

Central Bank Monetary Policy: A Comparative Study

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EXECUTIVE SUMMARY

Since the financial crisis of 2007-2008, central banks throughout the world have had to take unprecedented measures to stabilize and encourage economic growth. One such measure was quantitative easing, which was an expansionary monetary policy focused on lowering long-term rates to mitigate the economic downturn due to the financial crisis. The policy of quantitative easing originated in 2001, when the Bank of Japan implemented a strategy to purchase government debt to increase the money supply and encourage lending.

In a similar fashion, with the federal funds rate near zero percent, central banks were forced to focus on manipulating longer-term rates as an expansionary monetary policy after the financial crisis. Consequently, quantitative easing became a common approach among central banks throughout the world to stimulate growth. The present study compares how the Fed, the European Central Bank (ECB), the Bank of England (BOE), and the Bank of Japan's (BOJ) implemented quantitative easing and analyzes how the capital structure of each bank changed.

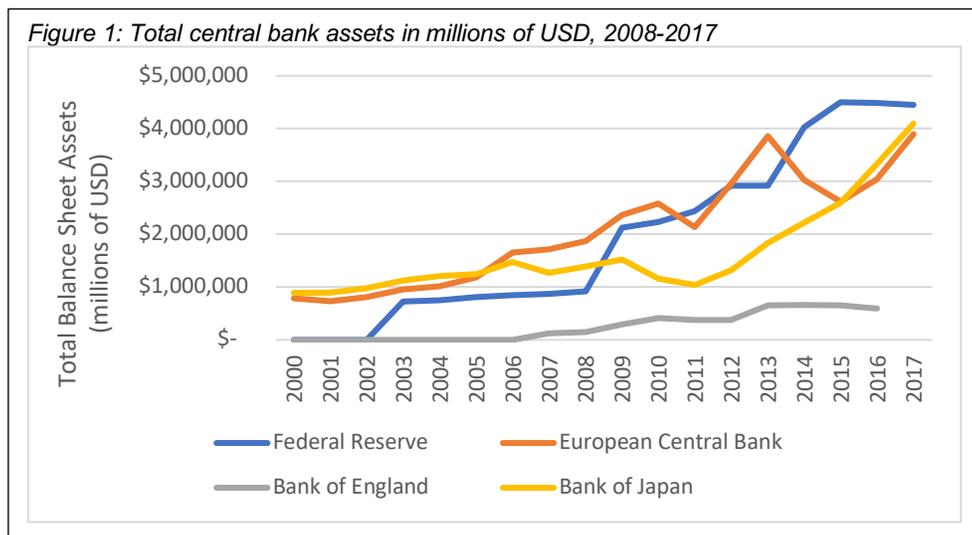
Each of the banks acted differently when implementing these programs. The differences were based on the structure of their respective economies and their intended effects. One of the main outcomes of quantitative easing was that it consistently caused massive growth of central bank balance sheets, fundamentally changing the mechanics of setting short term interest rates and substantially increasing markets' sensitivity to monetary policy changes. In an attempt to analyze the consequences of these major shifts in bank structures, this paper provides a brief discussion of normalization strategies moving forward.

INTRODUCTION

Quantitative easing was first seen in March of 2001 when the Bank of Japan, with interest rates already at zero, announced it would purchase government debt to flood the banking system with cash to spur lending. The program was eventually scrapped in 2006, but the Bank of Japan was ahead of its time, as similar stimulus programs became prominent just a few years later. In response to the economic downturn that started in 2007, the Federal Reserve (Fed) and other central banks took aggressive and unprecedented actions to stabilize markets, implementing policies similar to Japan in 2001.

Conventional monetary policy is only effective if short-term nominal interest rates are above zero (Blinder, 2010). Negative interest rates are impractical, because they imply that the depositor actually pays interest to a bank for holding the depositor's money. With interest rates near or even below zero, central banks had to find explore different approaches for effective monetary policy, which they did in choosing to influence prices and output by increasing liquidity through the purchase of long-term assets, like government bonds and mortgage-backed securities. The Fed was the first central bank to implement aggressive policies following the 2008 financial crisis, announcing it would purchase roughly \$600 billion in mortgage-backed securities in November 2008. Despite Fed Chairman Ben Bernanke's attempts to draw distinction between the US's stimulus program and Japan's, the market dubbed the program "quantitative easing" after the Japan's stimulus program (French, 2017).

Over the last 10 years, the aggressive and unprecedented monetary policy actions taken by the Fed include a funds rate between zero and one-fourth of one percent and quantitative easing, which ballooned the Fed's balance sheet from \$900 billion to almost \$4.5 trillion by the time the program ended in 2014. Figure 1 illustrates this, showing the change in major central banks' assets from 2008 to present.



Initially, central banks needed to utilize these policies to stabilize financial markets during a time of extreme distress. However, the scope of policies expanded over time to include achieving inflation targets, stimulating the real economy, and controlling the European sovereign debt crisis. For the Fed and other central banks, implementation caused major changes to the capital structure of the bank. This paper specifically compares the Fed,

European Central Bank (ECB), Bank of England (BOE), and the Bank of Japan's (BOJ) implementation of quantitative easing, analyzing how the capital structure of each central bank changed and what the potential consequences could be when they pursue normalization.

Since the 2008-09 financial crisis, significant research has been done on quantitative easing programs implemented by the Fed, BOE, ECB, and BOJ in response to the crisis. However, little research has been done comparing the monetary policy actions of each bank to one another, especially during and after the most recent recession, and post-QE. Each bank acted differently when implementing these programs, guiding policy based on the structure of each economy and the intended effect of each action. For example, the ECB and BOJ primarily lent money to banks to increase money supply because their economies are bank-centric, while the Fed and BOE relied on purchasing bonds and other long-term assets to inject reserves into the monetary system.

BACKGROUND

Overview of Quantitative Easing

Conventional monetary policy is conducted by buying and selling short-term debt securities to adjust short-term nominal interest rates to a specified target. When the Fed's Open Market Committee purchases a short-term debt security, the monetary base increases, and interest rates decrease. Conventional monetary policy stimulates economic growth through asset pricing and credit channels, meaning that lower interest rates encourage business investment and improve firm and consumer balance sheets. Purchasing short-term debt securities, however, does not work when interest rates are already near zero. When the federal funds rate is constrained to zero, monetary policy can still be effective by tightening interest rate spreads and risk premiums through the use quantitative easing, focusing on longer-term rates. Additionally, central banks used "signaling", or publicly committing to a long-term policy plan in an attempt to control monetary policy when rates approached zero (Bernanke, 2017).

By definition, quantitative easing is any monetary policy that unusually increases the monetary base, or money supply. Credit easing policies differ in that they target specific interest rates and restore market function. Credit easing can also be quantitative easing if the policy increases the monetary base, but conventional QE only increases the monetary base while credit easing targets specific interest rates and market functions and may increase the monetary base. Central banks use asset purchases to reduce the term premium, which in turn lowers interest rates.

Implementation of Quantitative Easing¹

The Federal Reserve's monetary policy actions are generally broken down in to four distinct stimulus programs. The Federal Reserve's programs were a special type of quantitative easing, called credit easing, designed to improve credit conditions and also increase the monetary base. The Fed initially announced QE1 in 2008 and purchased about \$1.725 trillion of assets in 2008 and 2009. Next, the Fed announced and implemented QE2 in 2010, purchasing roughly \$600 billion of assets. Then, Operation Twist was announced in 2011, resulting in about \$667 billion in asset purchases. The last distinct program implemented by the Fed was QE3 in 2012,

1. Data in this section is from Fawley & Neely 2013.

where they purchased \$85 billion of assets per month. After the initial asset purchases were completed, the Fed maintained the size of its balance sheet by reinvesting the principal payments of maturing assets. Initially, the Fed reinvested all principal payments in Treasuries, but later decided to reinvest the principal from maturing mortgage-backed securities and government-sponsored entities' bonds in additional mortgage-backed securities. Today, the assets on the Fed's balance sheet are valued at almost \$4.5 trillion, which increased more than 450% since 2008 when the Fed's balance sheet totaled about \$900 billion.

The Bank of England took a similar approach to monetary policy when mitigating the effects of the 2008-09 financial crisis. In January 2009, the BOE implemented an asset purchasing program which can be split into two distinct periods. The first period consisted of asset purchases targeted at high-quality private assets with a ceiling of £50 billion. But this program never held more than £3 billion. These purchases were funded with the sale of short-term gilts (i.e. U.K. government bonds), so the monetary base and the BOE's assets did not increase as a result. The second period began in March 2009, when the BOE announced a traditional QE program with a ceiling of £75 billion in asset purchases, which was intended to increase the monetary base. This ceiling was increased to £200 billion in November 2009, and then the program was suspended in February, when the BOE announced that Treasury issuances, and not money creation, would fund further asset purchases. The BOE reversed course in October 2011, announcing a new ceiling of £275 billion with new purchases once again funded by monetary expansion. The asset purchase ceiling was raised multiple times, settling at £375 billion in July 2012. Today, the BOE's balance sheet is about £400 billion, compared to £94 billion in 2008.

The European Central Bank relied more heavily on refinancing operations than any of the other major central banks and purchased relatively few assets. Under normal market conditions, the ECB's main policy instrument is its refinancing operations, in which the ECB lends a limited amount of capital to banks at an interest rate determined at auction. In response to deteriorating financial conditions in October 2008, the ECB amended its policy and announced that it would offer banks an unlimited amount at a fixed-rate tender. When the ECB did conduct asset purchases, it tended to be targeted at a specific market. For example, when the ECB first announced it would purchase assets in May 2009, the ECB purchased €60 billion in covered bonds. Lehman Brothers went bankrupt less than a year before, seriously impairing the market function of the covered bond market. The ECB also made several significant asset purchases of sovereign debt in response to the debt crises suffered by Greece and other European nations. Overall, the ECB's asset purchases on the balance sheet peaked at about €220 billion, having purchased a total of €320 billion of assets.

The Bank of Japan was the first central bank to use quantitative easing as a monetary policy tool, purchasing Japanese government bonds to increase the monetary base in the 1990s. The BOJ's monthly purchases reached ¥1.2 trillion in 2002, having maintained that pace even after officially ending quantitative easing four years later. To reduce its balance sheet after "ending" its QE program, the BOJ allowed short-term assets to mature without reinvesting the proceeds. But the balance sheet shrunk only marginally because of the continued purchases of government bonds. When the global economy sank into recession in 2008, the BOJ was still purchasing ¥1.2 trillion of government bonds monthly. In December 2008, closely following the Fed's announcement of QE1, the BOJ announced it would lend unlimited funds to banks at near zero rates to increase liquidity in its bank-centric economy. From 2008 through 2012, the BOJ purchased ¥34.8 trillion of government bonds in excess of the ¥1.2 trillion per month pace, totaling ¥106.8 trillion. During this period, the BOJ also purchased ¥3 trillion of commercial

paper and ¥1 trillion of corporate bonds. Lastly, the BOJ's Asset Purchasing Program, announced in October 2010, accounted for the purchase of an additional ¥76 trillion of assets through 2012. These were announced in nine separate announcements for purchases of various size and composition, totaling ¥44 trillion in Japanese government bonds, ¥24.5 trillion in Japanese Treasury discount bills, ¥3.2 trillion in corporate bonds, ¥2.2 trillion in commercial paper, ¥2.1 trillion in ETFs, and ¥130 million in REITs.

Summarily, the BOE, BOJ, and ECB purchased assets with private credit risk exposure to reduce the public's risk. The Fed, BOE, and BOJ purchased long-term assets, reducing the public's duration and lowering long-term real interest rates. All four banks used asset purchases to improve functions in specific markets (Fawley and Neely 2013).

EFFECT ON CENTRAL BANK STRUCTURES

Before the most recent financial crisis, the Fed's balance sheet could be described as minimalist, with about \$800 billion in currency as the primary liability and only slightly greater government-issued securities as the primary asset. Today, currency has risen to \$1.5 trillion and could rise to \$2.5 trillion, due to rising nominal GDP, low interest rates, increased foreign demand for dollars and other factors (Bernanke, 2017). The Fed also holds a large amount of short-term liabilities acquired during asset purchases.

The high level of bank reserves makes it impossible to manipulate interest rates with changes in the quantities of reserves, which was possible prior to the financial crisis. Instead, the Fed was forced to move to a "floor system" to set key short-term rates, specifically the federal funds rate (Kiestler, 2012). Under a floor system, the central bank sets a target "policy rate" to create a lower bound for interest rates by lending funds to banks at this policy rate (Bowman, Gagnon, Leahy, 2010). In order for the Fed to remain effective when setting monetary policy using a floor system, bank reserves must be significantly greater than \$1 trillion, potentially growing to over \$4 trillion in the next decade, compared to \$800 billion in 2008. Demand for excess reserves skyrocketed after the financial crisis began because Congress authorized the Fed to pay interest on excess reserves for the first time (Martin, 2017). Excess reserves increased from about \$10 billion in 2008 to a peak of \$2.8 trillion in 2015. Recently published research concludes that 72% of the increase in excess reserves held by banks is caused by the Fed's policy of paying interest on excess reserves and represents a decline in bank loan allocations, contrary to Fed statements that loan allocations were unaffected (Hogan, 2018).

Quantitative easing had a very similar impact on the Bank of England and European Central Bank. Balance sheets grew to over 20% of annual GDP, from £150 billion and €1.869 trillion in 2008 to almost £600 billion and €3.033 trillion in 2016, for the BoE and ECB respectively. Since 2016, the ECB's balance sheet as a percentage of GDP has deviated and risen past 40%, while Fed and BoE's remained fairly steady. Both banks are also similar to the Fed in that they were forced to move to a floor system for setting short term interest rates. Although monetary policy and QE programs varied substantially among the three banks, the effects were very similar.

Quantitative easing increased the BOJ's balance sheet from ¥1.13 trillion to almost ¥5 trillion and from 20 percent of annual GDP to almost 100 percent, which was more than double any other bank. The BOJ's total assets as a percentage of GDP were similar to the other major central banks until 2013 when Shinzo Abe was elected prime minister and made a hard commitment to reach 2 percent core inflation, after the country had experienced deflation for

several years. Abe's hardline stance led to the purchase of ¥50 trillion of Japanese government bonds per year and other aggressive policies, causing the BOJ to diverge significantly from the Fed, BOE, and ECB.

MONETARY POLICY POST QE

Monetary policy for all four major central banks discussed has historically been expansionary. Whereas, the normalization of monetary policy and central bank balance sheets will require restrictive monetary policies, or monetary tightening. Shrinking the Fed's balance sheet will have the opposite effect of quantitative easing, fundamentally increasing long-term interest rates (Wessel, 2017). This is a restrictive policy, having the same effect on the monetary base as raising short-term rates. In order for central banks to begin to normalize, interest rates must be meaningfully higher than during the recession, so that central bankers can use target rate adjustments to offset any unanticipated effects of balance sheet shrinkage.

Expect simple, predictable monetary policy when banks unwind QE, according to former Fed chief Ben Bernanke. It will help the public interpret interest rate projections (Bernanke, 2017). Bernanke also argues that central banks should determine the optimal long run size of their balance sheet prior to announcing normalization plans and should include information on the optimal size when normalization plans are announced. Once the normalization process begins, it should be completed without halting, as active management and policy shifts could lead to overreactions in financial markets, similar to the taper tantrum in 2013.

Thus far only the Fed has begun to wind down its recession-era stimulus packages by allowing balance sheet assets to mature without reinvesting the proceeds (Bernanke, 2017). The Federal Open Market Committee (FOMC) has repeatedly, publicly stated, or signaled its intention to passively shrink the balance sheet. The FOMC is signaling its monetary policy plans hoping to prevent a repeat of the "taper tantrum" in 2013, when bond markets plunged into turmoil following then-Chairman Bernanke's comments on potentially tapering the bond-buying stimulus program (Wessel, 2017). Shrinking the balance sheet without active selling, by allowing assets to mature without reinvesting proceeds, the FOMC is maximizing predictability and minimizing market disruption (Bernanke).

In a January 2017 speech, Janet Yellen estimated that the co-movement of short and long-term interest rates, as the date ending reinvestment approaches, could have the same effect on monetary policy as two 25 basis point increases over the course of 2017 (Yellen, 2017). As discussed in the previous section on the effects of QE, the Fed moved to a floor system for setting interest rates out of necessity but moving forward may prefer that method over manipulating reserves. The November 2016 FOMC notes state that it is "relatively simple and efficient to administer, relatively straightforward to communicate, and effective in enabling interest rate control across a wide range of circumstances" (Bernanke, 2017). The New York Fed recently released a framework detailing plans to conduct temporary reserve-draining operations aimed at "supporting [...] increases in the federal funds rate." (Martin, 2017). According to the FOMC's official guidance, normalization also means removing mortgage-backed securities from the balance sheet in favor of Treasuries.

The ECB recently announced it would continue to buy government bonds, on a reduced scale, until at least September 2018, marking the beginning of the end of the ECB's use of quantitative easing as a policy tool. This is the third time, however, that the ECB has pushed back the end of

its stimulus program, ballooning the program to over 2.5 trillion euros. Clearly, the ECB still has a long road to normalization, as it is still purchasing €30 billion in government bonds monthly and will continue to reinvest maturing bond proceeds for the foreseeable future (Fairless, 2017). The BOJ's most recent policy change was announced in September 2016, when it acknowledged it had failed to reach 2% inflation and changed its monetary policy to controlling interest rates, with hopes of paring bond purchases (French, 2017).

CONCLUSION

The overall effect of quantitative easing, and other radical policies like near-zero interest rates, has had a very significant effect on the world's major central banks. The most obvious effect of quantitative easing has been the exponential growth of central bank balance sheets, prominently seen in the Fed's balance sheet with growth from about \$800 billion to over \$4 trillion in just seven years. Central banks were also forced to move from a corridor system for setting short term interest rates to a floor system, because the larger balance sheets diminished the effect of open market operations.

Further, global financial markets have become very sensitive to central bank monetary policy changes, illustrated by events like the "taper tantrum" in 2013. Financial market sensitivity has led the major central banks to signal policy changes well before the changes take place to allow markets time to adjust slowly for the change and preventing volatility.

Now, as global financial markets recover following the 2008 financial crisis, central banks are beginning to unwind these expansionary policies. Much is still unknown about the banks' plans, so it will be important for central banks to signal policy changes well in advance to prevent drastic market swings. In addition to signaling the start of any unwinding policies well in advance, central banks should announce the target end date of the policy and the target final balance sheet size. For example, the Fed did announce that it would begin to passively reduce its balance sheet, but it did not inform markets on the magnitude of such a reduction, or the duration, leading to market speculation and volatility. Quantitative easing caused massive growth of central bank balance sheets, fundamentally changing the mechanics of setting short term interest rates and substantially increasing markets' sensitivity to monetary policy changes.

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