rate, especially a decrease that is expected to persist for some time, leads to a decrease in longer-term interest rates that in turn leads to an increase in consumer durables and investment spending. Chung et al. (2011) estimated that in the U.S. for the 1987–2007 period a 100 basis point (1 percent point) cut in the federal funds rate was associated with a 25 basis point (BP) decline in the yield on 10-year Treasury bonds. Further, a decrease in interest rates leads to a depreciation of the foreign exchange value of the domestic currency and an increase in the prices of assets like stocks, land, and houses; these changes reinforce the interest rate induced increase in spending.

Open market operations (OMO) are the most important monetary policy tool. When the central bank buys (sells) securities from (to) the public, it credits (debits) the reserve account at the central bank of the seller's (purchaser's) bank, thereby increasing (decreasing) banking system reserves. Most OMO involve repurchase agreements (repos) and reverse repurchase agreements (reverse repos) and hence result in temporary changes in reserves. In a repo (reverse repo), the central bank buys (sells) securities from (to) a counterparty with the agreement that it will sell (purchase) the securities back to (from) the counterparty at a specified price after a specified period of time, usually a very short period of time, and banking system reserves rise (fall). In essence the repo (reverse repo) is a short-term loan to (from) the counterparty. When a central bank wants to change the volume of reserves for an extended period of time, it may engage in outright purchases or sales, i.e. transactions with no agreement to reverse the initial transaction.

Central banks typically also have standing facilities—a lending facility at which banks can borrow from the central bank at a penalty rate that is a mark-up over the policy rate target and a deposit facility at which banks can earn interest on their reserves at an interest rate that is usually a “mark-down” from the policy rate target. A borrowing bank must pledge collateral, usually high-quality collateral, in excess of the value of the loan to obtain the loan. Since the standing facility rates are normally tied to the target for the policy rate, when the policy rate target is changed, so are the standing facility rates. Thus, most changes in the standing facility rates provide no independent information about central bank policy. However, there are circumstances in which this is not the case. For example, a reduction in the mark-up of the lending rate over the policy rate target would tend to encourage banks to borrow more from the central bank. Payment of interest on reserves allows the central bank to change the equilibrium value of the policy rate when the volume of reserves in the system is sufficiently large relative to the demand for reserves so that the equilibrium policy rate equals the interest rate on reserves. In this case, if the central bank wanted to raise the policy rate, it could raise the interest rate on reserves and the actual policy rate would follow. Prior to the crisis, the European Central Bank (ECB) and the Bank of England (BoE) had both lending and deposit facilities. The Federal Reserve (Fed) had only a lending facility, but, as the crisis progressed, the Fed prevailed upon Congress to accelerate the implementation of a previously authorized deposit facility, and, in October 2008, the Fed's deposit facility opened.

### *Credit easing and quantitative easing*

As the financial crisis began to unfold and economies moved toward recession, central banks reacted in their normal way and cut their policy rate targets (and hence the rates at their standing facilities) in a series of steps. As the crisis progressed and financial institutions' demand for liquidity rose, central banks responded in their role as “lender of last resort” by supplying more liquidity to the financial system in both standard and innovative ways.

Central bank policy innovations can be broadly categorized as credit easing and quantitative easing policies. Credit easing (CE) involves changing the composition of the central bank's balance sheet without expanding its size. More conventional assets like holdings of short-term Treasury securities and short-term loans to banks are replaced with more unconventional assets like longer-term loans to banks and other financial institutions, longer-term securities, and non-Treasury securities to include private securities. The goal is to enhance the operation of financial markets by increasing liquidity and providing support to particular markets and particular types of financial institutions by changing the mix of assets held by the central bank. Of course, this also increases the risk faced by the central

bank—interest rate risk rises as the share of longer-term securities held increases, and default risk rises as the share of private securities rises. In pure credit easing, the effect on reserves of increased loans to financial institutions or the purchase of non-traditional securities is sterilized (offset) by open market sales of the traditional securities held, or by reducing short-term loans while expanding longer term loans.

Quantitative easing (QE) refers to a policy of expanding the size of the balance sheet without changing its composition, and this is achieved by increasing the volume of open market purchases. This leads to concomitant increases of banking system reserves and the monetary base. This could lead to a significant increase in the money supply if banks use the additional reserves to expand loans and/or buy securities. If the money supply rises, the public would find itself holding excess money balances and could use these excess money balances to purchase other assets—both financial and real, thereby bidding up their prices and reducing their yields. During and after the recent crisis, most of the additional reserves created by QE were held as excess reserves, and the money supply rose by a much smaller percentage than did total reserves and the monetary base.<sup>2</sup>

Does a relatively small increase in the money supply mean QE is necessarily ineffective? Joyce et al. (2010) discuss several ways QE might be effective in reducing yields and raising asset prices even if the money supply does not rise significantly, and these channels provide the rationale for QE by the Fed and the BoE. Joyce et al. note that QE may serve as a signal that the central bank thinks economic activity will be depressed for a good while and that the policy rate will remain at a low level for an extended period of time, thereby reducing expectations of the level of future short-term interest rates and hence reducing long-term interest rates (macro-policy news channel). Since short-term rates are very likely to be close to zero when QE is begun, QE is likely to be implemented through the purchase of longer-term bonds which, by significantly reducing the supply of long-term bonds to the public, should reduce yields on these bonds and thereby trigger a shift by investors into other assets like stocks or real assets (portfolio rebalancing channel). If the central bank becomes a significant buyer in the dysfunctional financial markets, market functioning and liquidity improves, and the liquidity premium on securities traded in the market falls as does the yield (liquidity premium channel). Finally, if QE is expected to help stabilize macroeconomic activity at normal levels, the risk of bankruptcy would be expected to fall as would the risk premium on securities issued by firms. This would in turn reduce the level of interest rates (macro risk premium channel).

Prior to September 2008, when turmoil in financial markets increased substantially, the innovative central bank policies can be characterized as mainly CE. After September 2008, the innovative policies are best characterized as a blend of CE and QE, especially for the Fed and BoE. There were a number of significant disruptions to financial markets in September 2008, including the failure of the investment banking firm Lehman Brothers. The crisis deepened after September 2008, and, as the turmoil in financial markets increased, interbank loans fell significantly, and the demand for liquidity rose substantially.

### ***Monetary policy actions***

Figure 32.1 plots the policy rate targets for the Fed, the ECB, and the BoE from January 2007 until April 2011. The first vertical line marks the month of August 2007, the beginning of the crisis, and the second vertical line marks the month of September 2008 when turmoil in financial markets increased substantially. Note that these central banks all reduced their target interest rates substantially. The Fed reduced its target for the fed funds rate in September

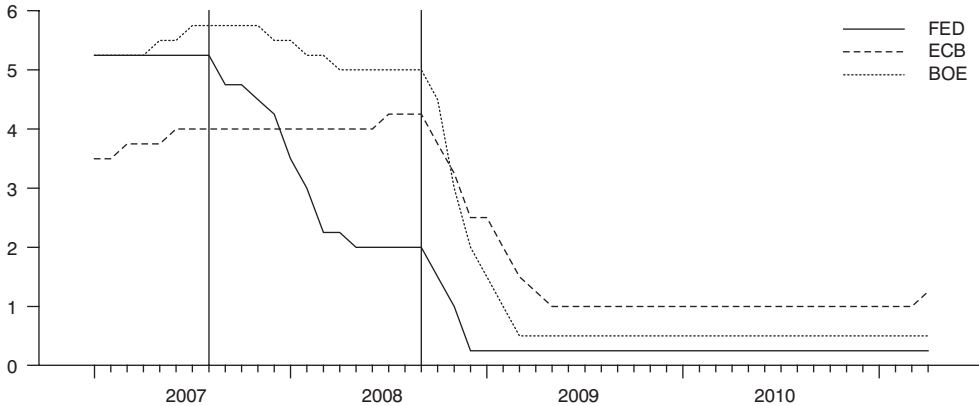


Figure 32.1 Central banks' policy target rates, 2007–2011

2007 as a preemptory move to counter the expected future effects of the financial crisis on the economy. As the financial crisis worsened and the economy moved into recession, the Fed continued to aggressively cut its target funds rate until it established a target range of 0–0.25 percent in December 2008. The BoE raised its policy rate target twice in 2007 because of concerns about inflation, but it began cutting its policy rate target in December 2007 and over time reduced its target rate to 0.5 percent in March 2009. The ECB did not change its target rate until July 2008 when it raised it in response to rising inflation stemming from adverse supply shocks. The ECB's first cut in the policy rate came as part of the unprecedented coordinated cut in policy rates in October 2008 by a number of central banks including the Fed and the BoE. Thereafter the ECB continued to reduce its policy rate until it hit 1 percent in April 2009. As these central banks cut their policy rate targets, following normal procedure, they also reduced the rates on their standing facilities. It can be argued that all three central banks essentially reduced their policy rate targets to the zero lower bound below which the policy rates can't be reduced further. Although the ECB reduced its target rate only to 1 percent, effectively it hit the zero lower bound since the ECB allowed the rate on overnight lending among banks (the EONIA rate) to fall to the rate paid on deposits (0.25 percent).

In addition to cutting the Fed funds rate target, the Fed also tried to manage market expectations about future values of the fed funds rate and hence maximize the effects of its policy rate cuts on long-term interest rates by adding language (forward-guidance) to its policy statements indicating that the funds rate would be held at exceptionally low levels for an extended period of time. Neither the ECB nor the BoE used explicit forward guidance; both indicated they preferred the public to draw their own inferences about future values of the policy rate from central bank communications about policy actions and forecasts of economic activity.

### *Liquidity provision*

As noted earlier, as the crisis progressed and the demand for liquidity grew, in their role as “lender of last resort” central banks provided substantial amounts of liquidity in both standard and innovative ways. In essence, the provision of liquidity by central banks substituted for the intermediation that took place in normally operating markets. The Fed was the most innovative and set up a number of new facilities to supplement its regular liquidity-providing

facilities. For the most part, the innovative actions of the ECB and the BoE took place within their normal frameworks for monetary policy. As noted by Lenza et al. (2010), before the crisis the Fed dealt with a smaller number of counterparties than did the ECB, and the ECB also accepted a wider range of collateral including asset-backed securities than did the Fed or the BoE. The new Fed facilities allowed the Fed to deal with a broader range of counterparties and to accept a wider range of collateral than before the crisis. Further, as Bean (2011) notes, relative to the BoE, the broader range of new facilities of the Fed also reflects the greater variety of non-bank financial institutions in the U.S. compared to the UK.

The actions of the central banks to provide liquidity to the system are outlined next, starting with the Fed. To encourage borrowing from the discount window, as the Fed cut its policy target rate, it also reduced the spread between the lending rate and the target fed funds rate and lengthened the maturity of discount window loans from overnight to 30 days and then to 90 days. To further encourage borrowing by reducing the stigma normally associated with borrowing from the discount window, the Fed introduced a temporary lending facility (the term auction facility) which auctioned funds to banks for 28 or 84 days. The competitively determined rate at this facility was typically below the lending (primary credit) rate.

Under authority granted in section 13(3) of the Federal Reserve Act (which allows the Fed, in unusual and exigent circumstances, to lend to individuals, partnerships, and corporations that are unable to obtain adequate credit), the Fed extended lending beyond banks to other financial market participants. The Fed set up separate facilities to make loans of funds and Treasury securities to primary government security dealers, to improve the functioning of the commercial paper (CP) market, to stem the outflow of funds from money market mutual funds, and to provide support to asset-backed securities markets. In addition, the Fed used its emergency authority to provide support to specific financial firms. Further, the Fed engaged in currency swaps with other central banks in which dollars were provided in exchange for other currencies so that the other central banks could make dollar-denominated loans to banks in their countries.

By establishing the new facilities, the Fed increased the number of counterparties and the range of collateral accepted for loans, and the risk carried on the Fed's balance sheet rose substantially. However, Fleming and Klagge (2011) noted that the net earnings to the Fed from the new facilities was about \$13 billion over the 2007–09 period and that thus far there have been no credit losses on the new facilities. Formal evaluation of the effectiveness of the new facilities has just begun. In a study of the auction facility for loans from the Fed, McAndrews, Sarkar and Wang (2008) and Christensen, Lopez and Rudebusch (2009) found a significant beneficial effect of this facility whereas Taylor and Williams (2009) and Thornton (2010) found no effect. Campbell et al. (2011) found that the facility designed to improve the functioning of markets for asset-backed securities did so, and Duygan-Bump et al. (2010) found that one of the facilities designed to improve the functioning of the commercial paper market significantly reduced the outflow of funds from money market mutual funds that held a high share of securities eligible for this facility.

As it cut its policy rate target, the ECB also reduced the spread between its lending rate and the policy rate target. After the crisis began, the ECB allowed banks, through the execution of repos, to obtain as much overnight liquidity as desired at the then-prevailing target policy rate. Subsequently, it introduced supplemental repos with terms of three and six months while simultaneously reducing the volume of repos with shorter terms to maturity. During 2007, most of the liquidity provided came from repos rather than from its lending facility, and this remained true throughout the crisis. The range of counterparties was extended,



and in December 2007, the ECB engaged in currency swaps with the Fed. Beginning in October 2008, the ECB introduced “enhanced credit support.” The ECB allowed financial institutions to obtain the full amount of liquidity they wanted at the policy rate, broadened the range of collateral accepted for repos to include less liquid assets, and further extended the list of counterparties. The ECB also expressed intent to provide more funding through six-month maturity repos and later introduced repos with one year maturity. In May 2009, it announced its intent to purchase €60 billion in covered bonds<sup>3</sup> in order to help restore functioning in this important market. Casual empiricism suggests that these efforts were important in stabilizing financial markets (interest rate spreads fell and stock and bond markets improved), and Lenza et al. (2010) found empirical evidence that the enhanced credit support policy had substantial effects on interest rates and loans and, with a delayed effect, on real economic activity. They also examined the effects of unconventional policy by the Fed and the BoE and found that these policies were also stabilizing.

The BoE also greatly extended its provision of liquidity to the system. It cut the spread between its lending rate and its policy rate target as an inducement to borrow. In December 2007, the BoE began to offer a larger volume of extended term repos and broadened the range of collateral for these repos to include residential mortgage-backed securities (MBS) and covered bonds. Later the collateral was further broadened to include commercial MBS and corporate bonds. The BoE also established a currency swap facility with the Fed and established a temporary facility to allow banks to exchange temporarily illiquid MBS and other securities for UK government treasury-bills, which enhanced the liquidity of the borrower’s balance sheet. In October 2008, the BoE established a permanent facility with the same function as the temporary facility. The BoE also expanded the range of its counterparties to include a larger set of banks. As before, casual empiricism suggests these liquidity-supplying efforts helped stabilize financial markets.

### ***Balance sheets and quantitative easing***

Figure 32.2 plots the evolution of these central banks’ balance sheets as measured by the volume of assets from January 2007–April 2011. The size of each balance sheet is normalized to be 1 in January 2007. Prior to September 2008, there was virtually no change (Fed) or relatively little change (ECB and BoE) in the balance sheets, but, beginning in October 2008, there were particularly large increases in the balance sheets of the Fed and BoE and a much more modest but still substantial increase for the ECB. Prior to September 2008, the central banks sterilized the effects of the additional liquidity provided. The Fed did this by open market sales of Treasury bills, and the Treasury helped by selling supplemental Treasury securities to the public and depositing the proceeds in its account at the Fed, a procedure that drained reserves from the banking system. The ECB did this by reducing short-term repos at the same time it was engaging in longer-term repos, and the BoE did this by engaging in open market sales and the sale of a new instrument—Bank of England bills (a non-monetary liability of the BoE with a maturity of one week)—to the public.

After September 2008, sterilization ended, and the size of the balance sheets and reserves rose. The increase in the size of the balance sheets of the Fed and the BoE was accelerated by the adoption of QE, which, as implemented, was simply open market purchases of longer-term securities. The ECB did not engage in quantitative easing to any extent, although it did begin to purchase covered bonds in order to enhance the functioning of that market. A key reason the ECB did not engage in QE was that the size of its balance sheet at the beginning of the crisis was much larger than that of either the Fed or the ECB. Both the Fed

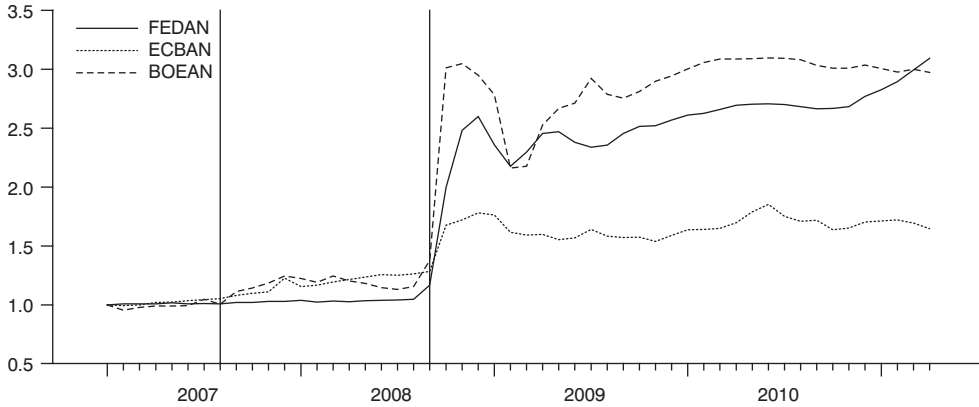


Figure 32.2 Central banks' total assets, 2007–2011

and BoE made clear that a major purpose of QE was to reduce longer-term interest rates by significantly reducing the supply of longer-term bonds to the public. Thus, QE was seen as a way of providing more stimulus to spending at a time when the zero lower bound had been hit and policy rates couldn't be lowered further.

In November 2008, the Fed announced it would begin to purchase securities issued by Fannie Mae, Freddie Mac, and the Federal Home Loan Banks and MBS securities issued by Fannie Mae, Freddie Mac, and Ginnie Mae, and longer-term Treasury securities were later added to the list. This first round of long-term security purchases (QE1) ended in the first quarter of 2010 and resulted in the purchase of \$1.75 trillion in long-term securities of which \$1.25 trillion were MBS, \$200 billion were agency securities, and \$300 billion were Treasury securities. These purchases represented about 22 percent of the outstanding stock of these securities at the beginning of QE1. Initially the Fed did not replace maturing securities purchased under QE1, which meant that its balance sheet began to shrink in size. In August 2010, it announced that it would replace maturing securities with longer-term U.S. Treasury securities, thereby maintaining the size of the Fed's balance sheet and hence the effects of QE on interest rates and asset prices. In November 2010, in response to continuing weak economic activity and concern that underlying inflation was trending lower, the Fed announced that it would purchase another \$600 billion of longer-term U.S. Treasury securities by the middle of 2011 (QE2). Note that both QE1 and QE2 changed not only the size of the balance sheet but also its composition, so there are elements of both credit and quantitative easing in these programs. These programs also increased the risk level of the Fed's balance sheet since interest rate risk rises as the proportion of longer-term securities on the balance sheet rises.

The BoE began its program of QE in March 2009 with the express intent of increasing nominal demand sufficiently to hit the BoE's inflation target of 2 percent over the medium term. Earlier the BoE had been authorized, and had begun, to purchase £50 billion in corporate securities (CP and bonds) in order to improve the functioning of these markets, but these purchases were funded by Treasury bills issued by the government and not by reserve creation. In March 2009, however, the range of securities was expanded to include government longer-term bonds (gilts), and the security purchases were paid for by reserve creation. Under its QE program, the BoE purchased £200 billion in securities, of which £198 billion were gilts (20 percent of non-government holding of gilts). The level of risk of the



BoE's balance sheet rose, although, unlike the Fed, the government indemnified the BoE for any losses on the securities it acquired through QE and through its earlier purchases of corporate securities.

As noted earlier, the intent of QE was to lower longer-term interest rates, and, based on an evaluation of several studies of the effect of QE in the U.S., Chung et al. (2011) estimated that QE1 reduced longer-term interest rates by about 50 BP.<sup>4</sup> Based on their estimates of the effect of a change in the federal funds rate on long-term rates, Chung et al. (2011) argued the effect of QE1 on long-term yields was approximately equal to a 2 percent point cut in the Fed funds rate. If we simply scale down the estimated 50 BP decline in long-term rates from QE1 for the size of QE2 relative to QE1, QE2 would be expected to have an approximate 17 BP effect on long-term rates (equivalent to an approximate 0.7 percent decrease in the fed funds rate). Consistent with this, Krishnamurthy and Vissing-Jorgensen (2011) found smaller interest rate effects for QE2 than for QE1. They also found significant increases in expected inflation as a result of both QE1 and QE2 thereby suggesting that the effects of these programs on real interest rates were larger than the effect on nominal interest rates and that these programs helped guard against deflation. Joyce et al. (2010) estimated that QE in the U.K. reduced longer-term interest rates by 50–100 BP across bonds with maturities of 5–25 years, but found the effects were concentrated on longer-term securities.

Thus, most studies for both the U.S. and the UK suggest significant effects of QE on longer-term interest rates. With regard to measures of economic activity like real GDP, inflation, the unemployment rate, stock prices, and the exchange rate, Chung et al. (2011) estimated the effects of QE1 and QE2 on economic activity in the U.S. to be the equivalent of a 3 percent point cut in the Fed funds rate. The studies to date mainly suggest beneficial effects of QE, but not everyone is convinced of the efficacy of QE. See, for example, Cochrane (2011) who expressed concerns about the methodology of studies of the effects of QE and noted that interest rates rose subsequent to the November announcement of QE2 and that yields on five-year maturity bonds that were the focus of QE2 did not decline relative to yields on bonds of other maturities.

### *Exit from QE and other crisis policies*

Even if QE has been successful in stimulating aggregate demand and thereby helping move the economy toward normalcy, is there a longer run danger to QE? As we have noted, since QE involves the large-scale purchase of securities, reserves rise significantly. Normally, this would also generate a significant increase in the money supply. However, in the recent crisis, most of the increase in reserves has been held as excess reserves by banks and hence haven't been used by banks to extend loans or buy securities. Over time, loan demand should begin to revive and banks are likely to use their excess reserves to extend loans. There is thus the potential for a massive increase in the money supply as this happens with a consequent threat to price stability. For example, Chari (2010) noted that if the reserve-to-deposit ratio returned to its level before the crisis, that the broadly-measured money supply would increase about 50-fold. Central banks are, of course, aware of this possibility and have thought about and discussed exit strategies from QE as the economy recovers.

At the April 2011 FOMC meeting the Fed made clear (FOMC 2011) that it wants to reduce the size of its balance sheet and return to its pre-crisis framework in which the Fed sets a target for the Fed funds rate and holds only Treasury securities. Most participants in the meeting saw increases in the target funds rate as the preferred tool for tightening monetary

policy as the economy expands. An important question is how to move the actual funds rate to a higher target. One possibility is to simply engage in open market sales of securities purchased during QE—either outright sales of U.S. government securities and MBS or continual roll-over of reverse repos. The Fed is concerned, however, given the enormous volume of reserves in the system, that the scale of open market operations required to decrease reserves enough to raise the funds rate would have to be so large that bond markets would be disrupted and the recovery threatened. Consequently, most participants in the FOMC meeting believed that asset sales should be put on a largely predetermined and preannounced path, although the pace might be adjusted if there were substantial changes in economic activity. The initial step in the reduction of its holdings of securities would be to stop reinvestment of the principal on maturing securities.

If open market sales are to be done only slowly over time, how then might a higher target funds rate be achieved? The preferred option is to raise the interest rate on reserves enough to induce banks to continue holding large volumes of excess reserves while reserves are being slowly drained from the system through open market sales. This process could be facilitated by use of the newly established term deposit facility in which the Fed offers term deposits (deposits with a specific maturity date) to financial institutions that are eligible to earn interest on their reserves at the Fed. Reserves shifted to term deposits are no longer classified as reserves, so as banks take out term deposits at the Fed, reserves in the system fall. The interest rate the Fed pays on term deposits will, of course, be greater than the interest rate on reserves, and changes in the interest rate paid on term deposits will affect the volume of reserves.

The temporary liquidity facilities set up by the Fed have expired. The Fed will continue to pay interest on reserves, but this was a policy change that would have been implemented in October 2011 even if there had been no crisis.

Like the Fed, the BoE has made clear that when it begins to tighten monetary policy it will first raise the target for its policy rate and then begin sales of securities acquired through QE. Fisher (2010) noted that the decision about the pace of security sales will depend on the outlook for inflation, but care will be taken not to unduly disrupt the operation of the gilt market. To that end, it will coordinate its sales with the government's debt management office. With regard to its other programs, the last security swaps under its temporary facility expired in January 2012, and that facility was then closed. The permanent security swap facility will remain in place. The BoE does not expect its balance sheet to return to its pre-crisis level since it expects banks will want to hold more reserves than pre-crisis and because the range of banks that can hold reserve accounts was expanded during the crisis.

Unlike the Fed and the BoE, although the ECB bought a relatively small volume of covered bonds, it did not buy substantial volumes of securities and hence doesn't face the problem of how to divest itself of securities bought in the crisis. Instead, most of its liquidity provision took the form of longer-term repos that are self-extinguishing. As noted in ECB (2010), the unconventional measures will be phased out in order to avoid disruptions to financial markets. However, the emergence of the European sovereign debt crisis in 2011 has led the ECB to delay the phase out.

### **Implications of the crisis for central banks**

The crisis and subsequent implementation of unconventional monetary policy by major central banks has raised a number of questions about monetary policy and its implementation. Mishkin (2011) discusses in detail the principles that guided monetary policy before the

crisis and how the crisis might change monetary policy strategy, and the proper conduct of monetary policy in light of the crisis has been discussed by others as well. This chapter can only briefly touch on some of the issues about monetary policy that will no doubt be debated intensely for some time to come.

One issue is how central banks should respond to asset price movements. Should central banks respond only indirectly to asset prices to the extent that asset prices affect aggregate demand, or should central banks try to identify emerging asset price bubbles and “lean against” the rise in asset prices? If a bubble has developed, should the central bank proactively pop the bubble or should it clean up after a bubble pops on its own? Proponents of direct response argue that the bursting of asset price bubbles, especially those that are fueled by significant credit creation, can generate prolonged recessions, so it is better to try to deflate a bubble before it gets too big and bursts on its own. Opponents note that it is often difficult to identify asset price bubbles, since if fundamental determinants of asset prices have changed significantly, then substantial changes in asset prices are warranted. They also note that monetary policy is a “blunt tool” for dealing with an asset price bubble since an increase in the policy rate affects not only the asset whose price is “bubbling” but also the prices of other assets as well as consumption and investment spending. Some argue that it would be better to use macro-prudential regulation like changes in capital requirements, changes in loan-to-value ratios, and more stringent collateral requirements for lending than monetary policy to address emerging bubbles. Issing (2011) notes that before the current crisis, central banks followed the “Jackson Hole Consensus”: don’t target asset prices, don’t try to prick a bubble and “mop-up” after a bubble bursts. Both Issing (2011) and Mishkin (2011) note that this consensus is being rethought. Mishkin points out that it is much easier to identify a credit-driven bubble than one that stems from irrational exuberance, and both Issing and Mishkin suggest that monitoring of credit market conditions will very likely become an essential part of the monetary and regulatory processes.

Prior to the recent crisis, most regulation of financial institutions was micro-prudential in nature, i.e. the focus was on the health of the individual institution and less attention was paid to the interconnections among institutions and hence the possibility that problems at one institution would be transmitted to others connected to it. The crisis revealed this to be an inadequate regulatory strategy, and macro-prudential regulation that aims to reduce systemic risks in the financial system is now considered essential. A key question is whether central banks should be the macro-prudential regulator or whether this task should reside in another institution. Proponents of a separate regulator stress enhanced accountability since a separate regulator has a well-defined mission. They also note that vesting authority in a single institution responsible for both monetary and regulatory policy may create too powerful an institution, and regulatory responsibility, especially for systemically important institutions, might end up politicizing monetary policy. Proponents of central banks serving as the macro-prudential regulator argue that information obtained from regulation about the financial health and interconnections among institutions is useful in conducting normal monetary policy and in serving as lender of last resort. These proponents note that information sharing among different government agencies is typically less than perfect so it is better to have one institution perform both functions. For a more detailed discussion, see Blinder (2010) and Mishkin (2011).

A third issue is the appropriate target rate of inflation. The major central banks have an explicit or implicit target of 2 percent or slightly less. As noted earlier, the major central banks essentially hit the zero lower bound for their policy rate during the crisis and hence had no further scope for lowering the policy rate. Consequently, they had to rely solely on

unconventional policy at this point. Blanchard, Dell’Ariccia and Mauro (2010) argue that if central banks would raise their explicit or implicit target to 4 percent, then they would have more scope for normal monetary policy and would be less likely to hit the zero lower bound. A higher inflation target means higher expected inflation and higher nominal interest rates and hence more leeway for the central bank to reduce policy rates in a crisis. This is a very controversial proposal, and opponents point out that the costs of increasing the inflation target as well as the benefits must be considered. They worry that raising the target inflation rate would reduce the hard-earned credibility of central banks as inflation fighters (Issing 2011), and they argue that history suggests it is much more difficult to stabilize prices when inflation is above 3 percent than when it is below 3 percent (Mishkin 2011). They also note the costs of higher inflation are continual, but the benefits of higher inflation for monetary policy implementation are realized only when the zero lower bound is reached. Since it is rare for central banks to hit the zero lower bound, the benefits won’t be realized very often but the costs are ever present.<sup>5</sup>

### **Conclusion**

After the onset of financial crisis in 2007, monetary policymakers faced significant challenges. Financial markets were in turmoil, normal credit flows were significantly disrupted, and economies moved into recession. Central banks sharply reduced their policy rates, effectively reaching the zero lower bound, and responded in an aggressive way to improve the functioning of financial markets. As “lenders of last resort,” central banks provided liquidity to financial market participants who were having difficulty replenishing their funding through normal market channels and extended the maturity of their lending in light of the extensive and ongoing nature of the crisis. Existing operational facilities were used but the Fed and, to a lesser extent, the BoE set up new lending facilities, and the Fed used emergency powers to provide assistance to particular financial firms. Further, the Fed and the BoE engaged in quantitative easing to help revive specific markets and to lower longer-term interest rates and raise asset prices. In their crisis response, central banks demonstrated flexibility and a willingness to innovate, and cooperated to help each other. Key elements of cooperation included the establishment of reciprocal currency swaps, the coordinated policy rate cut in October 2008 after the crisis began to worsen, and the general discussion and sharing of information about policies and the state of financial markets and economic activity. The bulk of the evidence to date suggests that the actions of central banks mitigated the effects of the crisis and fostered recovery.

As a consequence of the liquidity provision and monetary policy easing, the size of the balance sheets of the major central banks rose substantially after September 2008, and reserves and the monetary base rose sharply, although the money supply expanded by a much smaller magnitude since most of the reserves created were held idle by banks. Over time as financial markets return to normal, liquidity provision designed to enhance market functioning will naturally decrease and this will help shrink the balance sheets back towards normal levels. However, the central banks that engaged in quantitative easing are developing “exit strategies” that will help them shrink their balance sheets back towards a more normal size.

The crisis and central bank responses have stimulated discussion of the appropriate way to implement monetary policy and the role of central banks in both micro-prudential and macro-prudential regulation. An important lesson from the crisis is that central banks, whether they are the ultimate micro- or macro-prudential regulator or not, must pay more

attention to the level of systemic risk in formulating policy and to how their monetary policies might affect the degree of systemic risk. Accordingly, central banks have begun the task of identifying indicators of the level of systemic risk and have begun the discussion of how this information will be used in monetary policy decisions.

### Notes

- 1 A more detailed version of this chapter is available at [http://bus.lsu.edu/McMillin/Working\\_Papers/monpolcrisis.pdf](http://bus.lsu.edu/McMillin/Working_Papers/monpolcrisis.pdf)
- 2 There are several explanations for this including a recession-induced reduction in the demand for loans, the payment of interest on reserves, an increase in banks' perception of the riskiness of loans, and uncertainty about the specifics of increased capital and leverage regulation that will be imposed as a result of the crisis.
- 3 Covered bonds are securitized bonds similar to a mortgage-backed security except the assets "covered" by the bond are retained on the balance sheet of the issuer.
- 4 However, the earlier studies suggest there is a good bit of uncertainty about the true size of the effect of QE1 on interest rates.
- 5 Another issue is whether price level targeting would be superior to the (explicit or implicit) flexible inflation targeting practiced by many central banks. There are arguments pro and con for price level targeting over inflation targeting; see, for example, Walsh (2010) and Mishkin (2011).

### References

- Bean, C. (2011) 'Lessons on unconventional monetary policy from the United Kingdom', speech at US Monetary Policy Forum, New York, Feb. 25.
- Blanchard, O., Dell'Ariccia, G. and Mauro, P. (2010) 'Rethinking monetary policy', IMF Staff Position Note, Washington, DC: IMF.
- Blinder, A.S. (2010) 'How central should the central bank be?', *Journal of Economic Literature*, 48: 123–33.
- Campbell, S., Covitz, D., Nelson, W. and Pence K. (2011) 'Securitization markets and central banking: an evaluation of the Term Asset-Backed Securities Loan Facility', Federal Reserve Board Finance and Economics Discussion Series No. 2011–16.
- Chari, V.V. (2010) 'Thoughts on the Federal Reserve system's exit strategy', Federal Reserve Bank of Minneapolis Economic Policy Paper 10–1.
- Christensen, J.H.E., Lopez, J.A. and Rudebusch, G.D. (2009) 'Do central bank liquidity facilities affect interbank lending rates?', Federal Reserve Bank of San Francisco Working Paper 2009–13.
- Chung, H., Laforte, J.-P., Reifschneider, D., and Williams, J.C. (2011) 'Have we underestimated the likelihood and severity of zero lower bound events?', Federal Reserve Bank of San Francisco Working Paper 2011–01.
- Cochrane, J.H. (2011) 'Inside the black box: Hamilton, Wu, and QE2', Comments at NBER Monetary Economics Program meeting, March 4, 2011.
- Duygan-Bump, B., Parkinson, P.M., Rosengren, E.S., Suarez, G.A. and Willen, P.S. (2010) 'How effective were the Federal Reserve emergency liquidity facilities? Evidence from the asset-backed commercial paper money market mutual fund liquidity facility', Federal Reserve Bank of Boston Working Paper No. QAU10–3.
- ECB (2010) *European Central Bank Monthly Bulletin*, October, Frankfurt: ECB.
- Fisher, P. (2010) 'An unconventional journey: the Bank of England's asset purchase programme', speech to contacts of the Bank's Agency for the South-West, Stonehouse Court, Gloucestershire, October 11.
- Fleming, M.J. and Klagge, N.J. (2011) 'Income effects of Federal Reserve liquidity facilities', *Federal Reserve Bank of New York Current Issues*, 17, No. 1.
- FOMC (2011) Minutes of the Federal Reserve Open Market Committee, April 26–27.
- Issing, O. (2011) 'Lessons for monetary policy: what should the consensus be?' IMF Working Paper.
- Joyce, M., Lasoosa, A., Stevens, I. and Tong, M. (2010) 'The financial market impact of quantitative easing', Bank of England Working Paper No. 393.

- Krishnamurthy, A. and Vissing-Jorgensen, A. (2011) 'The effects of quantitative easing on interest rates', *Brooking Papers on Economic Activity*.
- Lenza, M., Pill, H. and Reichlin, L. (2010) 'Monetary policy in exceptional times', European Central Bank Working Paper No. 1253.
- McAndrews, J., Sarkar, A., and Wang, Z. (2008) 'The effect of the Term Auction Facility on the London Inter-Bank Offered Rate', Federal Reserve Bank of New York Staff Report No. 335.
- Mishkin, F.S. (2011) 'Monetary policy strategy: lessons from the crisis', NBER Working Paper 16755.
- Taylor, J.B. and Williams, J.C. (2009) 'A black swan in the money market', *American Economic Journal: Macroeconomics*, 1: 58–83.
- Thornton, D.L. (2010) 'The effectiveness of unconventional monetary policy: the Term Auction Facility', Federal Reserve Bank of St. Louis Working Paper 2010–044A, October.
- Walsh, C.E. (2010) 'Post-crisis monetary policy strategies: panel discussion', 8th *Journées* of the Banque de France Foundation.