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DIRECTORATE GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

Non-Standard Monetary Policy Measures and the Development of ESCB Balance Sheet in Comparison to the Fed and the Bank of England

IN-DEPTH ANALYSIS

Abstract

Over the course of the financial crisis the ECB has adopted a number of non-standard policy measures. The intention of this paper is to compare these actions with those of the Fed and Bank of England; to assess their differences, similarities and rationale. It also discusses the impact of the policies of the three central banks on the size and composition of respectively the balance sheets of the Eurosystem, the Federal Reserve System and the Bank of England.

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EXECUTIVE SUMMARY

- The ECB and the Fed responded decisively to the liquidity crisis of August 2007 to June 2008, but at first as if it were a pure monetary policy problem. The Bank of England delayed its response.
- The size of the balance sheets of the Federal Reserve System, the Eurosystem and the Bank of England were little changed over the course of the liquidity crisis, but their composition changed.
- During the solvency crisis of July 2008 to April 2010, the ECB, the Fed and the Bank of England provided liquidity, sought to support dysfunctional markets and undertook quantitative easing. The Fed stands out for the size of its quantitative easing and its blatant quasi-fiscal measures.
- The balance sheets of the Federal Reserve System, the Eurosystem and the Bank of England grew over the course of the solvency crisis and their composition changed.
- In the course of the sovereign debt crisis, beginning in May 2010, the ECB has mainly focused on restoring calm to disorderly markets while the Fed and the Bank of England have engaged in aggressive quantitative easing.
- The balance sheets of the Federal Reserve System and the Bank of England have expanded markedly over the course of the sovereign debt crisis and the Federal Reserve System's is still expanding. Notably, the expansion of the balance sheet of the Eurosystem was only temporary.

1. INTRODUCTION

Over the course of the financial crisis, the Federal Reserve (Fed), the European Central Bank (ECB) and the Bank of England have implemented a variety of monetary policy measures. The purpose of this paper is to analyze the impact of these measures on the composition and size of the balance sheets of the Federal Reserve System, the Eurosystem and the Bank of England. Furthermore, the reasons for the similarities of and the differences between the central banks' responses to the crisis and the appropriateness and effectiveness of their actions are set out .

Section 2 of this paper analyses policy measures during the "liquidity crisis phase" of the financial crisis (August 2007 to June 2008). Section 3 analyses policy measures during the "solvency crisis phase" (July 2008 to April 2010). Section 4 analyses policy measures during the "sovereign debt phase" (May 2010 to the present).

2. THE LIQUIDITY CRISIS OF AUGUST 2007 TO JUNE 2008

The liquidity crisis erupted in early August 2007 when markets for a wide range of financial assets became dysfunctional. On 9 August BNP Paribas, the largest French bank, froze withdrawals from three of its investment funds, claiming that a "complete evaporation of liquidity" in parts of the US securitization markets made it impossible to value their holdings.[1]

2.1. Central banks responses to the liquidity crisis

What the ECB and other central banks should have done in this scenario was to have acted as market makers of last resort by conducting outright purchases and sales of the illiquid private sector securities or to have accepted the illiquid securities as collateral in their lending operations.[2] However, what the Federal Reserve and, especially, the ECB initially did instead was to flood the market with liquidity against *good quality* collateral, thereby addressing a problem that did not exist.

2.1.1. The initial response

The ECB undertook a 95 billion euro fine-tuning operation at its four percent policy rate against the usual collateral on 9 August with additional infusions in the following days. This did little to help illiquid markets or borrowers. Ignoring Bagehot's advice, the Fed cut its primary discount rate from 100 basis points above the Federal Funds rate to 50 basis points without relaxing its collateral standards: a taxpayer subsidy for those with good quality eligible collateral.[3] In September 2007 it cut its main policy rate by 50 basis points as well. What the Bank of England initially did in response to the liquidity crisis was nothing. It declined to supply additional funds; it did not cut its policy rates; it did not ease its collateral requirements; it acted neither as a market maker of last resort or a lender of last resort.

Both the Fed and the Bank of England went into the solvency crisis with collateral regimes that were significantly more restrictive than that of the Eurosystem. For the Bank of England, the failure to immediately adjust its collateral requirements and to provide emergency funding to apparently solvent financial institutions was to have a serious reputational cost. In the late summer of 2007 Northern Rock, a systemically unimportant UK bank that mainly funded itself by issuing mortgage-backed securities found itself unable to raise sufficient liquidity in the markets. While the government was in the delayed process of putting together a rescue loan there was a leak and the resulting news reports on the evening of 13 September coordinated a depositor run. If Northern Rock had instead been in the euro area it could have borrowed from the Eurosystem using its high-grade mortgages as collateral.

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1 Quoted in Boyd, Sebastian, "BNP Paribas Freezes Funds as Loan Losses Roil Markets," Bloomberg, 9 Aug 2007, http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aW1wj5i.vyOg

2 See Buiter, Willem and Anne Sibert, "Central Banks in a Time of Crisis: a scorecard," Maverecon, *Financial Times*, 20 Aug, 2007, http://blogs.ft.com/maverecon/2007/08/#axzz34F4zCpBY.

3 Bagehot's fourth rule is that central bank lending in a financial crisis should be at a penalty rate. See, for example, Garcia, Cardiff, "What Bagehot said," Alphaville, *Financial Times*, 23 May 2012, http://ftalphaville.ft.com/2012/05/23/971111/what-bagehot-said/.

2.1.2. The later response

In the autumn of 2007 the Bank of England began to adjust its attitude about what constituted acceptable collateral. Beginning on 26 September, it offered longer-term liquidity to the banking system against a wider range of collateral with a sequence of fixed-amount term auctions with a minimum rate that was 100 basis points above its main policy rate.

On 12 Dec 2007 the Fed, the ECB, the Bank of England, the Bank of Canada and the Swiss National Bank released a joint statement, whereby they announced measures to deal with the illiquidity in short-term funding markets. The five central banks also announced the Fed's provision of temporary swap lines of 20 and 4 billion dollars, respectively, to the ECB and the Swiss National Bank. The ECB, which had previously only made euro loans, announced the availability of US dollar funding to its counterparts.

At the onset of the liquidity crisis the Fed conducted its open market operations with a relatively small number of broker dealers as counterparts and against a narrow range of collateral, mainly US Treasuries. It made direct loans to banks at its discount window against a broad range of collateral only on a very short-term basis and solely with the intention of insuring against operational failures or other transitory problems. As part of the 12 December package, the Fed announced the creation of a temporary Term Auction Facility (TAF) enabling all depository institutions judged to be financially sound to secure longer-term funds from the discount window against a wide range of collateral.

In April 2008, the Bank of England introduced the Special Liquidity Scheme (SLS) to improve the banking system's liquidity position by allowing banks and building societies to swap their high-quality mortgage-backed and other securities for UK Treasury Bills for up to three years. The SLS was designed to finance part of the overhang of illiquid assets on banks' balance sheets by exchanging them temporarily for more liquid assets. Although the drawdown period for the SLS ended on 30 January 2009, the scheme remained in place for another three years and was closed on 30 January 2012, all of the drawings having been repaid.

As the liquidity crisis progressed, the Federal Reserve vigorously pursued a conventional monetary policy. By the spring of 2008 it had reduced its target federal funds policy rate by 325 basis points from its August 2007 level. In contrast, the ECB left its key refinancing policy rate unchanged during the liquidity crisis phase of the financial crisis, while the Bank of England responded slowly, not cutting its policy rate until 8 October 2007 and reducing it by a total of only 75 basis points to five percent by the spring of 2008.

2.2. How were the responses to the liquidity crisis similar or different and why?

The initial crisis responses of the ECB and the Fed were similar; they reacted decisively, but especially at first, as if the crisis were a monetary policy problem instead of a financial stability problem. They saw market benchmark interest rates in both the euro area and the United States threatening to rise above their associated policy rates and they focused on this rather than on the collapse in trading volume. By lending against good quality collateral, they expanded their lending to banks that did not need it, rather than to those in need.

A possible explanation for the initial failure of all three central banks to initially treat the scenario as a liquidity crisis was that after the relatively benign economic environment of the past decade both their policy makers and their staff had focused on monetary policy and were not as accustomed to or adept in dealing with a complex microeconomic problem of dysfunctional credit markets.

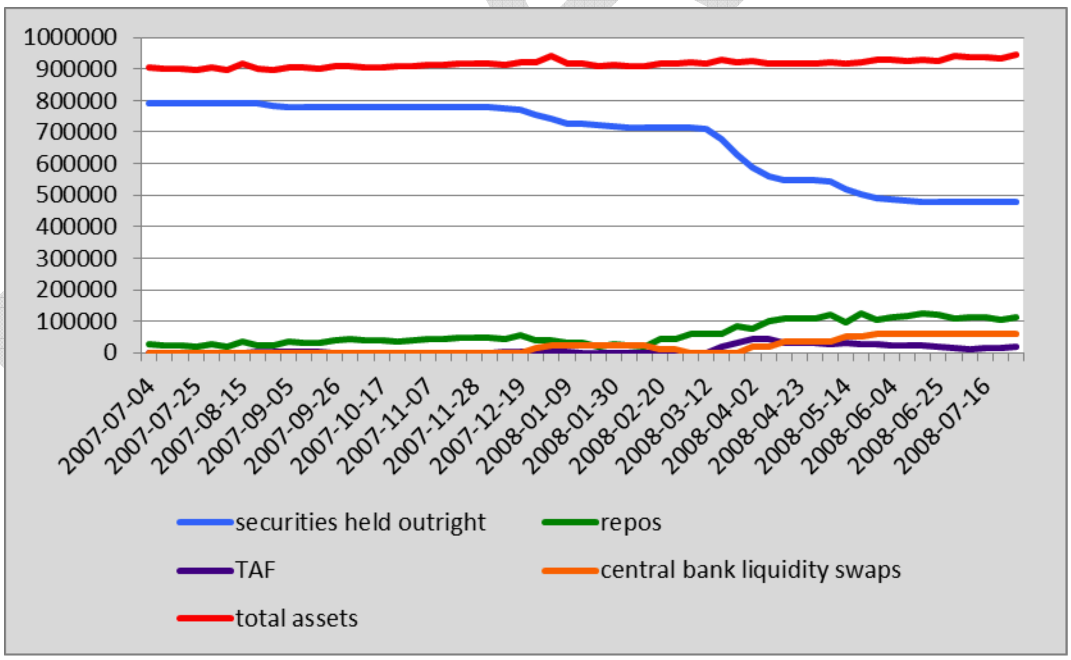
The delayed response of the Bank of England, with its history of acting as the Bagehot-style lender of last resort, is especially puzzling. Bagehot emphasized that the lender of last resort should stand ready to lend against *any and all* assets that would be indisputably good in *normal* times.[4] Perhaps the Bank's hesitation was the result of a belief that the potential costs of moral hazard problems associated with more accommodative lending outweighed the benefits of restoring order to what might have been perceived as a temporary glitch in lending markets.

The marked contrast between the Fed's forceful rate setting policy and those of the ECB and the Bank of England might be a result of the Fed's relative lack of *de facto* independence and its multiple mandated objectives. While the ECB and the Bank of England remained focused on their inflation goals, the Fed policy makers must have felt under political pressure to be seen as doing everything possible to improve matters.

2.3. The liquidity crisis, monetary policy and central bank balance sheets

In July 2007, the Federal Reserve System was using relatively simple balance sheet structures. It had two main instruments for supplying liquidity. The first was outright purchases of securities. Between July 2007 and July 2008 all of these securities held outright were US Treasuries. The second instrument was what it calls 'repos' (repurchase agreement) while the Bank of England used 'reverse repos'. [5]

Figure 1: Assets of the Federal Reserve System during the Liquidity Crisis (in millions of dollars)



Source: Federal Reserve

[4] See Humphrey, Thomas M., "Lender of Last Resort," *Economic Review*, Federal Reserve Bank of Richmond, Mar/Apr 1989, 8-16.

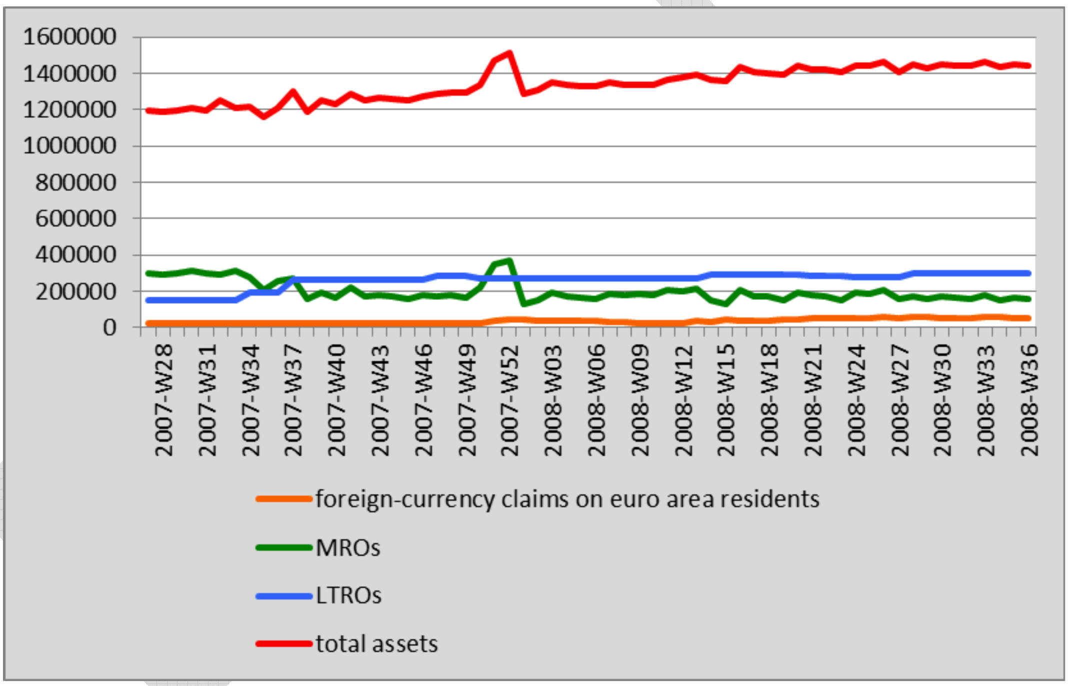
[5] A repurchase agreement, also known as a repo, is the sale of securities together with an agreement for the seller to buy back the securities at a later date. A reverse repo is the purchase of securities together with an agreement for the buyer to resell the securities at a later date.

As seen in Figure 1, the size of the central bank's balance sheet (shown in red) was little changed over the course of the liquidity crisis, but its composition shifted markedly. In July 2007, 93 percent of its assets were US Treasuries (depicted in blue); in July 2008, only 53 percent were US Treasuries while 17 percent were TAF loans (shown in purple) and 14 percent were repos (shown in green).

In contrast to the Fed, the Eurosystem had a rather complex balance sheet at the start of the liquidity crisis – a result of combining and aggregating the balance sheets of the individual National Central Banks. Assets arising from current monetary policy operations made up a relatively small fraction of its total assets. Its primary instruments for supplying liquidity were its Main Refinancing Operations (MROs), which are repos with a maturity and frequency of one week, and its Long-Term Refinancing Operations (LTROs).

As seen in Figure 2, the ECB responded to the liquidity crisis by providing temporary extra liquidity, especially in December 2007, but mainly by changing the composition of the Eurosystem's lending. In July 2007, 26 percent of its assets were MROs (shown in green), 12 percent were LTROs (shown in blue) and only two percent were non-euro-denominated loans to euro-area residents (shown in orange). At the end of July 2008, 12 percent of its assets were MROs, 20 percent were LTROs and seven percent were non-euro-denominated loans to euro-area residents.

Figure 2: Assets of the Eurosystem during the Liquidity Crisis (in billions of euros)

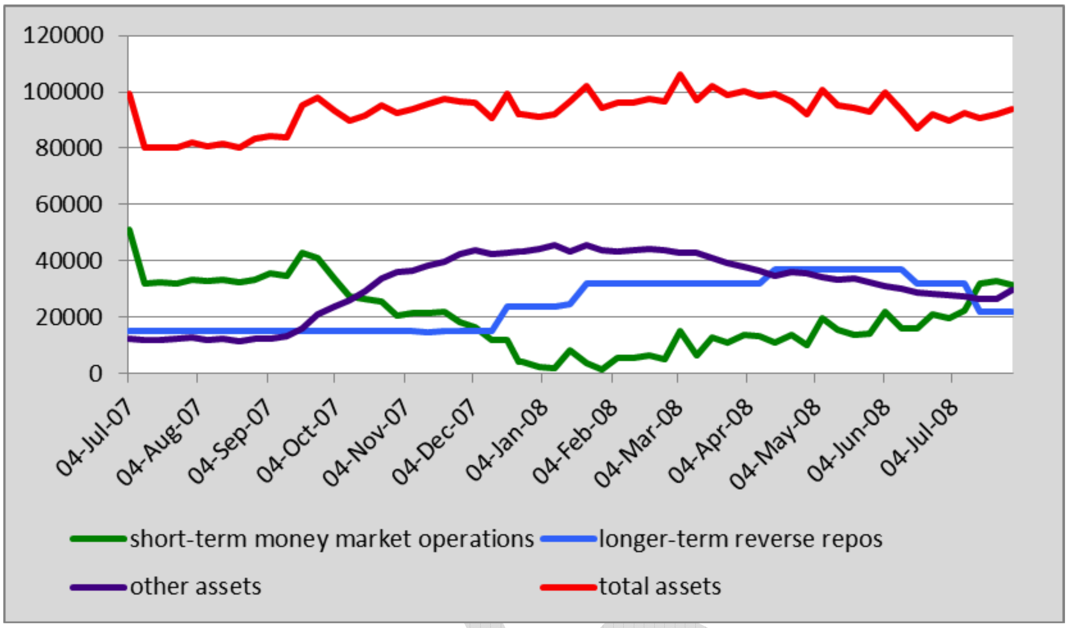


Source: ECB

Prior to the liquidity crisis, the Bank of England's operations primarily consisted of short-term open market operations, which were one-week reverse repos, and longer-term reverse repos, offered in variable-rate tenders at three-, six-, nine- and 12-month maturities. To produce long-run changes in the money supply, the Bank could also purchase and sell high-quality securities outright. In practice these securities were gilts (UK Treasuries) and the amount held constituted a relatively small and little changing share of the Bank's balance sheet.

As seen in Figure 3, the liquidity crisis had only a temporary significant effect on the size of the Bank of England's balance sheet (shown in red). In December 2008, there was an important compositional change when short-term reverse repos against a narrow range of collateral (shown in green) became relatively less important compared to longer-term reverse repos against a wider range of collateral (shown in blue).

Figure 3: Assets of the Bank of England during the Liquidity Crisis (in billions of pounds)



Source: Bank of England

3. THE SOLVENCY CRISIS OF JULY 2008 TO APRIL 2010

The beginning of the solvency crisis stage of the financial crisis might be the middle of July 2008, when reports about problems with Fannie Mae and Freddie Mac, guarantors of half of the United States' $12 trillion mortgage market, were published. It was certainly in full swing in mid-September when on successive days Merrill Lynch was sold to Bank of America, Lehman Brothers filed for Chapter 11 bankruptcy protection – the largest bankruptcy in US history – and the US government bailed out the insurance giant AIG. Market interest rates rose sharply and trading volume in credit markets - all maturities except for the shortest term - dried up.

3.1. Central bank responses to the solvency crisis

The Federal Reserve adopted a three-pronged approach to the solvency crisis. First, at the likely behest of and in cooperation with the US Treasury it assumed a blatantly fiscal role, providing massive support to insolvent institutions such as AIG through its Maiden Lane vehicles. [6]

Second, to foster liquidity in short-term funding markets the Fed provided a vast amount of liquidity support to a wide range of counterparties against enlarged sets of collateral. On 22 September 2008 its Asset Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) made its inaugural loans; on 7 October its Commercial Paper Funding Facility (CPFP) came into being. By the end of the solvency crisis phase there were so many special funding facilities that listing and summarizing them all required a US legal-size page covered in small type.[7] The Fed also enlarged its swap lines with the ECB, Bank of England, the Swiss National Bank and the Bank of Canada by $180 billion on 18 September and added another $30 billion and four more counterparty central banks on 24 September.

Third, the Fed pursued a 'muscular' policy of monetary easing. Having already slashed its policy rate in the liquidity crisis phase it lowered it further in a series of cuts in the autumn of 2008, including a coordinated move with other central banks on 8 October, to 0.00-0.25 percent on 16 December. Having no further scope to cut the policy rate, in late November 2008 it pursued a policy combining quantitative and qualitative easing. In what later became known as QE1, the Fed announced that it would purchase the direct obligations of the housing-related government-sponsored enterprises Fannie Mae, Freddie Mac, and the Federal Home Loan Bank and mortgage-backed securities backed by Fannie Mae, Freddie Mac, and Ginnie Mae. This action was intended to support conditions in the US housing market and in financial markets more generally.

The ECB's response to the solvency crisis was aimed at ensuring that solvent but illiquid financial institutions had access to funding. On 8 October 2008 the Eurosystem began conducting its MROs as fixed-rate tender procedures with full allotment at its main refinancing rate. On 15 October it expanded its LTROs and massively increased the set of collateral that it would accept. In 2009, it lengthened the average maturity of its open market operations, introducing LTROs with a maturity of one year and continuing its refinancing operations at full tender and its provision of dollar funding via its swap line with the Fed.

[6] Maiden Lane vehicles refers to (three) limited liability companies created by the Federal Reserve Bank of New York in 2008 as a financial vehicle to facilitate transactions involving three entities: the former Bear Stearns company as the first entity, the lending division of the former American International Group (AIG) as the second, and the former AIG's credit default swap division as the third. The name Maiden Lane was taken from a street which runs beside New York Federal Reserve in Manhattan.

[7] Irwin, Neil, *The Alchemists*, New York, Penguin Press, 2013, p. 151.

At the end of 2009, in reaction to improving market conditions, it began to roll back its program of credit enhancement, discontinuing its six- and 12- month LTROs and deciding to reintroduce variable-rate tender procedures for its three-month LTROs.

The ECB also followed a conventional expansionary monetary policy during the solvency crisis phase of the financial crisis. After raising its key policy rate by 25 basis points on inflation fears in July 2008, it joined in the coordinated cut on 8 October. In a series of further rate cuts between then and May 2009, it lowered its policy rate to one percent.

The Bank of England initially reacted to the solvency crisis with the provision of temporary liquidity. In January 2009 the UK Chancellor of the Exchequer authorized the Bank to create the Asset Purchase Facility (APF). Its original function was to promote liquidity in financial markets by purchasing good-quality assets financed by the UK Treasury issuing UK Treasury bills and depositing the proceeds with the Bank of England which then used these deposits to buy the good-quality assts. The Bank was permitted to use the facility for monetary policy purposes, purchasing UK government securities and good-quality private-sector securities in secondary markets, financed by issuing money. Between March and January 2010 the MPC used the APF to conduct a quantitative easing programme; purchasing 200 billion pounds of gilts, most with medium and long maturities. The Bank also purchased commercial paper and corporate bonds through the APF, but on a much smaller scale.

The Bank of England joined in the coordinated policy rate cut of 8 October with a 50 basis points reduction. In a sequence of further cuts, it reduced its policy rate to 0.50 percent on 5 March.

3.2. How were the responses to the solvency crisis similar or different and why?

During the solvency crisis, all three central banks undertook to provide liquidity to dysfunctional markets and all three engaged in rate cutting and quantitative easing. The Federal Reserve stands out, however, for also engaging in blatant quasi-fiscal policy and the amount of both quantitative and qualitative easing that was carried out.

The reason that the Fed undertook both its fiscal policy and aggressive liquidity provision was likely due to its lack of independence, the leadership of the US Treasury and the personality interaction between the Secretary of the Treasury and the Chairman of the Federal Reserve Board. It would probably have been politically impossible for the ECB to have acted as the Fed did and in the United Kingdom, the tripartite system for sharing responsibility for financial regulation that was set up by Gordon Brown in 1997 apparently never functioned as efficiently as intended.

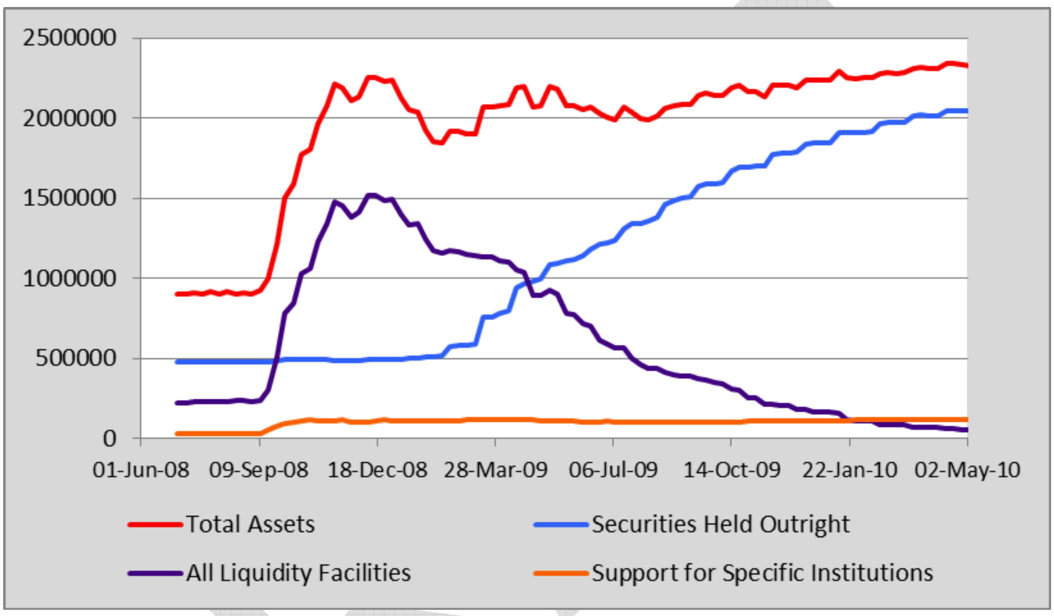
That the ECB was able to respond as effectively as it did in providing liquidity during the solvency crisis phase is remarkable. The Eurosystem was set up to provide low and stable inflation, the Treaty has little to say about a financial stability role and the ECB had no experience with financial crises. That the Bank of England did not respond more rapidly and effectively, given its history is also surprising. The personalities of the policy makers involved may have possibly played a key role. In addition, the ECB may have benefited from the lack of interference from a fiscal authority or an executive branch; the Bank of England may have been hindered by losing its supervisory and regulatory roles in 1997 and by the somewhat seemingly dysfunctional tripartite arrangement.

The more aggressive rate cutting carried out by the Fed during the solvency crisis phase was – as it was during the liquidity crisis phase – probably a result of the Fed's lack of actual autonomy and domestic political pressure.

3.3. The solvency crisis, monetary policy and central bank balance sheets

The impact of the Fed's actions on the asset side of its balance sheet during the solvency crisis is shown in Figure 4 below. Its support for specific institutions is depicted in orange. This relatively small component of its total assets (shown in red) rose in early September 2008 and remained stable throughout the period. The provision of liquidity facilities, shown in purple, caused the Fed's assets to rise dramatically during the autumn of 2008. These facilities were wound down throughout 2009 and early 2010. Beginning in early 2009, QE1 caused the Fed's securities held outright, shown in blue, to rise sharply, offsetting the falloff of the liquidity facilities' activities. At the end of April 2010, the Fed's total assets were two and a half times as large as they were at the end of July 2008.

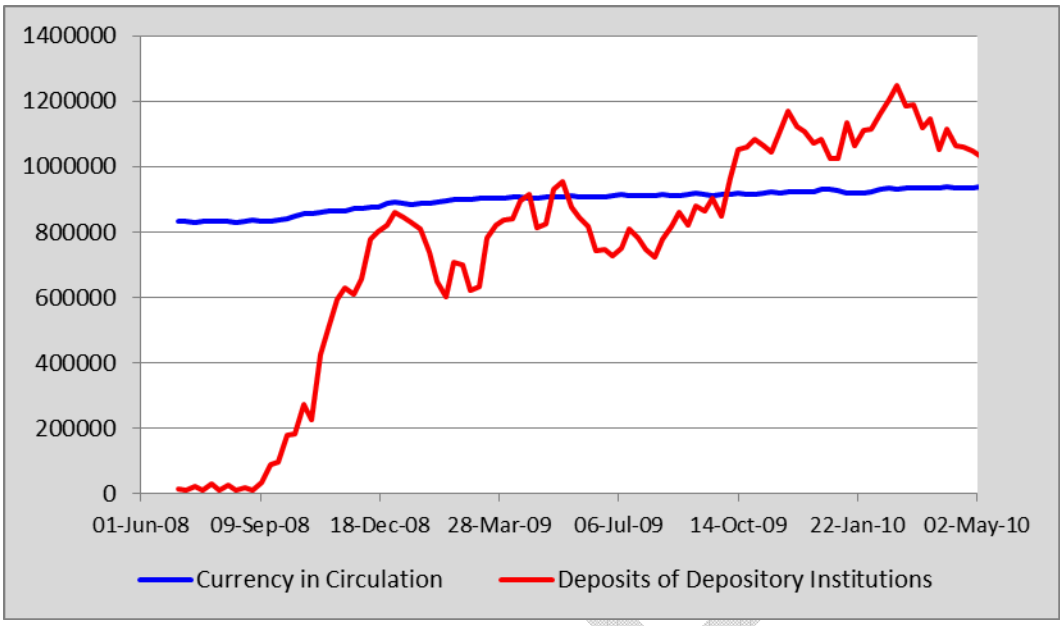
Figure 4: Assets of the Federal Reserve System during the Solvency Crisis (in millions of dollars)



Source: Federal Reserve

The Fed's quantitative easing – the increase in its balance sheet – and its qualitative easing – the change in composition of its assets – were undoubtedly crucial to restoring order to funding markets. Its quantitative easing was probably less successful at fostering economic growth through conventional monetary transmission channels. As seen in Figure 5, below, most of the money created to purchase securities ended up parked in depository institutions' deposits (shown in red) at the Fed.

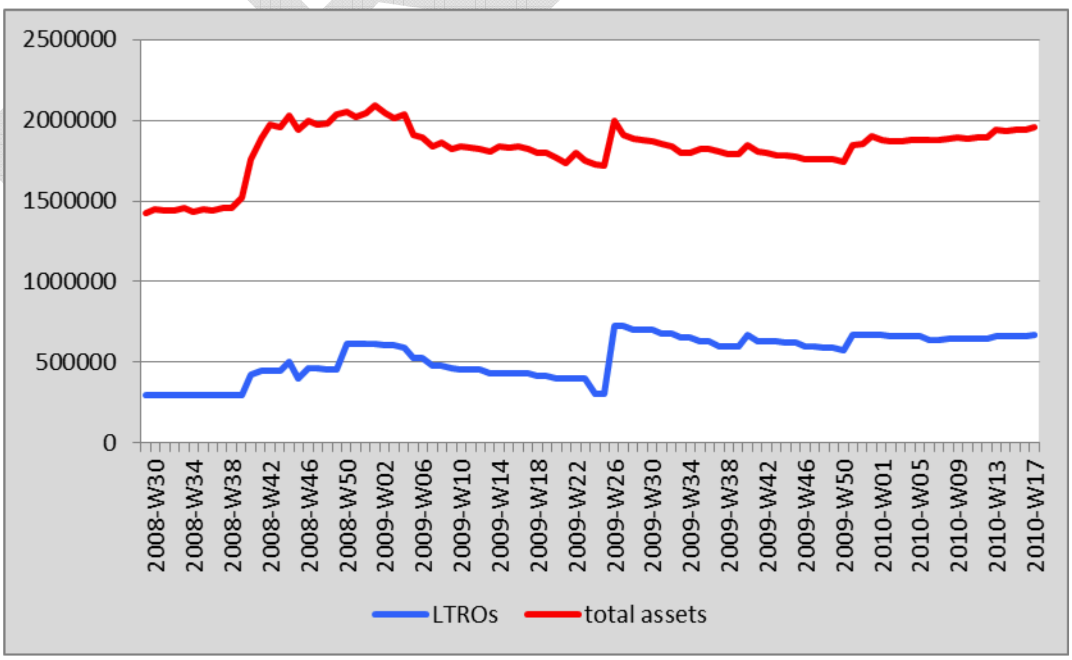
Figure 5: Selected Liabilities of the Federal Reserve System during the Solvency Crisis (in millions of dollars)



Source: Federal Reserve

As shown in Figure 6, the effect of the ECB's liquidity provision on the Eurosystem balance sheet was not quite as impressive as the effect of the Fed's monetary policy on the Federal Reserve System's balance sheet. However, by May 2010 the Eurosystem's total assets (depicted in red) were about 1.4 times as large as they were at the start of the solvency crisis, with about 70 percent of the increase accounted for by the increase in LTROs (shown in blue).

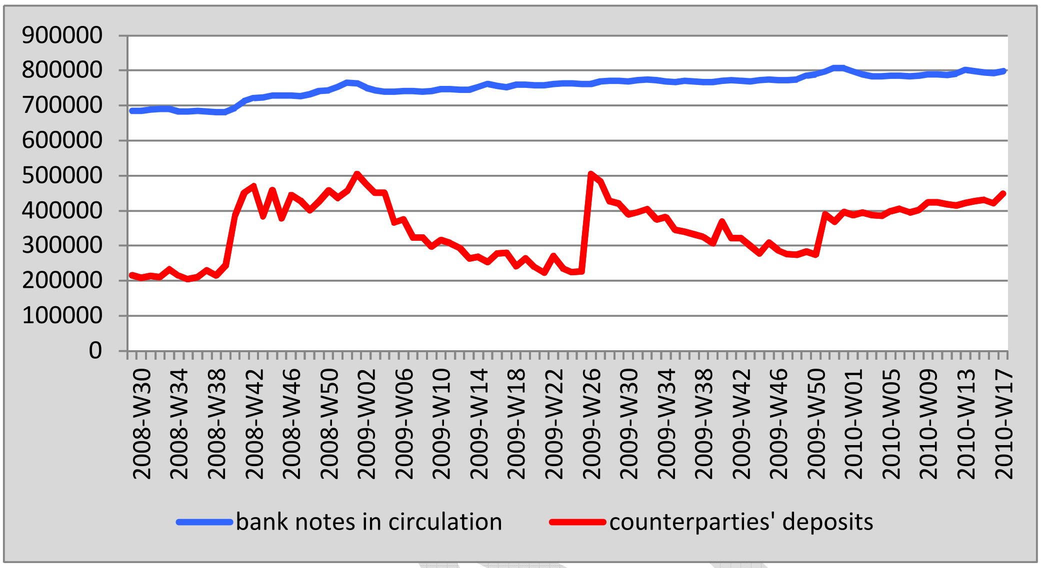
Figure 6: Assets of the Eurosystem during the Solvency Crisis (in millions of euros)



Source: European Central Bank

As in the case of the Fed, the ECB's qualitative easing undoubtedly helped calm the credit markets. However, also as in the case of the Fed and as seen in Figure 7, most of its additional lending ended up in its counterparties' deposits at the National Central Banks (shown in red).

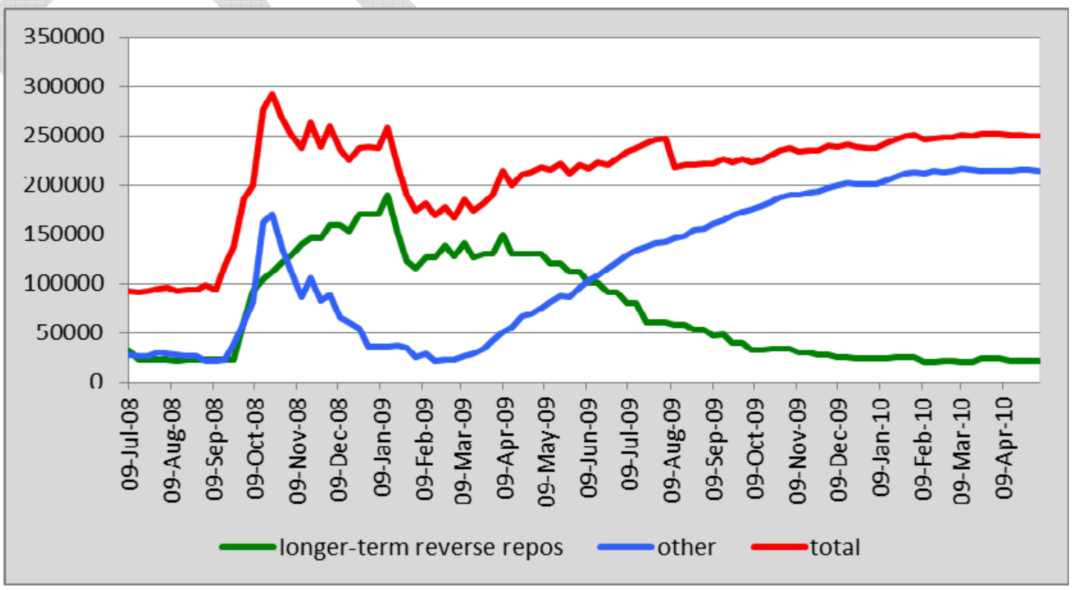
Figure 7: Selected Liabilities of the Eurosystem during the Solvency Crisis (in millions of euros)



Source: European Central Bank

The impact of the Bank of England's monetary policy on its balance sheet during the solvency crisis is shown in Figure 8 below. Following the onset of the crisis, the Bank provided temporary liquidity. A longer-term expansion of its balance sheet did not occur until the MPC's March 2009 decision to use the APF to conduct a quantitative easing policy. The gilts purchased by the Bank under this program are part of the Bank's other assets, shown in blue in Figure 8.

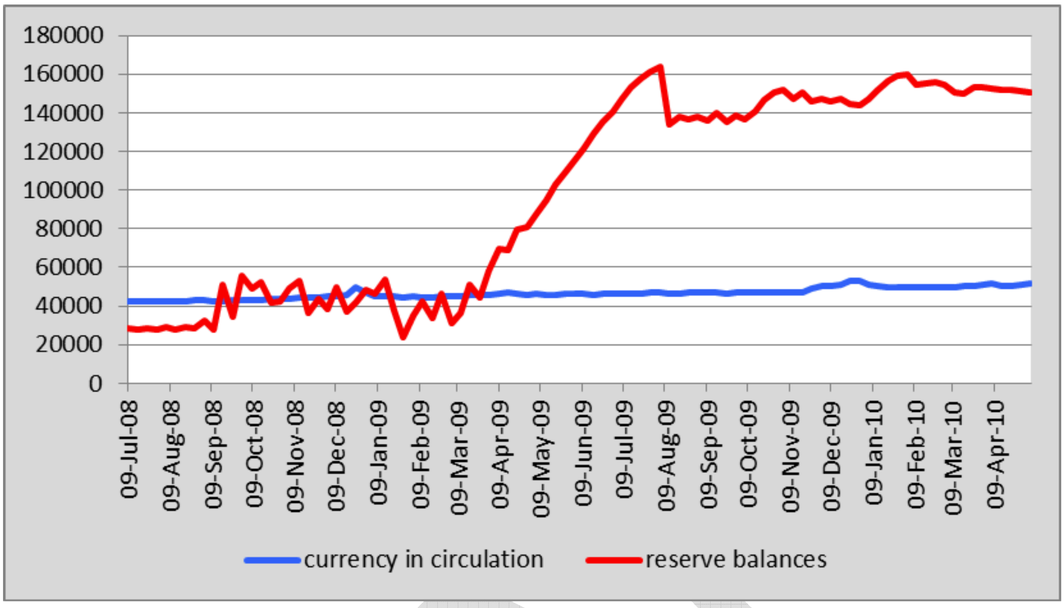
Figure 8: Assets of the Bank of England during the Solvency crisis (in millions of pounds)



Source: Bank of England

As was the case with the Federal Reserve and the ECB, the counterpart on the liability side of the Bank of England's balance sheet to the increase its assets is the increase in depository institutions' reserve balances at the central bank. This is seen in red in Figure 9.

Figure 9: Selected Liabilities of the Bank of England during the Solvency crisis (in millions of pounds)



Source: Bank of England

4. THE SOVERIGN DEBT CRISIS: MAY 2010 TO SPRING 2014

In late April 2010 Standard & Poor's downgraded Greek debt to junk and in early May the interest rate differential between Greek and German ten-year government debt suddenly spiked to 10-1/2 percentage points. A sovereign debt crisis arose.

4.1. Central bank responses to the sovereign debt crisis

The immediate need in the solvency crisis was to restore order to euro area sovereign debt markets. This required the ECB to do something that it was never envisioned it would do: act as lender of last resort to both solvent - but illiquid - and insolvent euro area sovereigns.

4.1.1. Response to the debt crisis

On 9 May 2010, the ECB unveiled its Securities Markets Programme (SMP), deciding to 'conduct interventions in the euro area public and private debt securities markets to ensure depth and liquidity in those market segments which are dysfunctional.' The operations were sterilized with fine-tuning operations and although they enlarged the balance sheet they did not affect the quantity of base money.

In early December 2011, the ECB announced two 36-month full-allotment LTROs whose interest rates varied with the refinancing rate. These were probably intended to restore bank lending, which had become moribund, to calm financial markets and as way of ensuring the private financial sector purchase of sovereign debt in the new-issuance market.[8]

4.1.2. Promoting recovery

Since May 2010, the Fed, the ECB and the Bank of England have attempted – in various degrees – to spur the economic recovery. Their main tools have been quantitative and qualitative easing.

By June of 2010 all of the Fed's special liquidity facilities that had supported markets during the liquidity and credit crises had been closed. However, in response to external dollar funding needs the Fed re-established its swap lines with the ECB, the Bank of England and other central banks. During the course of the sovereign debt phase of the solvency crisis the Fed has pursued a large-scale programme of both quantitative and qualitative easing.

In August 2010 the Fed decided to reinvest the principle payments from agency and agency mortgage-backed securities debt (MBS) in longer term Treasuries. In November 2010 the Fed announced its intention to purchase an additional $600 billion in longer-term US Treasury securities by the end of June 2011. This quantitative easing combined with a maturity twist is referred to as QE2. In September 2011 the Fed engaged in further qualitative easing, deciding to extend the average maturity of its US Treasuries and to reinvest the principle payments from MBSs in MBSs, rather than Treasuries.

In September 2012 the Fed announced what is now called QE3. It would continue to extend the average maturity holdings of its US Treasuries and it would begin buying $40 billion worth of MBSs per month. In December 2012 it announced that it would augment its MBS

[8] See Sibert, Anne, "Non-Standard Policy Measures: A First Assessment," Briefing paper for the Committee on Economic and Monetary Affairs (ECON) of the European Parliament, Apr 2012.

purchases with purchases of $45 billion US Treasuries per month. In December 2013 the Fed decided to begin tapering off its asset purchases. After a sequence of reductions it was announced at the end of April 2014 that the Fed would purchase MBSs at a rate of $20 billion worth per month and longer-term US Treasuries at a rate of $25 billion worth per month.

During the sovereign debt phase of the solvency crisis, the ECB has focused more on calming disorderly markets and less on efforts to promote growth. However, on 5 May 2014, the ECB cut is refinancing policy rate to 0.15 percent and in an attempt to increase bank lending to the private sector, it cut the rate that it pays on its counterparties' deposits at the Eurosystem to minus 0.1 percent. It also announced two four-year maturity Targeted LTROs (TLTROs) that will provide financing to banks that make loans to the non-financial private sector. These LTROs will be held in September and December and banks can borrow up to seven percent of their loans to households and firms, other than mortgages, up to a total of 400 billion euros. Furthemore, the ECB announced that it will no longer sterilize its past purchases of government bonds under the SMPand that preparatory work was underway to launch a programme for the outright purchase of asset-backed securities.

During the sovereign debt crisis phase of the financial crisis, the Bank of England continued its programme of sizable asset purchases. In early Oct 2011 the MPC mandated an increase in gilt purchases of 75 billion pounds. This was followed by a further 50 billion pound increase in mid-February and another 50 billion pound increase in early July 2012.

4.2. How were the responses to the sovereign crisis similar or different and why?

The ECB's fiscal policy response to the sovereign debt crisis through the SMP was similar to the Fed's bailing out AIG during the solvency crisis without the authorization of the US Congress. It was no doubt distasteful to the policy makers involved; it must have damaged the legitimacy of both the ECB and the Fed; it was unfortunately preferable to the alternative.

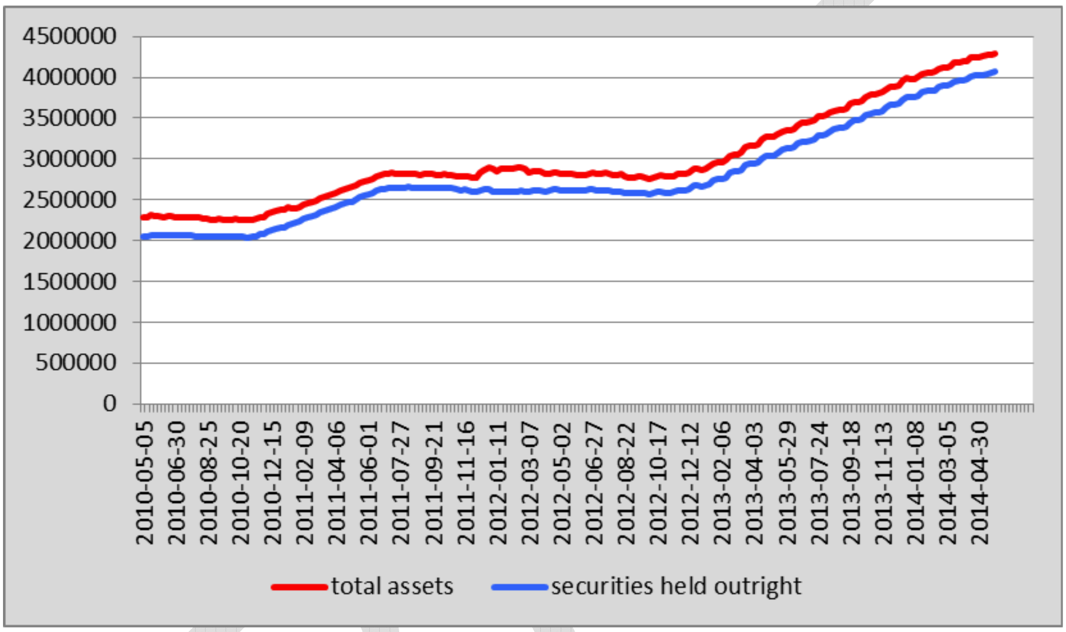
The ECB policy response was effective at calming markets. Moreover, Mario Draghi's 2012 assertion that he would do whatever it takes to preserve the Eurosystem was apparently plausible, eliminating the need to actually intervene. The more credible the lender of last resort is that it will do whatever it takes, the less likely it is that there will be a speculative attack on an illiquid borrower based solely on self-fulfilling expectations.

The ECB's quantitative easing programme during the solvency crisis has been strikingly different from those of the Fed and the Bank of England. The Bank of England accumulated a massive amount of gilts. While the expansion of its balance sheet has stopped, it continues to hold the gilts. The Federal Reserve's balance sheet has ballooned and it continues to purchase securities, albeit at a reduced pace. The ECB on the other hand, did not renew (until the announcement of the TLTROs) the LTROs as banks began to repay them and did not engage in outright purchases of private or government securities to make up for the resulting contraction of its balance sheet, which is now down to about where it was at the start of the solvency crisis.

4.3. The sovereign debt crisis, monetary policy and central bank balance sheets

Figure 10 depicts the total assets of the Fed (in blue) and its holdings of securities (in red). The special liquidity facilities and support for specific institutions that were shown in Figure 4 are no longer depicted: the liquidity facilities were they were closed by the end of the first half of 2011 and the support for specific institutions, always a relatively small component of total assets, had already declined significantly.

Figure 10: Assets of the Federal Reserve System during the Sovereign Debt Crisis (in millions of dollars)



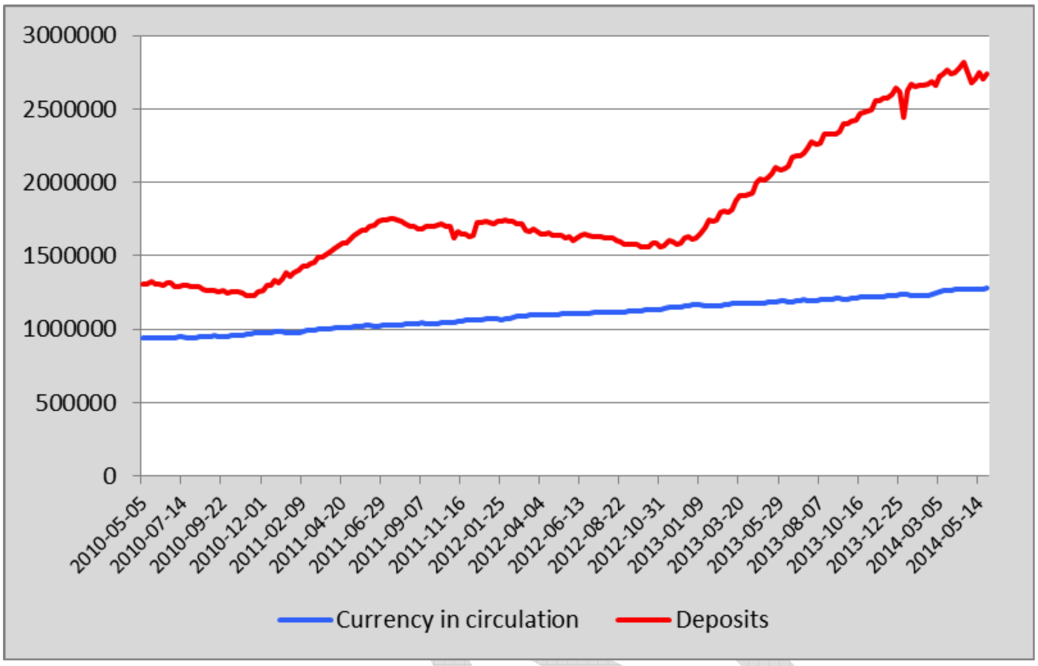
Source: Federal Reserve

As seen in Figure 10 above the Fed's QE2 caused its balance sheet to expand through the first half of 2011 and its QE3 caused it to again rise sharply again in the Autumn of 2012. The tapering of asset purchases is barely visible in the Figure as a decline in the rate of increase of asset accumulation in early 2014.

As of 11 June 2014, the total assets of the Federal Reserve System had mushroomed to about five times their size on 26 July 2007. The proportion of assets made up of securities held outright is little changed from 93 percent to 95 percent. However, in July 2007 all of the securities were US Treasuries, now only 58 percent are Treasures and the rest are MBS.

Selected liabilities of the Fed are shown in Figure 11. As in the solvency crisis phase, the quantitative easing of the Fed in its QE2 and QE3 programs his primarily resulted in increased reserved deposits held at the Fed.

Figure 11: Selected Liabilities of the Federal Reserve System during the Sovereign Debt Crisis (in millions of dollars)

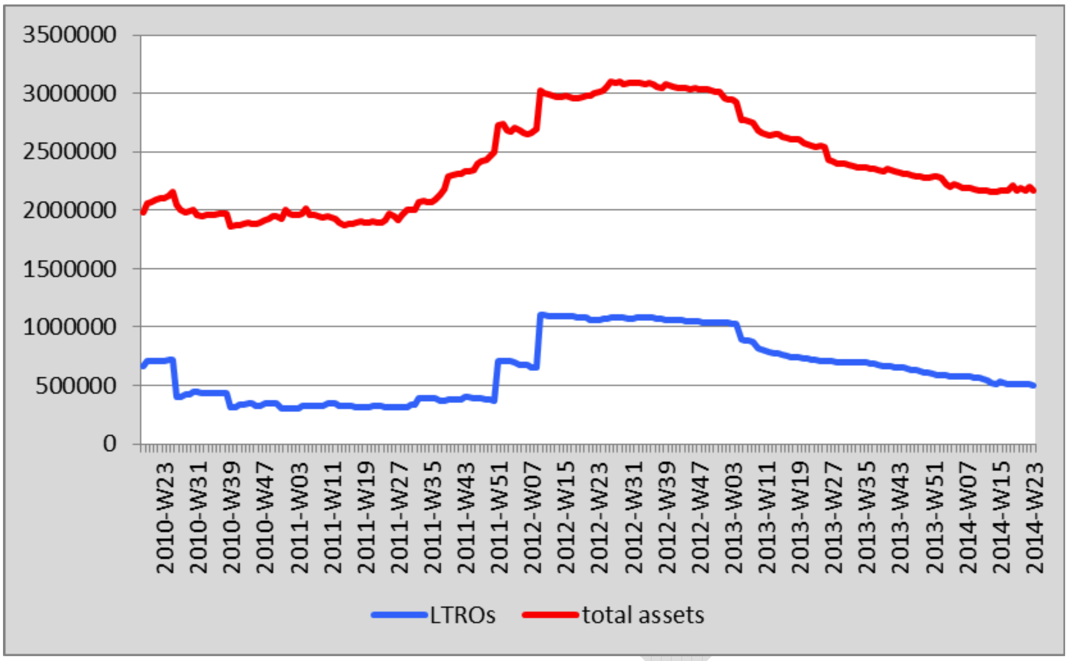


Source: Federal Reserve

As a consequence of its two LTROs, the balance sheet of the Eurosystem swelled in 2012. However, unlike the asset purchase programmes of the Fed and the Bank of England, these measures were purely temporary and the Eurosystem's total assets are little changed from early May 2010. Currently, the ECB holds 167 billion euros of bonds purchased under its SMP.

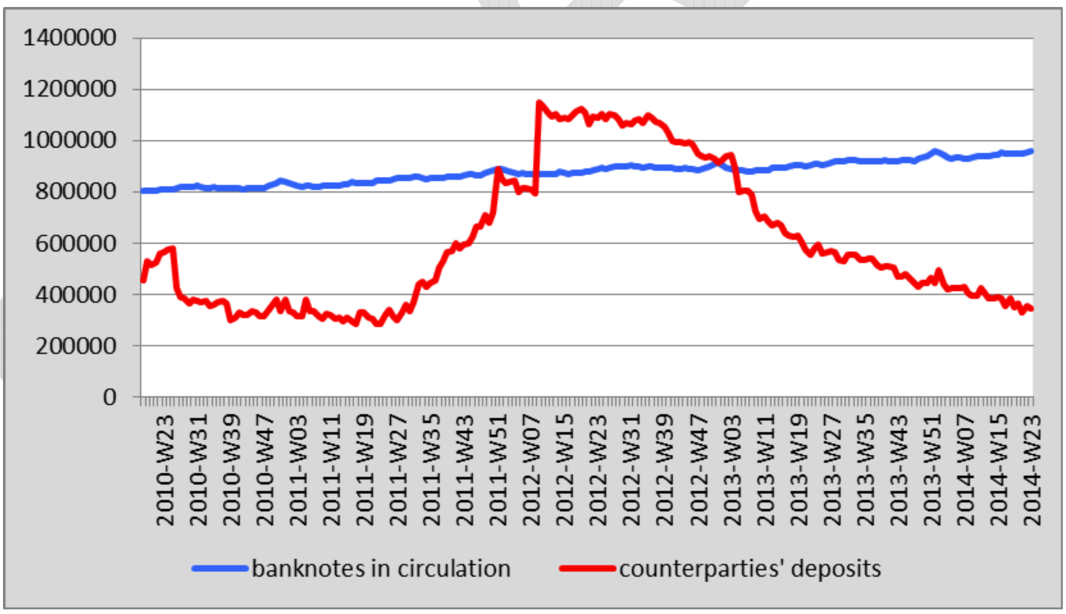
The new measures announced in June 2014 will begin to affect the asset side of the balance sheet in the autumn. If the full amount of 400 billion euros under the TLTROs were to be taken up, total assets would be almost twenty percent higher than their current level.

Figure 12: Assets of the Eurosystem during the Sovereign Debt Crisis (in millions of euros)



Source: European Central Bank

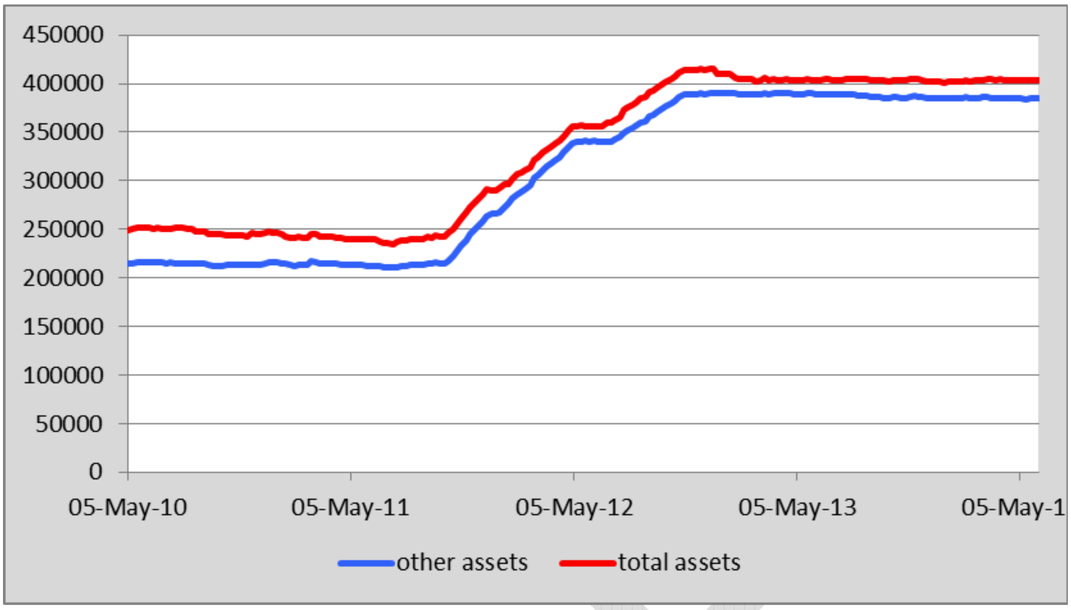
Figure 13: Selected Liabilities of the Eurosystem during the Sovereign Debt Crisis (in millions of euros)



Source: European Central Bank

Figure 14 below depicts the impact of the Bank of England's gilt purchases through the APF on its balance sheet. At the start of the period of the sovereign debt crisis about 80 percent of the Bank of England's assets, shown in red, were made up of the 200 billion pounds of gilts that had already been purchased. These are part of the Bank's other assets, shown in blue. Three additional rounds of purchases brought total gilts purchased up to 375 billion pounds and produced the sharp rise in both the Bank's other and total assets over the period of autumn 2011 through autumn 2012.

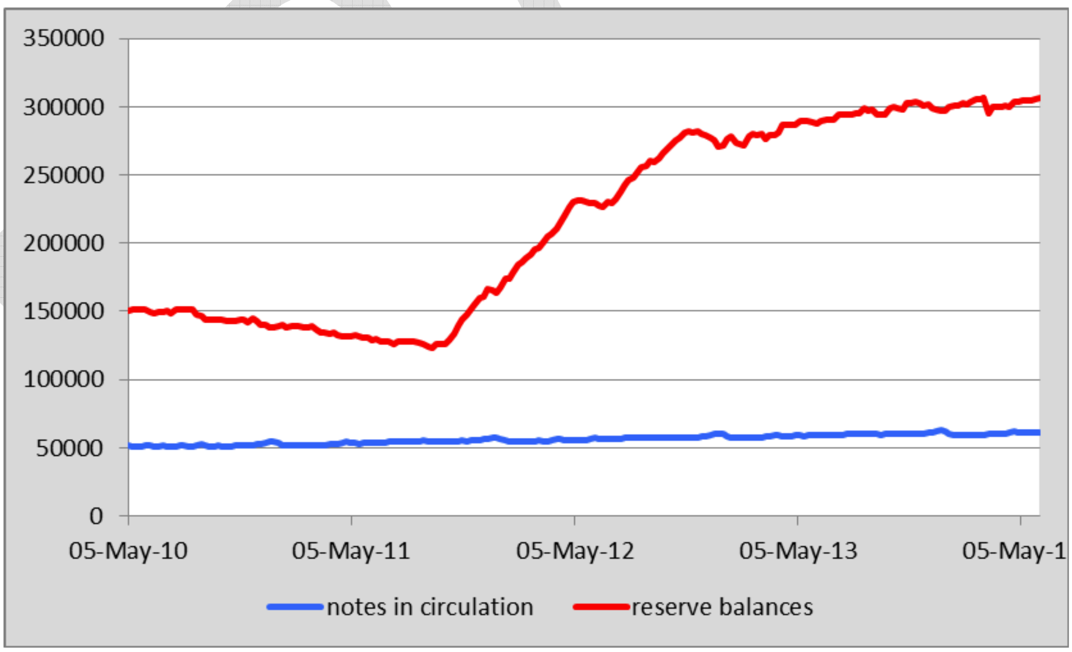
Figure 14: Assets of the Bank of England dduring the Sovereign Debt Crisis (in millions of pounds)



Source: Bank of England

Similarly to other central bank expansions of assets during the financial crisis, the Bank of England's enlargement of its balance sheet mainly produced an increase in reserve deposits at the Bank.

Figure 15: Selected Liabilities of the Bank of England during the Sovereign Debt Crisis (in millions of pounds)



Source: Bank of England

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