

The Response of the Federal Reserve to the Recent Banking and Financial Crisis*

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The financial market crisis moved U.S. central bank policy from a well-established routine of interest-rate targeting to a multi-pronged triage that wedded traditional policy tools with new initiatives aimed at reviving an ailing financial system. The triage was controversial as it entailed support that required discretion over targeting particular markets and firms. These changes in the operation of central bank policy have been especially jarring following a quarter-century of generally quiescent macroeconomic activity and policy, a period often characterized as the “Great Moderation.” With the crisis increasingly moving into the rearview mirror, the timing, size, appropriateness and effectiveness of the measures taken by the Federal Reserve are the subject of much discussion, analysis, and controversy.

In this paper, first, we hope to present an account of the multitude of policy actions taken by the Fed, providing a readable narrative that brings together information that otherwise requires consulting a variety of sources. Second, we also present a framework for thinking about the central bank policy response that gives the reader a means of organizing her own understanding of the response. A key theme is that the traditional tools at the disposal of the Federal Reserve, and much of the structure of banking regulation such as deposit insurance, focused on banks as being at the center of the financial system. With the development of markets such as those for securitized assets and credit derivatives and institutions such as Money Market Mutual Funds, those tools were not sufficient to deal with a wider variety of institutions and markets that have become closely interconnected and central to the function – and dysfunction – of the banking and financial system. The Federal Reserve responded by creating facilities that have expanded the type of counterparties receiving support, broadened the collateral accepted to access the support, and lengthened the maturity of the support. These innovations and exercises of “emergency” powers by the Fed came about in recognition of the limits of the traditional tools to respond to the greatest financial crisis in the United States since the 1930s. We then conclude with highly preliminary thoughts on unwinding the extraordinary actions by the Fed and creating a regulation and supervision framework that acknowledges the dramatic changes that have occurred in the financial system during the last 75 years.

The next section of the paper addresses some broader themes that provide context for analyzing the Fed's response during the crisis. The second section describes the evolution of the traditional policy tools during the turmoil. The third section presents a taxonomy for classifying the nontraditional policy initiatives and then describes the new initiatives using this taxonomy. Conclusions and preliminary lessons for reform are offered in the final section.

I. Context: Evolution of the Financial System and Role of Non-Bank Institutions

Putting aside the chicken and egg question of whether finance leads development or vice versa, there is near universal agreement that a well functioning financial system is part and parcel of a thriving, modern economy and that the financial system is an important conduit through which central bank policy influences prices and economic activity. Naturally, a well functioning financial system will evolve with the economy, and this has certainly been true in the United States. In 1950, depository institutions (banks for short) accounted for 60 percent of the assets held by the financial sector, by 2006 that share fell to 30 percent. To paraphrase the work of Shin (2009) and Adrian and Shin (2009), financial intermediation chains have grown much longer and many of the links in the chain are market-based, non-bank financial intermediaries that do not rely on deposits for their funding. Money market mutual funds (MMMFs) alone, for example, hold roughly \$4 trillion, while total bank deposits are roughly \$8 trillion. Rather than a single bank accepting deposits from households and making commercial loans to firms or mortgage loans to other households, the financial system has evolved so that a lending household might purchase shares in a money-market mutual fund that holds commercial paper issued by a bank that engages in a repurchase agreement with a securities firm that has a special purpose vehicle that issues asset-backed securities that funds a pool of residential mortgages and that purchases credit derivatives from other financial institutions to hedge its exposure to these securities and others in its portfolio, etc. You get the picture.

No matter what the driving forces may be behind this increase in the layers of financial intermediation - ranging from a more efficient allocation of risk to regulatory arbitrage aimed at avoiding

capital requirements - the many layers of intermediation create chains of inter-linkages that can make the entire system more vulnerable to shocks in any one market or at any single institution. These inter-linkages dramatically complicate supervision and the information necessary for monitoring by both market participants and regulators.

Similarly, these intermediation chains and inter-linkages also significantly complicate the ability of a central bank and regulatory authorities to respond to a financial crisis. In a crisis, the classic admonition from Bagehot was for central banks to lend freely but at a high rate of interest to illiquid but not insolvent firms. Fair enough, but does this lending need to be extended to every firm in a long intermediation chain and how do you disentangle liquidity and solvency for some of these market-based intermediaries when price discovery in the markets that would allow for the valuation of assets and liabilities may be significantly impaired and, in some cases, has essentially disappeared?

Suffice to say that, at least in the United States, the tools available to the Fed did not evolve along with the financial system. The Fed's toolkit was essentially set in the 1930s. Open market operations and discount lending, in addition to affecting the overall level of interest rates, are also designed to impact bank reserves and thereby the larger economy via the bank lending channel. When banks are the largest players in the financial system, these tools can be sufficient for quelling a crisis, but they are unlikely to be sufficient in a financial system characterized by long intermediation chains with many market-based intermediaries.

An important legacy of the 1933 Glass-Steagall Act that separated commercial banking from investment banking in the U.S. was to restrict the traditional tools of the Fed to focus narrowly on commercial banks and bank holding companies. The 1999 Gramm-Leach-Bliley Act repealed a number of the legal obstacles erected by Glass-Steagall that prevented a commercial bank from affiliating with entities engaged in investment banking (although it still prohibited a commercial bank from directly underwriting or dealing in many types of securities). Few financial institutions that were not long-standing commercial bank holding companies, however, chose to become "financial holding companies" (FHCs) that would permit access to the Fed's discount window. The large investment banks, for example,

preferred not to be regulated by the Federal Reserve and, in particular, be subject to the minimum leverage ratio (that is, capital to total assets ratio) that banks in the U.S. had to follow. In addition, the Money Market Mutual Fund (MMMF) industry developed to provide a close substitute to traditional checkable deposits at banks. Thus, the Fed had no tools in its traditional repertoire to provide liquidity during a crisis to large and increasingly important segments of the financial system, ranging from investment banks to money market mutual funds.

The current crisis is characterized by both a sharp fall in the market value of assets held by financial intermediaries coupled with uncertainty over which intermediaries are most affected by the drop in asset values. Funding dries up for all intermediaries due to lack of information on intermediaries' exposures to the troubled assets and potentially troubled institutions along with an increase in risk aversion (see Garber and Weisbrod (1992) and Gorton (2009).) Long intermediation chains compound this effect, as firms are concerned not only about the balance sheet of their immediate counterparty, but the balance sheet of firms throughout the intermediation chain. The balance sheet of their counterparties' counterparty thus becomes crucial to evaluating the soundness of an institution. It is not sufficient, for example, to know the amount of asset-backed securities (ABS) or credit protection purchased by an institution but the health of monoline insurers of those ABS and the soundness of sellers of insurance through credit derivatives held by the institution. Concerns about the "fire sale" of assets, due to liquidity or funding problems or requirements to post additional collateral, and the uncertainties of the exposures led to "funding runs." It then becomes extremely difficult to disentangle liquidity from solvency, particularly in such circumstances bid-ask spreads widen so much that in many markets the price-discovery process breaks down. As confidence collapses, the financial system slams to a halt and with it economic activity.

Traditional central bank policy tools can flood the banking system with liquidity, but this liquidity may not spill over to the market-based intermediaries when the financial markets linking the various institutions are not functioning. Open market operations and discount window lending will increase bank reserves, but there is no guarantee that these bank reserves will revive bank lending, or

much less the entire chain of intermediation. Bank deposits, protected by deposit insurance, may be slow to runoff, but bank deposits are a much smaller fraction of the funding of financial activity than once was the case. Institutions increasingly relied on the ability to securitize (that is, to sell) assets, to issue short-term commercial paper, to finance portfolios through secured repurchase agreements, etc., that is, on market-based intermediation rather than deposits. Thus, traditional policy tools can liquefy banks but have little direct effect on either bank traditional lending or market-based intermediaries. Even for banks, but more so for market-based intermediaries, questions about asset quality and capital adequacy remain.

In a crisis, financial firms need access to sufficient liquidity and capital to instill confidence in counterparties in order to successfully intermediate and thereby keep the credit channel open to support economic activity. And this liquidity and capital must be accessed in a timely matter. The U.S. experience during the turmoil indicates that speed is essential in preventing the unraveling of intermediation chains.

As this framework makes clear, the Fed's response to the banking and financial crisis must be understood first within the context of the limits to its traditional toolkit, and second by the need to innovate to keep up with recent changes in the financial system. We begin by focusing on the traditional tools of central bank financial-crisis-response followed by a careful consideration of the new initiatives, what we label the nontraditional response.

II. Traditional Responses

Textbook descriptions of central bank policy usually list three key tools: open market operations, discount lending, and reserve requirements, before going on to say that reserve requirements are a relatively blunt and rarely used tool. As the financial market turmoil spread in August 2007, the Fed responded in what can certainly be described as a textbook or traditional manner with an emphasis on the target federal funds rate (open market operations) and the primary credit rate (discount lending). By way of background, from June 2006 through August 2007, the target federal funds rate was 5.25 percent and

the primary credit rate was 6.25 percent – the 100 basis point wedge between the two rates having been adopted at the time of the discount window overhaul in early 2003.

On August 10, 2007, three days after the August FOMC meeting, in a press release reminiscent of those following the October 1987 stock market crash and the September 2001 terrorist attacks, the Federal Reserve Board announced that it would “provide reserves as necessary” to keep the fed funds rate close to its target and reminded market participants that “the discount window is available as a source of funding.” One week later, the Board voted to reduce the primary credit rate by 50 basis points, halving the usual 100 basis point gap between the primary credit rate and the target federal funds rate, to reduce not only borrowing costs but stigma associated with discount window borrowing. At the September 2007 FOMC meeting, both the target federal funds rate and the primary credit rate were reduced by 50 basis points, the largest reduction in rates since the November 2002 FOMC meeting.

<Insert Figure 1 here>

Figure 1 depicts these changes and shows the subsequent reduction in these two rates over the next two years. From September 2007 through the end of the year, the FOMC reverted to traditional operating easing procedure – reducing the target fed funds rate by 25 basis points at each meeting and the Board bringing down the discount rate in lock-step. In response to the intensification of the market turmoil, however, the FOMC reduced rates by a total of 125 basis points in an unscheduled conference call and at its regularly scheduled meeting during January 2008. Rates were cut an additional 75 basis points at the March FOMC meeting and the spread between the target fed funds rate and the primary credit rate was reduced to 25 basis points. (Non-traditional steps to assist the merger of Bear Stearns and JP Morgan Chase in March will be discussed below). Following a 25 basis point reduction in April, rates were cut another 100 basis points in October, which included an unprecedented internationally coordinated rate cut of 50 basis points, and effectively another 100 basis points in December when the FOMC moved to a target federal funds range of 0 to 25 basis points, hitting the zero-lower-bound.

<Insert Figure 2 here>

A pattern of a gradual increase in the virulence of the crisis can be clearly seen in Figure 2 that plots discount window borrowing at the primary credit rate. Given the huge demand for funds since September 2008, the onset of the crisis in August 2007 appears relatively modest. At that time, however, an increase in primary borrowing from essentially zero to almost \$3 billion was quite large. Pressures emerged again at year-end 2007 with borrowing reaching almost \$6 billion.

III. Nontraditional Responses

By December 2007 it was evident that the traditional financial crisis playbook for central bank policy was not achieving the desired result.¹ From December 2007 through March 2009 the Federal Reserve put in place 16 different facilities or programs to combat the crisis. Temporarily setting aside the question of the effectiveness of these initiatives, the list is impressive both in its length and breadth. Even describing, much less assessing, the initiatives is a daunting task that can get bogged down in a long list of easily confused and easily forgotten acronyms. Any attempt at analysis requires an organizing framework.

Bernanke (2009a) presents a framework that classifies each nontraditional initiative into three descriptive categories: lending to financial institutions, providing liquidity to key credit markets, and purchasing longer-term securities.² For our purposes, an alternative, functional framework may shed more light on the means by which the nontraditional initiatives supported the banking and financial sector. In particular, the policy initiatives can all be thought of as supplementing the traditional central bank policy tools in three dimensions: expanding the type of counterparties receiving support, broadening the collateral required to access the support, and lengthening the maturity of the support. As discussed earlier, the traditional tools of open market operations and discount lending are almost exclusively aimed at short-term liquidity support for the bank-based piece of the financial system. In particular, the direct effect of

¹ Note that in a speech in 2002, then Governor Bernanke outlined non-traditional policy responses to prevent deflation that did provide a playbook for Fed actions during the crisis. See Bernanke (2002).

² This framework has proven quite popular, see Carlson et al (2009) and the charts available at (http://www.clevelandfed.org/research/data/credit_easing/index.cfm). Cecchetti and Disyatat (2009) present a framework based on liquidity.

these traditional tools is felt on bank balance sheets via either short-term transactions involving Treasury securities or the lending of reserves against high quality collateral. Dealing with new counterparties is critical to extending assistance to important markets and firms in the intermediation chain, thereby acknowledging the interconnectedness of institutions and markets that has evolved. Accepting a wider range of collateral allows the Fed to support the financial system that has evolved from simple bank-based lending towards greater reliance upon securitization and market-based intermediation. Finally, extending the maturity of the support provides important flexibility in countering a long-lived crisis and provides confidence to market participants that institutions and counterparties will have a source of funding for longer periods to reduce the likelihood that sudden liquidity problems do not force “fire sales” of assets that could compromise their solvency.

<Insert Table 1 here>

Table 1 presents a chronological listing and some information for the nontraditional policies, including an assessment of the function(s) served by each. The list is remarkable in its length and in the size of some of the policy initiatives. The list demonstrates the determination on the part of the Federal Reserve to contain the crisis – “whatever it takes” in the words of Chairman Bernanke. The Fed was bound and determined to learn the lessons of history – lessons taught both by the U.S. experience during the Great Depression and by the Japanese experience in the 1990s. Three of the five members of the Fed Board at this time (Bernanke, Kroszner, and Mishkin) had done research on the 1930s and financial crises around the globe. Bernanke (2000) lays out these lessons quite clearly:

But Roosevelt’s specific policy actions were, I think, less important than his willingness to be aggressive and experiment – in short, to do whatever it took to get the country moving again. Many of his policies did not work as intended, but in the end FDR deserves great credit for having the courage to abandon failed paradigms and to do what was needed to be done. ... Japanese monetary policy seems to be suffering from a self-induced paralysis. Most striking is the apparent unwillingness of the monetary authorities to experiment, to try anything that isn’t absolutely guaranteed to work. Perhaps its time for some Rooseveltian resolve in Japan.

In the remainder of this section we will provide a short description of the nontraditional initiatives, commenting where possible on the success of each program.

In an effort to remove the stigma associated with discount window borrowing and to allow depository institutions access to longer-term federal funds, the Term Auction Facility (TAF) was put in place in December 2007.³ Rather than the mainly overnight borrowing of funds available at the discount window, the TAF initially made 28-day funds available, with the term increasing to as long as 84 days in August 2008. Figure 3 shows the allocations for each of the auctions as well as the amount of the bids submitted. As can be seen, the Fed only gradually increased the size of the allocations, despite bid-to-cover ratios that averaged 1.7 during the first nine months of operations. Allocations doubled in October 2008 at the peak of the crisis and since then bids have never exhausted the allocation. Outstanding borrowing under the TAF peaked at almost \$500 billion in March, 2009. Most recently, allocations have been gradually reduced in line with improving financial conditions. The TAF was designed to mimic the tenders conducted by the European Central Bank and provides a useful tool, in both crisis and more normal periods, to smooth out fluctuations in the fed funds rate. Armantier, Krieger and McAndrews (2008) provide an extensive analysis of the TAF.

<Insert Figure 3 here>

At the same time as the TAF was established, the Fed also opened up reciprocal currency arrangements, swap lines, with other central banks. Financial institutions abroad had very strong demand for dollars during the crisis. Large demand by European banks, for example, would often send the federal funds rate up sharply in the mornings U. S. time before the markets would close in Europe. After the close in Europe and European institutions had satisfied their demands, reserves would flow back into the system and the federal funds rate would then often fall sharply. This international connection introduced volatility and complicated the task of the desk at the NY Fed to maintain the target rate. We classify these swap lines as non-traditional in that they are not typically one of the tools used to implement central

³ The replacement of discount window adjustment credit with primary credit in 2003 was clearly not enough to remove the perceived stigma associated with access to the discount window by institutions judged to be “sound.”

bank policy; however, they have a long history dating back to 1962.⁴ The upper half of Table 2 provides data on the introduction and limits for the swap lines, while the bottom half shows the outstanding balances for each line at quarterly intervals. All told, swap lines were established with 14 different central banks during the crisis.

<Insert Table 2 here>

Under the swap, the Fed provides dollars to the foreign central bank, while at the same time, the foreign central bank provides the equivalent amount of funds in its currency to the Fed, based on the market exchange rate at the time of the transaction. The exchange of funds is reversed in as little as one day or as long as three months, using the same exchange rate as in the initial transaction. Under these most recent arrangements, the Fed agrees to hold foreign exchange over the term of the swaps in special accounts at the foreign central banks. The System will earn no interest on these accounts and has agreed not to withdraw foreign currencies from these accounts. Foreign central banks will only draw dollars through the swap lines as they need them. They will use these dollars to provide liquidity to their banking institutions and financial markets. The foreign central banks guarantee full repayment of any drawing, and any interest earnings from lending these dollars revert to the System. The asymmetric interest payments act as a penalty rate for the foreign central bank, providing some incentive to discontinue the lines as financial markets improve.

In December 2007, lines were established with the ECB and the Swiss National Bank. As the crisis peaked in September and October 2008, lines were established with additional central banks and the sizes of the lines were increased. Baba et al. (2009) document the importance of increasing the swap lines as a result of runs on MMMFs in September 2008 (discussed below.) Total drawings under the lines peaked in December 2008 and have declined since then, now standing at less than \$40 billion. In terms of our taxonomy, the swaps expand the counterparties to which the Fed can provide assistance via the foreign central banks, which then could lend these dollars directly to their domestic institutions.

⁴ See Bordo, Humpage and Schwartz (2009) for details. Most notably, swap lines were used to support the Canadian dollar in 1962 and pound sterling in 1967. Under NAFTA, the Fed maintains two ongoing swap lines with Canada and Mexico.

Just prior to the December 2007 policy innovations, market anxiety began to breach the levels seen in September 2007. The LIBOR/OIS spread (discussed below) rose to more than 100 basis points in late November, more than ten times what it had averaged during the years prior to the crisis. Following the implementation of TAF and the swap lines, this spread dropped relatively quickly, returning to a 20 basis points in January 2008. By this measure, the TAF and swap lines would be judged an initial success at relieving pressure in the inter-bank funding market (see McAndrews, Sarkar, and Wang (2009).) By March 2008, however, the spread had returned to 65 basis points on concerns over the viability of Bear Stearns and the consequences of its collapse for other players.

At this point in time, newer measures were needed to relieve pressures on non-depository institutions without access to either the discount window or the TAF. The ghost of Glass-Steagall haunted the halls of the Fed because the Fed did not have traditional tools to provide liquidity to key institutions facing liquidity crises whose demise could have profound effects on the financial system. Moving quickly to mitigate the potential turmoil associated with the troubles at Bear Stearns, the Fed introduced the Term Securities Lending Facility (TSLF), the Primary Dealer Credit Facility (PDCF) and provided assistance to facilitate the merger of Bear Stearns with JPMorgan Chase, assistance channeled through the Maiden Lane limited liability corporation.

In the week prior to the merger of Bear Stearns, the Term Securities Lending Facility (TSLF) was put in place to lengthen the term over which Treasury securities could be borrowed by primary dealers from the System Open Market Account (SOMA). The usual overnight lending of Treasuries reached \$20 billion in late February 2008, signaling a clear appetite for a risk-free asset. In an attempt to relieve additional pressure in the Treasury markets, the maturity on lending was extended to 28 days in a series of weekly, rather than daily, auctions. Roughly every other week, auctions were held requiring Schedule 1 collateral followed the next week with an auction backed by Schedule 2 collateral. Schedule 1 collateral includes Treasury securities, agency securities, and agency mortgage-backed securities. Schedule 2 collateral adds highly rated private securities to the list of eligible collateral. Fleming, Hrung, and Keane (2009) discuss the TSLF in detail.

The troubles at Bear Stearns made the Fed acutely aware of the constraints that it faced under the traditional policy of lending in a crisis – because the traditional tools could not provide liquidity directly to crucial financial institutions that were not bank holding companies but that might be crucial, directly or indirectly, to the availability of market-based funding for the banking system. The inter-linkages of market-based intermediaries raised concerns about the consequences for counterparties of the failure of an institution such as Bear Stearns, hence for the stability of the financial system as a whole.

In these circumstances, the Fed Board exercised the so-called 13(3) emergency powers granted to it in the 1932 amendments to the Federal Reserve Act to expand beyond its traditional tools to provide lending to “any individual, partnership, or corporation” in “unusual and exigent circumstances” to stabilize the financial system (see Fetting 2008). The Congress required that a supermajority of five votes or more of the seven Board members to make a determination that the situation was “unusual and exigent.” Since the Fed Board has had only five members during 2008 and 2009, this meant that each Board member had the ability to veto any of the exercises of these emergency powers. In particular, during the weekend of the Bear Stearns collapse, the Board unanimously agreed to create a facility that would allow wider access to Fed liquidity to a significant class of non-depository institutions in the financial markets.

The Primary Dealer Credit Facility (PDCF) was established to give primary dealers (mostly investment banks) access to overnight federal funds – effectively discount window access. These dealers pay the same primary credit rate that depository institutions are charged. As can be seen in Figure 4, borrowings quickly reached almost \$40 billion in early April 2008 but fell off quite rapidly as market conditions improved. In July and August 2008 the PDCF was almost completely inactive. Lending soared with the September and October 2008 market turmoil, reaching almost \$150 billion. While TSLF allocations did not move in September and October, the PDCF accommodated additional demand. Obviously, the two facilities did not prevent the re-emergence of financial stress during September and October, but it is likely that the strains would have been much greater without these facilities, in particular the PDCF (see Adrian, Burke and McAndrews (2009) and Atruc and Demiralp (forthcoming).)

<Insert Figure 4 here>

The assistance to facilitate the merger of Bear Stearns with JP Morgan Chase in March 2008 became the first of the Fed's initiatives aimed at particular financial institutions. As the merger was finalized in June 2008, the FRBNY extended a \$28.8 billion dollar ten-year loan to Maiden Lane to provide liquidity support to finance \$30 billion in former Bear Stearns assets.

The policy measures put in place in early March 2008 generated an enormous amount of controversy (see Volcker (2008)). In effect, the Fed "crossed the Rubicon" by both dramatically expanding its counterparties and by facilitating the resolution of Bear Stearns. The broadening of collateral and expansion of counterparties undertaken in early March 2008 were unprecedented. It also raised concerns at the Fed and the Treasury about the inability of the existing bankruptcy regime to deal with the failure and resolution of a large non-depository institution (see see Kroszner 2009a and Swagel 2009).

Markets remained under heightened stress for roughly 10 weeks beginning in March 2008. Conditions eased slightly and were much less volatile from the middle of May 2008 through early September and this period saw only one additional initiative on the part of the Fed – the introduction of options on the TSLF (TOP). These options were designed to help relieve quarter-end pressures when firms might feel heightened need for risk-free assets and all the options required Schedule 2 collateral. Through 2008, auctions were heavily subscribed with bid to cover ratios average 1.75. The two auctions conducted in 2009 generated much less interest and the program has been suspended. These options programs bore some resemblance to a program that the Fed created to accommodate the strong liquidity demand that occurred during Y2K.

The conservatorship of Fannie Mae (FNMA) and Freddie Mac (FHLMC) marked the beginning of the most virulent phase of the financial crisis – September through December 2008. In the second week of September, investment banks and many commercial banks were facing extraordinary funding pressures and the Libor-OIS spread was rising rapidly. Their funding horizons had been shortening as risk appetites declined, meaning that an enormous amount of paper had to be rolled overnight or over very short horizons. In many cases, these institutions were having much difficulty obtaining funding even at

these short horizons and even in fully secured overnight borrowing markets, the repo markets. In addition, a number of market participants were pulling away from institutions where there were rumors or concerns about solvency – not only as counterparties but as clients. This implosion of their business model stemming from uncertainty about how different parties would be treated in bankruptcy (see Kroszner (2009a)) only made market participants more concerned about their viability.

In one momentous weekend in mid-September, 2008, the ghost of Glass-Steagall was truly vanquished. In a transformation that in normal circumstances might have taken years, large independent investment banks disappeared in a couple of days. Morgan Stanley and Goldman Sachs requested and received permission on an emergency expedited basis to become commercial bank holding companies regulated by the Fed. Bank of America purchased Merrill Lynch. Despite efforts by the Fed and the Treasury, a merger partner for Lehman, which had been struggling to survive for months prior to the conservatorship of Freddie and Fannie, could not be found and it entered bankruptcy.

At the same time, one of the world's largest insurance companies AIG (a thrift holding company, because it owned a thrift, hence supervised by the Office of Thrift Supervision) was on the verge of collapse. AIG faced credit ratings downgrades and large requirements to post collateral due to enormous exposure in the credit derivatives markets (particularly credit default swaps -- CDS) taken on by its AIG Financial Products subsidiary. It had effectively sold large amounts of insurance in the CDS market but had done so with few reserves. The potential collapse of AIG raised the possibility of two types of significant disruptions. First, impact of its failure through its enormous set of counterparty inter-linkages could have been damaging to many institutions and markets. Second, its downgrading and possible default would have triggered state insurance regulators to force the underlying insurance operating companies into receivership which could voided the insurance policies of millions of individuals and enterprises.

To avoid these potentially deep disruptions, on September 16th the Fed Board authorized the FRBNY to provide up to \$85 billion secured lending for up to two years to AIG at a rate of 850 basis

points above three-month LIBOR, an offer that was immediately taken up.⁵ This was the first of a number of actions to stabilize AIG. The second, announced in October, 2008, provided an additional \$37.8 billion in liquidity to AIG via FRBNY borrowings of securities from AIG backed by cash collateral posted by the FRBNY. On November 10, 2008, Fed assistance to AIG was restructured. AIG used TARP funds to reduce the balance on the \$85 billion loan to \$60 billion. In addition, the FRBNY extended credit to the newly created Maiden Lane II and Maiden Lane III corporations that respectively purchased \$22.5 billion in residential mortgage-backed securities and \$30.0 billion in collateralized debt obligations from AIG. The Maiden Lane II facility replaced the October \$37.8 billion facility. Both the Maiden Lane II and Maiden Lane III loans have a term of six years with an interest rate 100 basis points above one-month LIBOR.

Another key non-bank intermediary began to experience extraordinary liquidity pressure, namely money market mutual funds (MMMFs, also called 2a-7 funds). As noted above, MMMFs hold roughly half as much as banks do in deposits and the MMMFs were key funding sources for short-term bank paper and repo agreements. MMMF shareholders had traditionally treated MMMFs as near-perfect substitutes for deposits because they had consistently been able to maintain the value of each share at \$1. That began to change in this period as shareholders became concerned about the value and liquidity of their investments and began to withdraw their money. As can be seen in Figure 5, the largest withdrawals were made by institutional shareholders.

<Insert Figure 5 here>

The net asset value of the Primary Fund, a heavy purchaser of Lehman notes and the flagship fund in the historically important Reserve Funds complex, fell below \$1.00 per share on September 16, 2008 – the first time such a major money market mutual fund had “broken the buck.” This significantly exacerbated the run that had begun on MMMFs: redemptions totaled \$300 billion the week of September 15th. In turn, the MMMFs rushed for the liquidity and safety of Treasury securities and shunned their long-standing role as funders of the banking system. The run on the MMMFs thus led to a “funding run”

⁵ On November 10, 2008 the rate was reduced to 300 basis points above LIBOR.

on the banks, since the banks suddenly lost much of this significant source of financing. Baba et al (2009) document that this source of funding was important not only for U.S. banks but also crucial for European banks, eventually leading to the increase in central bank swap lines discussed above as a partial replacement for this funding source. The impact of the MMMF run provides a clear example of the global and interconnected nature of the crisis.

To stanch the runs on the MMMFs, on September 19th, the Treasury, using the Exchange Stabilization Fund, provided a temporary guarantee of \$1 per share for MMMF accounts and funds began to flow back into these accounts. Importantly, the guarantee was only for the amount in a MMMF account as of the date of the announcement of the program. A full guarantee that covered future inflows could have precipitated a liquidity drain, or even a run, on bank deposits, which at the time were guaranteed up to only \$100,000. Soon after, the FDIC was authorized to increase deposit insurance to \$250,000 and provide unlimited guarantees for non-interest-bearing transactions accounts that are typically used by businesses.

The Fed also announced a significant new program on September 19 to try to restore the ability of banks to obtain short-term secured financing. The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) extends non-recourse loans at the primary credit rate to U.S. depository institutions and bank holding companies to finance purchases of asset-backed commercial paper (ABCP) from money market mutual funds at amortized cost rather than market prices. Loans under AMLF could be used to purchase ABCP with maturities up to 120 days for depository institutions or 270 days for bank holding companies. The cash raised by the funds from selling the ABCP then allows the MMMFs to honor their redemptions and, thus, increase the willingness of MMMFs to return to their role of providing short term secured funding to the banking system. The AMLF was accessed immediately, see Figure 6, reaching \$152 billion on October 1, 2008.

<Insert Figure 6 here>

With the turmoil in the financial markets reaching a fever pitch, on September 20th, the Treasury department, with the support of the Federal Reserve, submitted legislation to Congress to request \$700

billion for a Troubled Asset Relief Program (TARP) (see Swagel (2009) for a comprehensive discussion of the program and the politics). In the following week, major financial institutions were either failing or facing significant funding and liquidity pressures. Evidence of these strains can be seen in Figure 7 that shows one measure of bank fragility, the LIBOR-OIS spread, which was reaching extraordinary levels.

<Insert Figure 7 here>

On September 25th, Washington Mutual (WaMu), a thrift holding company that had been suffering for many months from large exposures in mortgage lending in some of the hardest hit areas of the country, failed and was acquired by JP Morgan Chase. Wachovia, the fourth largest bank at the time, was also on the brink of failure, and on September 29th reached an agreement in principle to be acquired by Citigroup with FDIC assistance. Roughly a week later, Wells Fargo agreed to acquire Wachovia without FDIC assistance, and the FDIC approved the Wells acquisition of Wachovia. On the same day, October 3, the Emergency Economic Stabilization Act of 2008 (EESA) was passed by Congress.

During early October, the Federal Reserve continued to work on relieving the stress and strains in the commercial paper market and on October 7 announced the establishment of the Commercial Paper Funding Facility (CPFF). After growing very rapidly during the 2000s to become a more-than \$1 trillion source of financing, asset-backed commercial paper (ABCP) issuance had been falling steadily since the turmoil began in the summer of 2007 (see Figure 8).

<Insert Figure 8 here>

In September and early October, 2008 financial firm issuance fell precipitously as risk appetites waned. Spreads on commercial paper jumped, most notably for the riskier A2/P2 variant shown in Figure 9. The CPFF is a special purpose vehicle funded by a FRBNY loan and supported by the U.S. Treasury that makes direct purchases of three-month unsecured and asset-backed commercial paper. The commercial paper purchased through the CPFF is discounted using a rate equal to the three-month overnight index swap (OIS) rate plus a spread. The spread for unsecured commercial paper is 100 basis points and the spread for ABCP is 300 basis points. Unsecured commercial paper issues also pay a 100

basis points surcharge. The spreads were chosen to discourage use of the CPFF as market conditions stabilize.

<Insert Figures 9 and 10 here>

The first purchases under the CPFF were made in late October and the facility held \$300 billion in commercial paper by early December, seen in Figure 10. Holdings of the CPFF have gradually run-off since January 2009 and now stand at around \$15 billion. The effectiveness of the CPFF can be assessed by looking at both commercial paper outstanding as well as commercial paper interest rates. By the former measure, the CPFF can be judged to have slowed the decline in issuance while by the latter it has relieved pressures in the commercial paper by sharply reducing A2/P2 rates (see Anderson (2009).)

In an effort to further support money market mutual funds, the Money Market Investor Funding Facility was also established in October 2008. The MMIFF was designed to complement both the AMLF and CPFF by providing funding to private special purpose vehicles created to purchase certificates of deposit, bank notes and financial commercial paper with maturities of less than 90 days from money market mutual funds. Thus, the AMLF financed purchases of asset-backed commercial paper from money market mutual funds by banks and bank holding companies, the CPFF supported the purchase of commercial paper from any seller, not just money market mutual funds, and the MMIFF was designed to broaden the class of assets to be purchased from money market mutual funds. Originally, the FRBNY was given authorization to lend as much as \$540 billion to the special purpose vehicles under the MMIFF. However, the pressures on money market funds eased in late October and November and the FRBNY has yet to extend any loans under the MMIFF.

Also during this period, effective October 9, 2008, as authorized by the EESA, the Fed began to pay interest on banks' required and excess reserve balances. Initially, banks earned 75 basis points less than the target federal funds rate on excess reserves, two weeks later the 75 basis point differential was narrowed to 35 basis points, and two weeks later, in early November, the differential was eliminated. At the December FOMC meeting, the rate on excess reserves was set at 0.25 percent where it has since remained.

For many years the Fed sought the ability to pay interest on reserves. Authorization was granted effective October 1, 2011 under the Financial Services Regulatory Relief Act of 2006. Paying interest on reserves removes the deadweight losses associated with the implicit tax on required reserves and allows for better targeting of the federal funds rate via enhanced control of holdings of excess reserves. Moreover, the ability to pay interest allows the Fed to better manage its balance sheet independently of the Treasury, both during the expansion of the balance sheet during the crisis and the managing of its balance sheet and reserves as the crisis fades (see Bernanke 2009b and Kroszner 2009b). While paying interest on excess reserves may have provided an incentive for banks to hold more reserves in late 2008 and 2009, this move does not appear to have been all that quantitatively important.⁶

On October 14, two key initiatives supporting the banking sector were announced. First, the Treasury would use TARP funds to inject capital into financial institutions through the purchase of preferred stock and warrants, the Capital Purchase Program (CPP). This is similar to the purchase of preferred stock in banks by the Reconstruction Finance Corporation during the 1930s (see Kroszner (1994) and Jones (1951)). On October 14, nine of the largest banks announced that they would accept \$125 billion of government capital under this program. Second, the FDIC would guarantee the senior debt obligations of FDIC-insured depositories and their holding companies under the Temporary Liquidity Guarantee Program (TLGP). As Figure 7 illustrates, after the announcement of these programs and the Fed actions of early October, the Libor-OIS spread began to come down from unprecedented heights. Table 3 provides some information on the size and usage of the FDIC loan guarantee, and Table 4 presents information on the TARP allocations and repayments for 17 of the largest financial institutions through September 2009.

<Insert Tables 3 and 4 here>

⁶ The initiatives put in place in September and October 2008 would result in a large increase in the monetary base. At the time, Federal Reserve officials did not welcome such an increase. Therefore, on September 17, 2008 the Treasury announced, at the request of the Federal Reserve, a supplementary financing program under which proceeds from the sale of newly issued Treasury bills would be deposited at the Fed in a special account. The Treasury sale of supplemental Treasury bills drained bank reserves even as the lending under the new initiatives added to bank reserves. This supplemental account diminished in importance over the next few months as it became clear that an increase in reserves was not an inflationary concern.

Late November 2008 also saw a flurry of new initiatives. The Fed joined Treasury and the Federal Deposit Insurance Corporation (FDIC) in providing a package of support to Citigroup, in particular guaranteeing \$306 billion in Citigroup assets backed by residential and commercial real estate. The Fed agreed to provide a non-recourse loan to Citigroup in the event that losses on the asset pool amount to more than \$46 billion, with losses above this amount split 90/10 between the Fed and Citigroup. The loan would carry an interest rate of 300 basis points above the Overnight Index Swap (OIS) rate. This guarantee is in place for 10 years for residential assets and 5 years for non-residential assets. To date, no Fed lending has been provided to Citigroup.

Two programs were announced on November 25, 2008. The Term Asset-Backed Securities Loan Facility (TALF) is a joint operation of the Fed and Treasury. Again exercising its 13(3) emergency powers to lend to individuals, partnerships, and corporations in “unusual and exigent” circumstances, the Fed Board unanimously authorized the FRBNY to provide non-recourse loans to owners of newly issued and highly rated asset back securities (ABS). TARP funds would be used to capitalize a special purpose vehicle (SPV) that would purchase and manage any assets received by the FRBNY in connection with the TALF loans. By putting the Treasury in the first loss position through its purchase of subordinated debt in the SPV, the structure of the TALF then permitted the Fed to be able to accept a wider variety of collateral and for longer horizons and hence provide direct liquidity support to a broader set of securitized credit markets than previous facilities had permitted.

As the TALF was originally constructed, the FRBNY would lend on a non-recourse basis to owners of newly issued, AAA-rated, asset backed securities (ABS) collateralized by student loans, auto loans, credit card loans, and loans guaranteed by the Small Business Administration. This lending was meant to revive the securitized credit markets serving households and small businesses. Initially, the Treasury provided \$20 billion in TARP funds for loss protection to the FRBNY and the TALF was limited to \$200 billion. In February 2009, the TALF was expanded to include newly issued ABS collateralized by commercial and residential mortgage-backed securities. At the same time, the limit on the TALF was increased to \$1 trillion with the Treasury TARP loss protection increasing to \$100 billion.

In May 2009, CMBS issued before January 1, 2009 (legacy CMBS) were added to the list of eligible collateral for the TALF. The rates charged on the TALF loans vary by collateral, ranging from 50 basis points over one-month LIBOR to 100 basis points over the five-year LIBOR swap rate. Loan amounts are determined by haircuts that vary across sector and maturity, ranging from a low of 5 percent applied to prime credit card assets with a maturity of less than one year to 16 percent for auto rentals with a maturity between four and five years. Here again, this rate and haircut structure should discourage TALF issuance as market conditions normalize.

The TALF was designed to offer liquidity and reduce uncertainty during times of stress to revive the functioning of these markets. The creation of the TALF seems to have had an impact on stabilizing these markets even before the first lending under the program took place in late March 2009. Spreads on ABS issuances have come down significantly since the TALF and its extension have been announced. Prices for CMBS securities moved up, for example, upon announcement that the program was expanded to include that class of securities. Lending under this program has grown slowly as markets for these securities have normalized and currently stands at \$44 billion (Figure 11). In some sense, the slow growth of the program suggests that it is a victim of its own success. According to Dudley (2009) TALF lending supported roughly half of all the consumer ABS issuance since March, although new ABS issuance is still down significantly from its peak in early 2007.

<Insert Figure 11 here>

On the same day that the TALF was announced, the Fed also announced plans to purchase direct obligations of housing-related government sponsored enterprises⁷ (GSEs) as well as mortgage-backed securities guaranteed by Fannie Mae, Freddie Mac, and Ginnie Mae. Upon announcement of the program, their costs of funding dropped noticeably. Initially, purchases were capped at \$100 billion for the direct obligations and \$500 billion for the mortgage-backed securities. Purchases commenced in early December 2008 for the direct obligations and early January 2009 for the guaranteed mortgage backed

⁷ Federal National Mortgage Association (Fannie Mae), Federal Home Loan Mortgage Corporation (Freddie Mac), and the Federal Home Loan Banks

securities. At the March 2009 FOMC meeting the caps were increased to \$1.25 trillion for mortgage-backed securities and \$200 billion for the direct obligations. To date, almost \$850 billion in mortgage-backed securities have been purchased and more than \$150 billion in direct obligations, as can be seen in Figure 12.

<Insert Figure 12 here>

These purchases were designed to “reduce the cost and increase the availability of credit for the purchase of houses, which in turn should support housing markets and foster improved conditions in financial markets more generally.” With regard to cost, the spread of 30-year conventional mortgages over 30-year Treasuries has fallen from almost 250 basis points in late November, 2008 to a current spread of roughly 60 basis points. Availability is harder to judge, given data lags, but appears to be mixed. In the first quarter of 2009, net borrowing via agency and GSE-backed securities fell while net borrowing via mortgages increased. As of November 2009, these purchases are to be completed by the end of the first quarter of 2010 and the size of direct obligation purchases was reduced to \$175 billion.

In January 2009, the Fed joined Treasury and the Federal Deposit Insurance Corporation (FDIC) in providing a package of support to Bank of America that is quite similar in structure to the support provided to Citigroup. The Fed’s non-recourse loan guarantees the return on a pool of \$118 billion in Bank of America assets backed by residential and commercial real estate. Fed lending would be tapped in the event that losses on the asset pool amounted to more than \$18 billion, with losses above this amount split 90/10 between the Fed and Bank of America. To date, no Fed lending has been provided to Bank of America.

The last nontraditional policy measure to be introduced is the purchase of longer-term Treasury issues “to help improve conditions in private credit markets.” This announcement was made at the conclusion of the March 2009 FOMC meeting and a cap of \$300 billion was placed on longer-term Treasury purchases. At the August 2009 FOMC meeting it was announced that the full \$300 billion is to be purchased by the end of October 2009. As of this writing, the \$300 billion in longer-term Treasuries purchases have been completed (Figure 12). The bulk of these purchases, about 85 percent, have

involved maturities between 2 and 10 years, with most of the balance in maturities greater than 10 years. On the March 18, 2009 announcement, the yield on the 10-year Treasury fell almost 50 basis points but since then has risen, on balance, more than 120 basis points. Obviously, movements in Treasury yields give little indication of the program's success or failure considering all the other determinants of Treasury yields, in particular, the evolution of the government's fiscal situation. Even after these purchases are completed, the amount of Treasuries on the Fed's balance sheet will be roughly the same (\$800 billion) as in early August 2007. Of course the maturity of these Treasury securities will have lengthened significantly, In early August 2007 only 20 percent of the Treasuries had a maturity of greater than 5 years, now that figure stands at 45 percent.

IV. Conclusions and Lessons for Reforms

One of the key lessons from the recent crisis is that supervision, regulation, and the tools of the central bank must keep pace with developments and change in financial markets and institutions. In the U.S., the focus had been too narrow on commercial banks and commercial bank deposits, partially a legacy of the Glass-Steagall Act. As the crisis revealed, many institutions beyond commercial banks are crucial to the healthy functioning and stability of the financial system and that "funding runs" can pose perhaps a greater threat to the stability of banking and financial institutions than traditional depositor runs. The interconnectedness of financial institutions and markets globally through long market-based intermediation chains should be taken into account when assessing the winding down of new various facilities and proposals for regulatory reform.

The actions undertaken by the Fed during the crisis to expand lending to non-traditional counterparties, broaden the acceptable collateral against which it would lend, and lengthen the maturity of its lending were an acknowledgement of the narrowness of the traditional tool set to deal with a modern financial crisis. Judging the effectiveness of the new facilities and emergency actions of the Fed is of course a complicated task, plagued, as always in economics, by the absence of the counterfactual had the policies not been followed. As the tone of the previous sections makes clear, and with recovery seeming

to take hold, we judge the combination of traditional and non-traditional responses to have been on balance successful in preventing the Great Recession from turning into a repeat of the Great Depression. While the effectiveness of individual initiatives will continue to be debated, the key issue going forward is to consider what comes next for the initiatives and how supervisory and regulatory policy can be shaped to improve the resiliency of the system.

As noted above, all of the facilities and initiatives summarized in Table 1, with the exception of the three Maiden Lane LLCs and direct purchases of longer term assets, were structured to naturally wind down as their charges and fees become more onerous with declining risk spreads brought about by a return to normal market functioning. This natural diminution can be clearly seen with the TAF, TSLF, PDCF, AMLF, CPFF, and the swap lines. In addition, in the December 2009 FOMC statement, the Federal Reserve reiterated its intention to shutter these facilities by February 1, 2010, with the exception of the TAF which will gradually be reduced in size. (As noted above, the TAF is an effective way to provide the equivalent of discount window lending while avoiding stigma, similar to ECB credit provision programs, so it may make sense to maintain a facility like this over time.) The TALF is scheduled to be phased out by mid-2010. For the longer-term securities purchases, the Treasury purchase program was completed in October of 2009, and the Fed intends to complete the purchase of the Agency and MBS debt by the first quarter of 2010 at the maximum amounts previously stated. Although this will leave the Fed's balance sheet roughly two and a half times larger than when the crisis began, the Fed has a variety of tools -- such as the newly granted power to provide interest on reserves and offer interest-bearing term deposits for excess reserves, as well as the traditional tool of reverse repurchase agreements -- to maintain control of growth of the monetary base and the fed funds rate as the economy recovers (see Bernanke 2009b and Kroszner 2009b). The initiatives put in place by the Treasury and FDIC also have, to differing extents, built-in exit strategies. Capital injections under TARP are being gradually repaid and the FDIC guarantee program for new bank securities issues expired in October 2009.

Nonetheless, issues of moral hazard will remain. The Rubicon cannot be uncrossed and financial market behavior will surely anticipate the return of the "temporary" programs and guarantees in the event

of another crisis. To maintain the stability of the system and to protect taxpayers, the “too interconnected to fail” problem needs to be addressed in two ways: through improvements in the supervision and regulation framework as well as improvements in the legal and market infrastructure to make markets more robust globally (Kroszner 2009a).

Giving supervisors the information and ability to monitor risks throughout the system, not just in traditional banks, is an important part of the improvements going forward, and international cooperation will be a necessary part of this. Exactly who should bear the responsibility of being the “systemic risk regulator” and what authorities would be necessary for effective systemic risk monitoring and mitigation is the subject of much controversy. In the U.S., proposals have ranged from giving those powers to the Federal Reserve, to setting up a systemic risk council of existing regulators including the Federal Reserve, to taking away those powers from existing regulators and giving them to a stand-alone Financial Supervisory Agency, much like the FSA in the UK. We will not attempt to resolve this debate here but do want to caution that the task of defining the boundaries of what types of organizations and activities would be subject to systemic risk monitoring is particularly vexing, given the ability of the financial institutions and markets to innovate and move risk-taking activity just one step beyond those boundaries.

Some have argued that a return to the separation of commercial and investment banking embodied in the Glass-Steagall Act would insulate banks from financial market shocks and help to promote stability. The experience of the last few years, however, does not provide strong support for such an argument.⁸ In the U.S., for example, the interconnected problems arose not primarily from the mixing of commercial and investment banking at individual institutions. Recall that Bear Stearns, Merrill Lynch, and Lehman Brothers were not commercial bank holding companies and so their troubles had nothing to do with allowing commercial and investment banking to occur in the same holding company. The exposures that led to the downfall of Indymac, Washington Mutual, and Wachovia, for example, were primarily related to risky choices and concentrations within the traditional commercial banking

⁸ The historical evidence also does not support an argument in favor of the Glass-Steagall separation (see for instance, Kroszner and Rajan (1994) and Kroszner (1996)).

sphere of mortgage origination and lending, again not related to investment banking activities of underwriting or dealing in securities. In addition, re-introducing a Glass-Steagall separation in the U.S. would likely result in greater fragmentation of the financial system, with the likely consequence of increasing rather than decreasing interconnectedness of banking institutions funding sources to other financial institutions and markets. Pushing risk-taking activities just outside of the commercial banking system could have the unintended consequence of making the entire system more, rather than less, fragile.

Certainly, ensuring that financial firms have enough “skin in the game” through appropriate capital requirements against their risk-taking activities is important for mitigating moral hazard problems and maintaining confidence in the system. Appropriate capital requirements, however, are only one piece of the puzzle. High capital requirements on banks or other classes of financial institutions, for example, can lead to strong incentives for getting around them, through either off balance sheet activities or activities being undertaken by entities not facing the requirements. After all, regulatory burden and high capital requirements are part of the reasons that finance moved to the long and increasingly complex intermediation chains.

It is thus crucial for reform to acknowledge the challenges posed by modern financial market developments and focus on making market infrastructure more robust to mitigate the fragilities of the intermediation chains. Of primary importance is improving the resolution regime for large financial institutions (see Kroszner 2009a). Uncertainties associated with contract enforcement and delays in bankruptcy made it difficult or impossible for firms to obtain even secured funding and customers and counterparties pull away, as was evident in September of 2008. The market-based intermediation chain relies heavily upon clarity in contract enforcement and rules for resolution. The stress situation in 2008 revealed the extent of those uncertainties and how they could lead to “funding runs.” Greater reliance on “living wills” would give greater clarity about how a troubled institution will operate as it winds down operations. Pre-packaged bankruptcy could reduce uncertainty about how various stakeholders will be treated if an institution fails. Greater international cooperation and clarity on the cross-border aspects of bankruptcy resolution also are important for reducing uncertainty and, hence, fragility.

Many other proposals have been put forward to enhance market resiliency and mitigate the interconnectedness problems in a modern financial system, such as central clearing of derivatives (see Kroszner 2009a). An important lesson to draw from the recent financial crisis is that a key criterion for judging the effectiveness of the reforms is how they deal with the interconnectedness of financial institutions and markets both within and across national borders.

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Figure 1
Target Federal Funds Rate and Primary Credit Rate

Source: Federal Reserve Bank of St. Louis

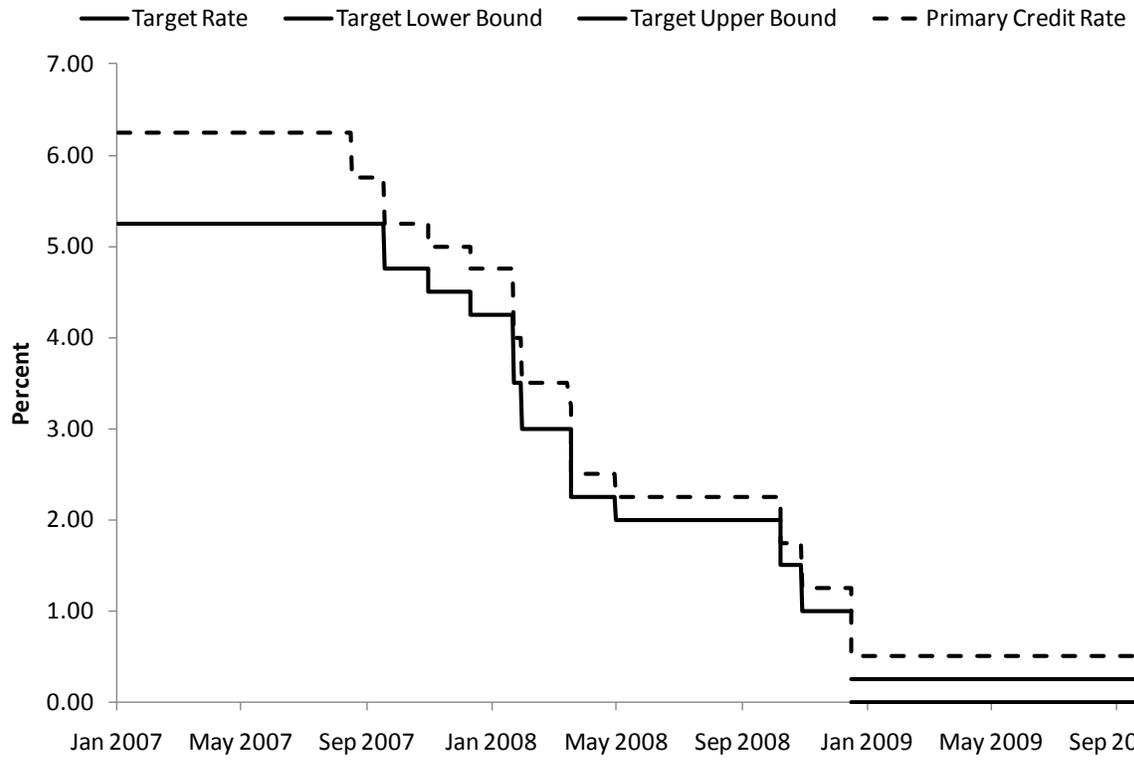


Figure 2
Primary Discount Window Lending
Source: Federal Reserve Board Release H.4.1

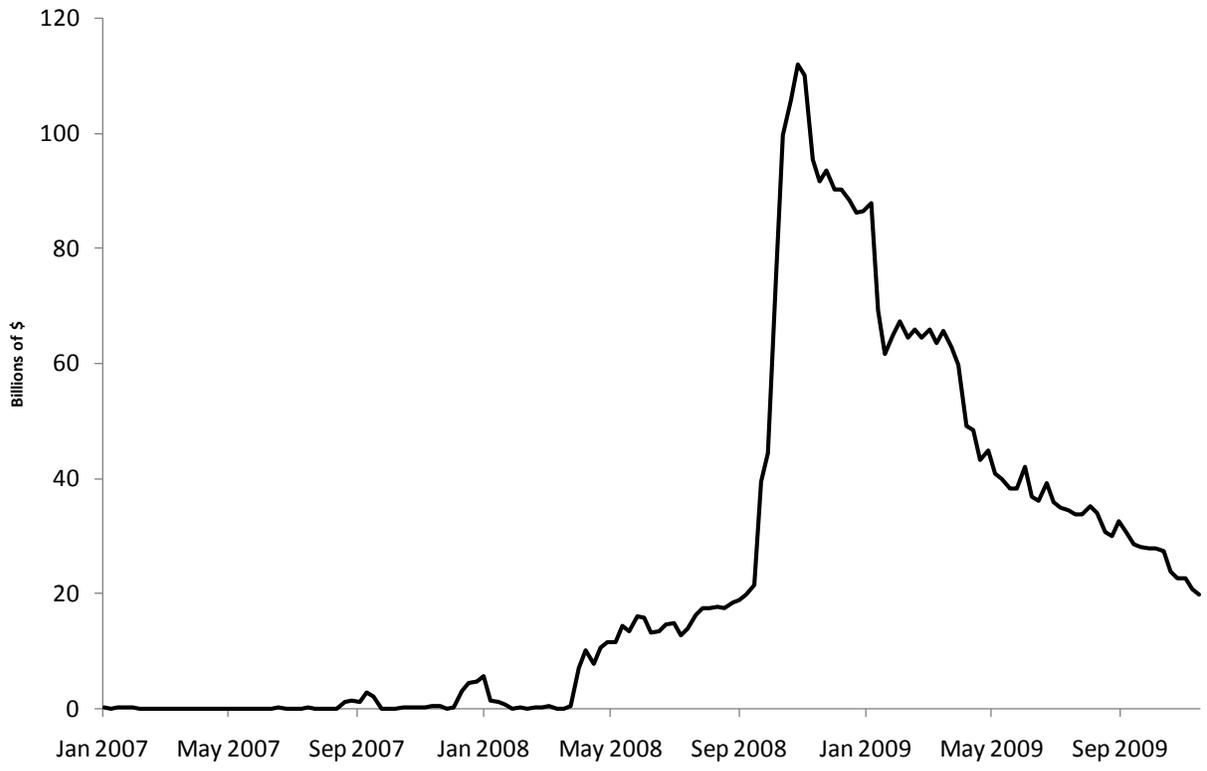


Figure 3
Term Auction Facility
Source: Federal Reserve Board

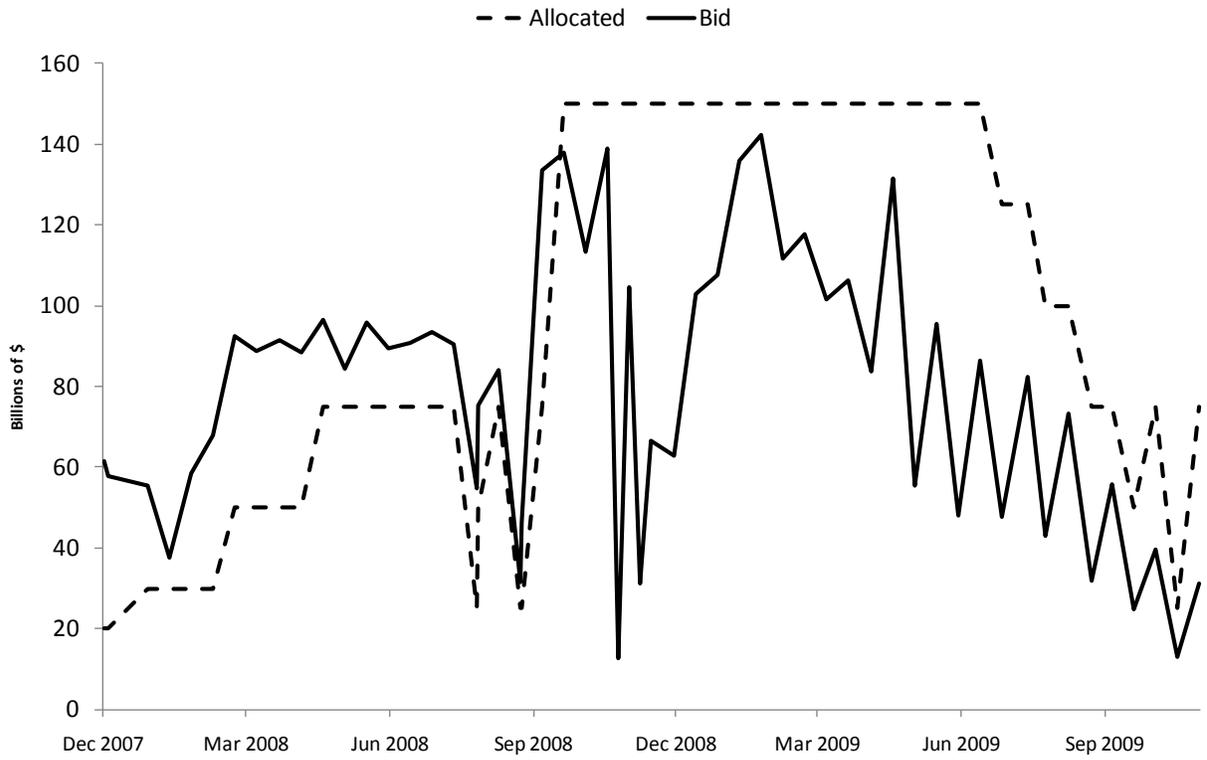


Figure 4
Primary Dealer Credit Facility
Source: Federal Reserve Board Release H.4.1

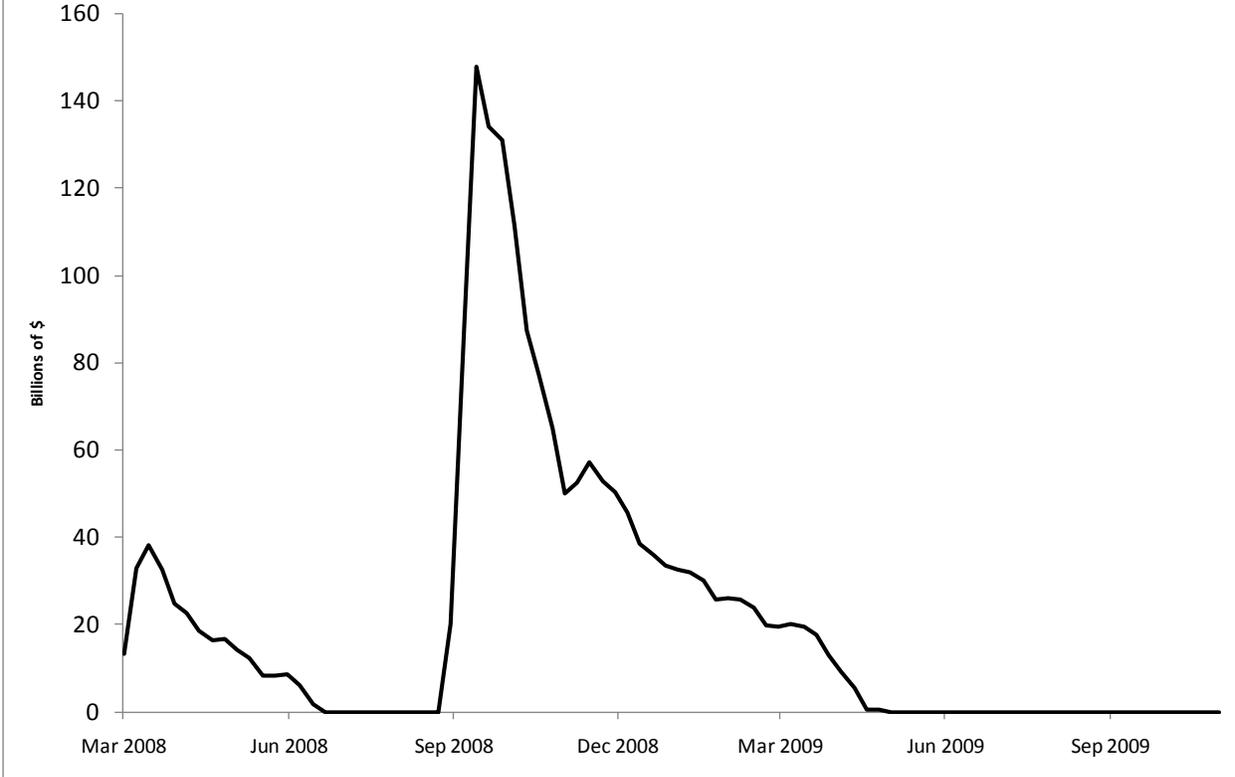


Figure 5
Money Market Mutual Fund Assets
Source: Investment Company Institute

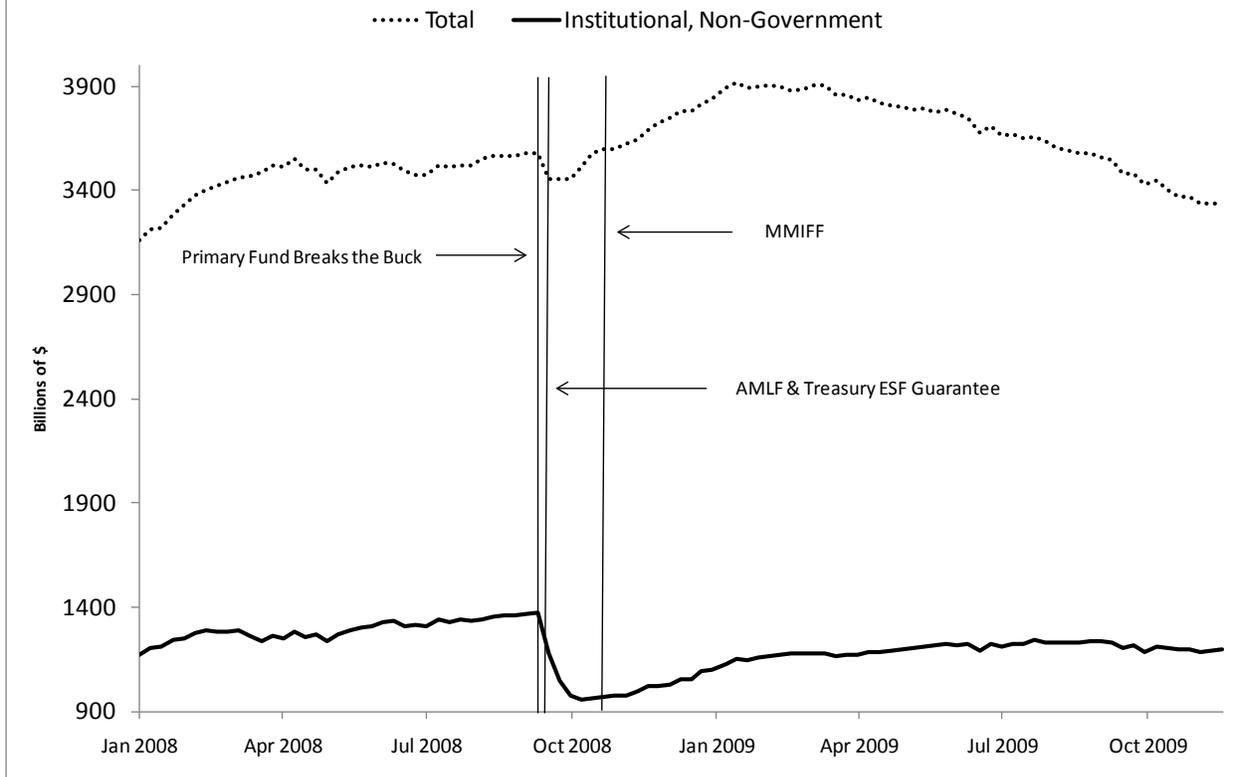


Figure 6
**Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity
Facility**

Source: Federal Reserve Board Release H.4.1

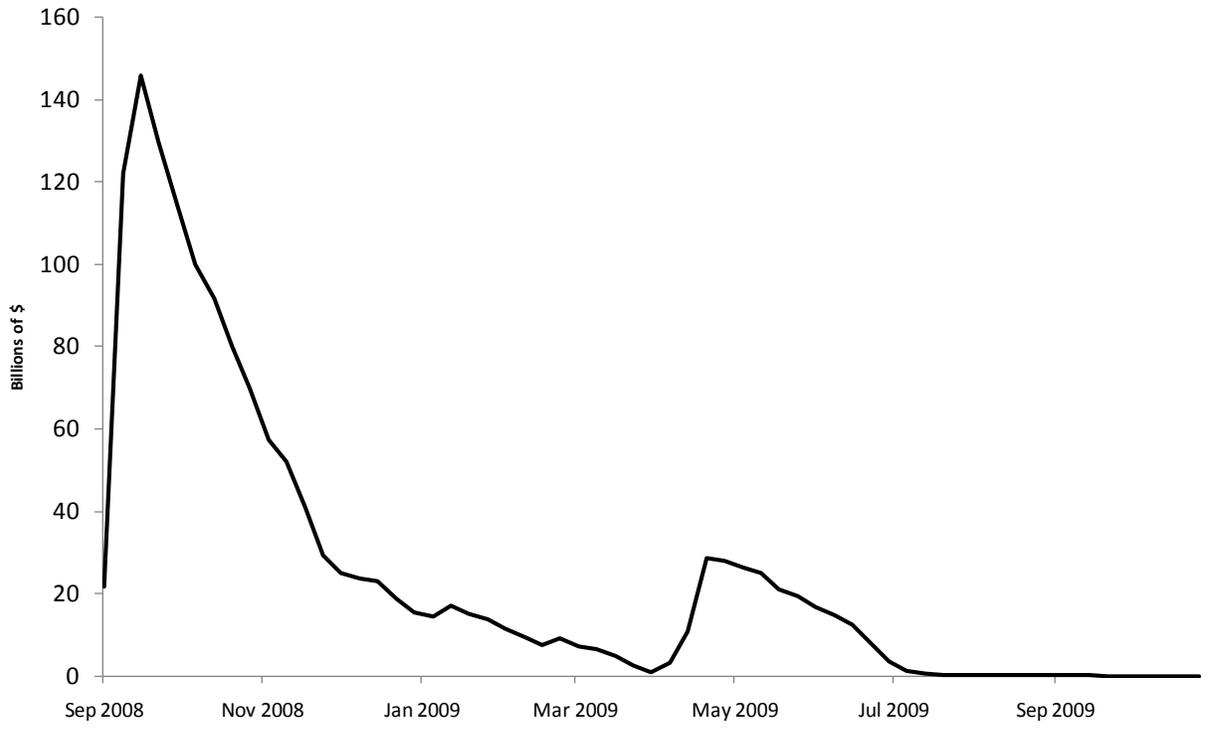


Figure 7
Three-Month LIBOR OIS Spread
Source: Bloomberg Tickers US0003M and USSOC

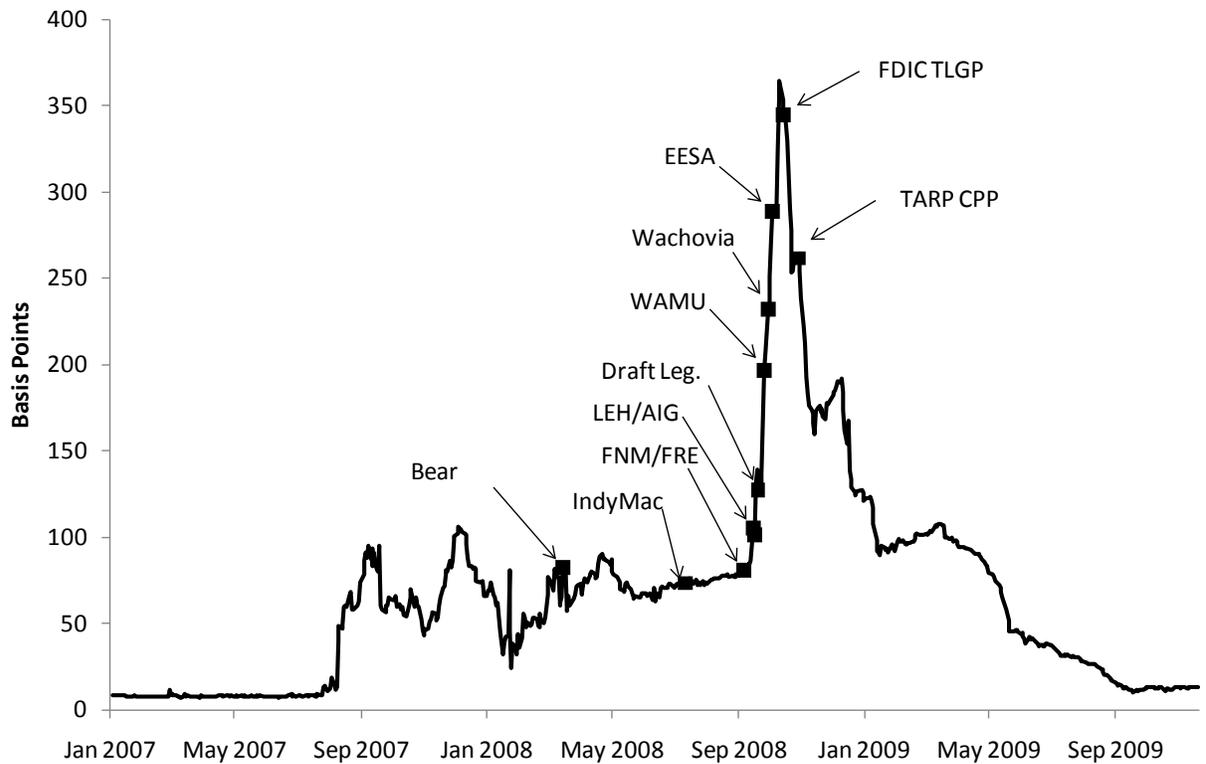


Figure 8
Commercial Paper Outstanding

Source: Federal Reserve Board

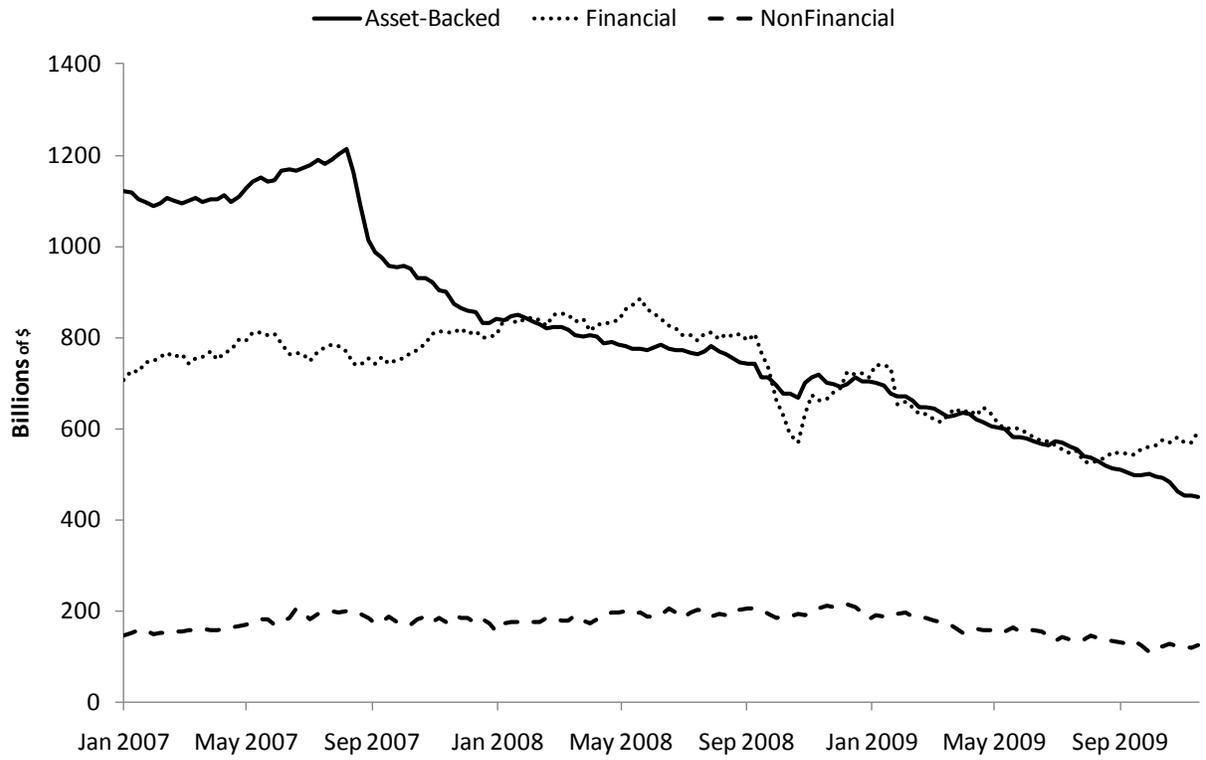


Figure 9
30-Day A2/P2 Minus AA Nonfinancial Commercial Paper Interest Rate

Source: Federal Reserve Board

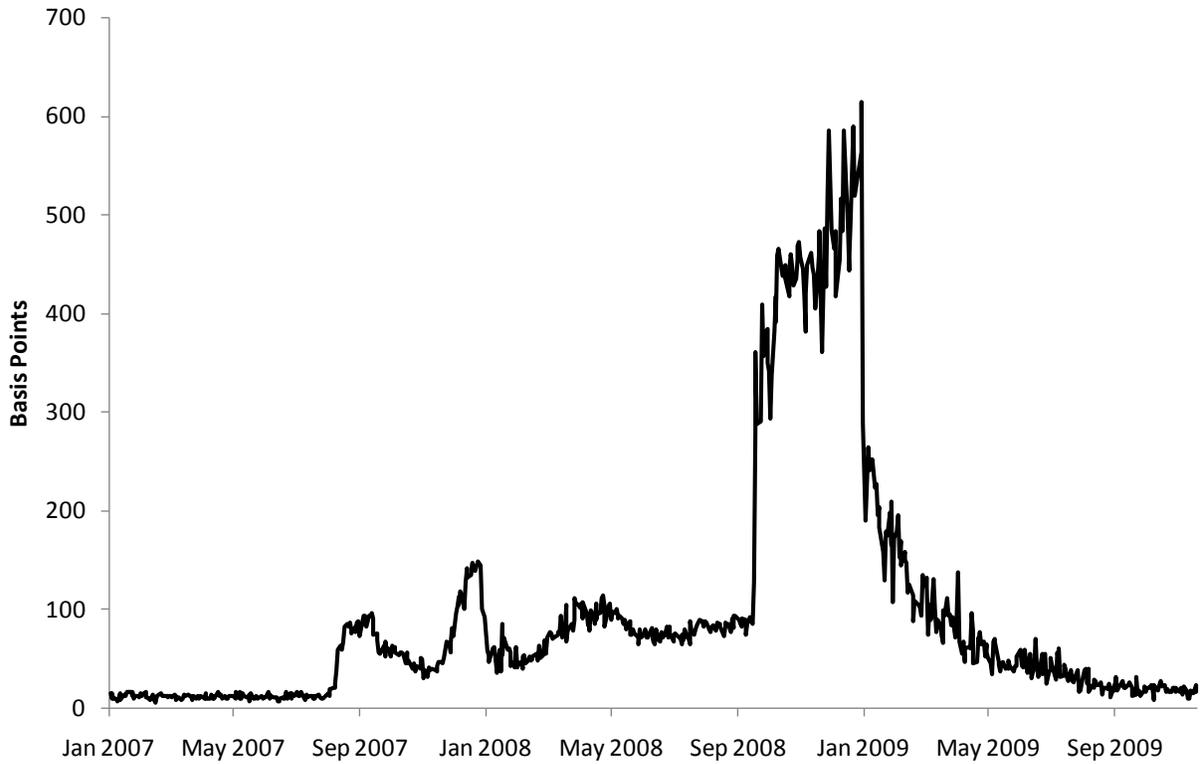


Figure 10
Commercial Paper Funding Facility

Source: Federal Reserve Board Release H.4.1

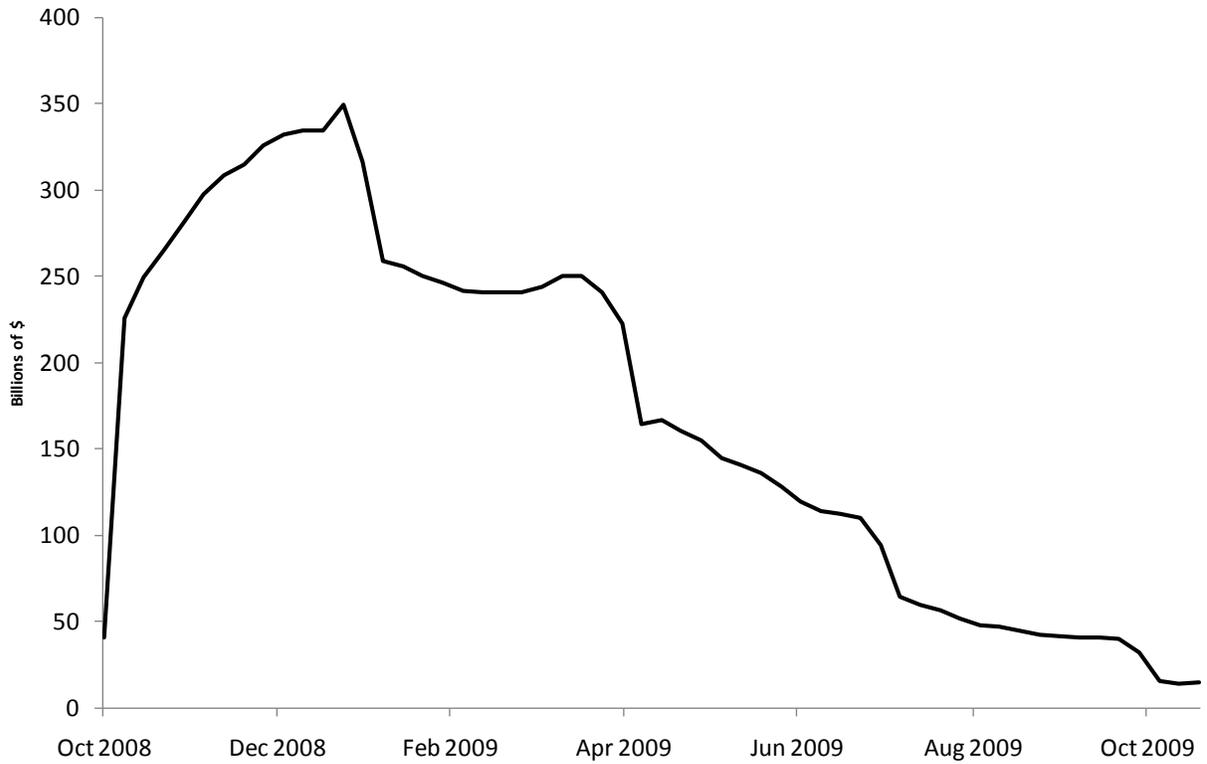


Figure 11
Term Asset-Backed Securities Loan Facility

Source: Federal Reserve Board Release H.4.1

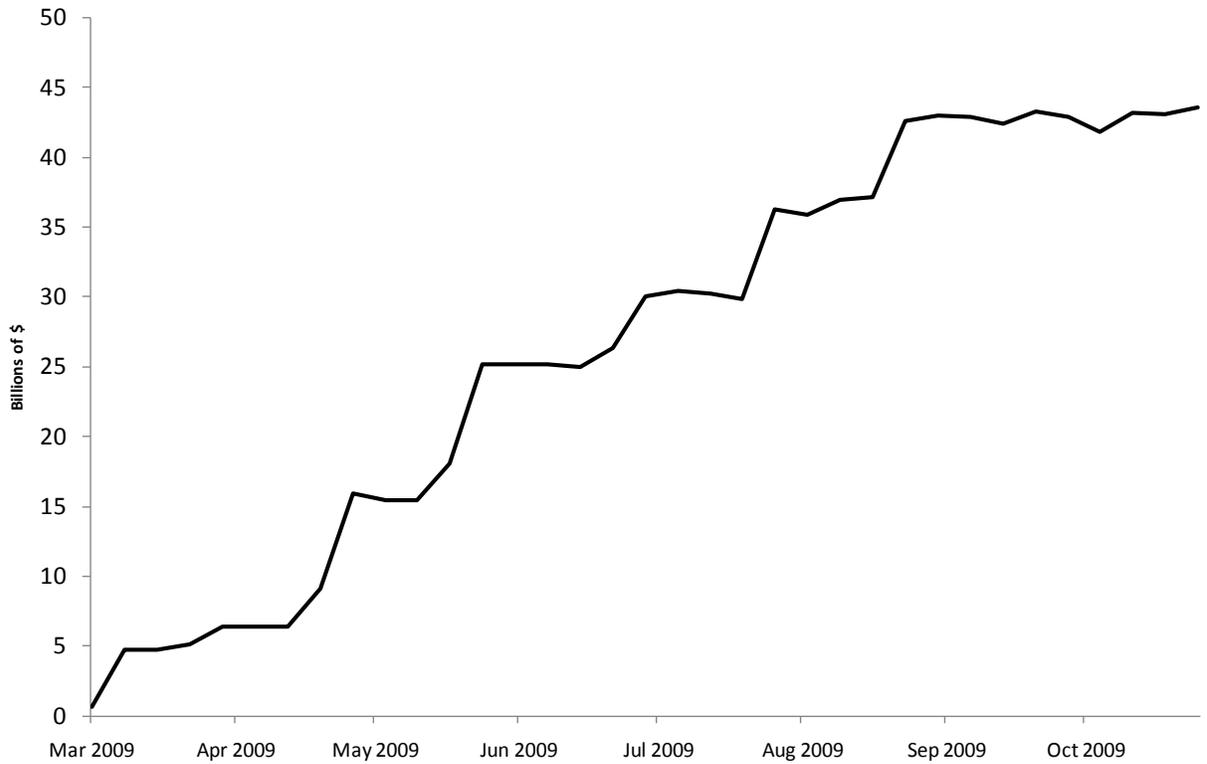


Figure 12
Federal Reserve Holdings of Securities

Source: Federal Reserve Board of Governors

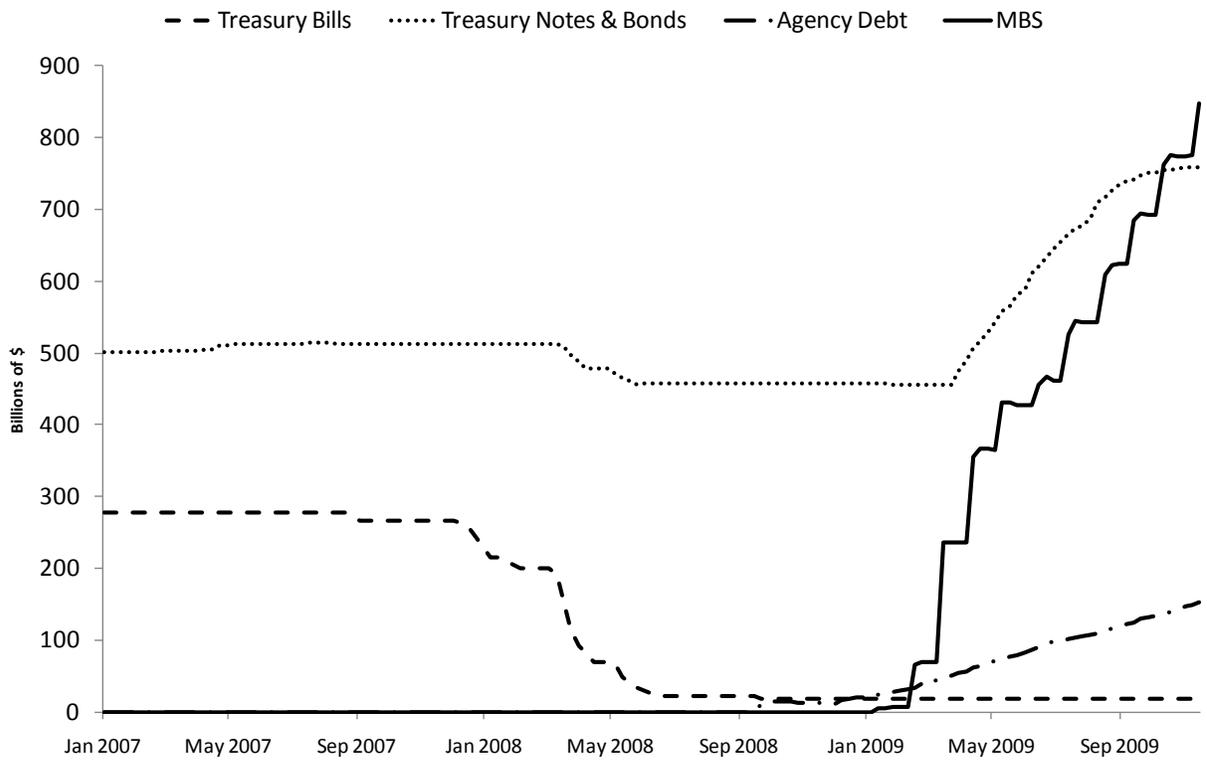


Table 1
Federal Reserve Nontraditional Policy Initiatives – Chronological
(As of November 18, 2009)

Initiative	Description					Objectives		
	Announced	First Used	Status (Authorized Through)	Maximum Size (Billions)	Current Size (Billions)	Lengthen Maturity	Broaden Collateral	Expand Counterparties
Term Auction Facility	12/12/2007	12/17/2007	Ongoing	493	109	x		
Central Bank Swap Lines	12/12/2007	12/20/2007	2/1/2010	583	28			x
Term Securities Lending Facility	3/11/2008	3/27/2008	2/1/2010 ⁶	234	0	x		
Maiden Lane (Bear Stearns)	3/14/2008	6/26/2008	Ongoing	30	26		x	x
Primary Dealer Credit Facility ¹	3/16/2008	3/19/2007 ²	2/1/2010	148	0			x
Term Securities Lending Facility Options	7/30/2008	8/27/2008	Suspended ³	50	0	x		
AIG								
FRBNY Lending to AIG	9/16/2008	9/17/2008 ²	Ongoing	90	45		x	x
Maiden Lane II	11/10/2008	12/12/2008	Ongoing	20	16		x	x
Maiden Lane III	11/10/2008	11/25/2008	Ongoing	28	23		x	x
Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility	9/19/2008	9/24/2008 ²	2/1/2010	152	0		x	
Commercial Paper Funding Facility	10/7/2008	10/27/2008	2/1/2010	351	15		x	x
Money Market Investor Funding Facility	10/21/2008	Not used	10/30/2009	Not used	0		x	x
Citigroup Support	11/23/2008	Not used	Not used	Not used	0			x
Term Asset-Backed Securities Loan Facility	11/25/2008	3/25/2009	3/31/2010 6/30/2010 ⁵	44	44	x	x	x
Purchase of MBS guaranteed by GSEs	11/25/2008	1/5/2009	3/31/2010 ⁷	847	847	x		x
Purchases of direct GSE Debt	11/25/2008	12/5/2008	3/31/2009 ⁷	153	153	x		x
Bank of America Support	1/16/2009	Not Used	Not used	Not used	0			x
Purchases of Longer-Term Treasuries	3/18/2009	3/25/2009	10/31/2009 ⁷	311	311	x		

Source: Federal Reserve Board of Governors weekly H.4.1 statistical release.

1. Includes transitional support for Goldman Sachs, Morgan Stanley, and Merrill Lynch announced on 9/21/2008

2. Based on first appearance in the H.4.1

3. Suspension on 6/25/2009

4. Terminated on 11/10/2008

5. Loans against newly issued ABS and legacy CMBS authorized through March 31, 2010, loans against newly issued CMBS through June 30, 2010.

6. Auctions against Schedule 1 collateral suspended on 7/1/2009

7. Based on FOMC statements

Table 2
Federal Reserve Reciprocal Currency Arrangements (Swap Lines) with Other Central Banks
(Billions of Dollars)

Dates of Arrangement and Limits on Lines										
	2007	2008								
	Dec. 12	Mar. 11	May 2	July 30	Sep. 18	Sep. 24	Sep. 26	Sep. 29	Oct. 13/14	Oct. 28/29
European Central Bank	20	30	50	55	110	110	120	240	Unlimited	Unlimited
Swiss National Bank	4	6	12	12	27	27	30	60	Unlimited	Unlimited
Bank of Japan					60	60	60	120	Unlimited	Unlimited
Bank of England					40	40	40	80	Unlimited	Unlimited
Bank of Canada					10	10	10	30	30	30
Reserve Bank of Australia						10	10	30	30	30
Sveriges Riksbank						10	10	30	30	30
Danmarks National Bank						5	5	15	15	15
Norges Bank						5	5	15	15	15
Reserve Bank of New Zealand										15
Banco de Mexico										30
Bank of Korea										30
Banco Central do Brasil										30
Monetary Authority of Singapore.										30

Draws on Lines, End-of-Quarter and Most Recent										
	2007	2008				2009				
	Dec. 31	Mar. 31	Jun. 30	Sep 30	Dec 31	Mar. 31	Jun. 30	Jul. 29	Aug. 26	Oct. 28
European Central Bank	20	15	50	175	291	166	60	51	43	26
Swiss National Bank	4	6	12	29	25	7	0*	0*	0*	0
Bank of Japan				30	123	61	18	9	3	1
Bank of England				40	33	15	3	1	0*	0*
Bank of Canada				0	0	0	0	0	0	0
Reserve Bank of Australia				10	23	10	0*	0	0	0
Sveriges Riksbank				0	25	23	12	12	3	0
Danmarks National Bank				5	15	5	4	3	2	0
Norges Bank				0	8	7	5	1	1	0
Reserve Bank of New Zealand					0	0	0	0	0	0
Banco de Mexico					0	0	3	3	3	3
Bank of Korea					10	16	10	8	6	3
Banco Central do Brasil					0	0	0	0	0	0
Monetary Authority of Singapore.					0	0	0	0	0	0

Source: Federal Reserve Board of Governors, monthly report *Credit and Liquidity Programs and the Balance Sheet* and Federal Reserve Bank of New York, quarterly report *Treasury and Federal Reserve Foreign Exchange Operations*

*Less than \$0.5 Billion

Table 3 FDIC Temporary Liquidity Guarantee Program (As of October 31, 2009)			
Issuance and Revenues (Dollar Figures in Millions)			
Number of Issuers	Debt Outstanding	Guarantee Fees	Surcharges
88	\$315,095	\$9,476	\$872
Issuance Detail (Percent of Total)			
Instrument		Maturity	
Commercial Paper	0.6	< 2 Years	22.9
Notes	89.7	Between 2 and 3 Years	28.5
Other	9.7	Over 3 Years	48.6

Source: Federal Deposit Insurance Corporation *Monthly Report on Debt Issuance Under the Temporary Liquidity Guarantee Program*

Table 4 TARP Capital Purchase Program for the Largest Financial Institutions (As of September 1, 2009, Dollar Figures in Millions)					
	Mean	Median	Maximum	Minimum	Total
Warrants					
Initial Investment	\$9,618	\$4,850	\$25,000	\$2,000	\$163,514
Repaid	\$7,409	\$3,555	\$25,000	\$2,000	\$66,677
Percent of Total					40.8
Proceeds					
Dividends Accrued	\$340	\$185	\$1,055	\$64	\$5,776
Warrants Liquidated	\$399	\$139	\$1,100	\$60	\$2,792
Gain on Citigroup Stock					\$9,922
					\$18,490
Percent of Initial Investment					11.3

Source: www.FinancialStability.gov Capital Purchase Program transactions. The sample includes 17 of the 19 institutions included in government stress tests: Bank of America, Bank of New York, BB&T, Citigroup, Capital One, Fifth Third, Goldman Sachs, JPMorgan, KeyCorp, Morgan Stanley, PNC, Regions, State Street, SunTrust, U.S. Bancorp, and Wells Fargo. The two excluded are MetLife and GMAC – companies that did not receive CPP funds. Gains on Citigroup stock holdings values the government's position in Citigroup stock at \$4.54 a share (the price as of September 1, 2009) and subtracts the initial capital investment of \$25 billion.