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Abstract

Like the Bank of Japan (BOJ) a decade ago, the U.S. Federal Reserve (Fed) has recently taken a number of unprecedented steps to stabilize its foundering financial system. This paper describes the Fed's and the BOJ's responses to their countries' crises, highlighting the similarities and differences between the two banks' policies. Both banks acted as lenders of last resort, providing the short-term funding necessary to prevent full-blown liquidity crises. Circumstances compelled the Fed to act much more quickly than the BOJ, however. And, in its direct involvement in the provision of credit to the private sector and its assumption of banks' credit risk, the Fed has intervened in the financial markets more extensively than the BOJ. Disparities in the speed and scope of the two countries' crises help explain the Fed's relatively more aggressive response. The more heavily securitized financial structure in the U.S. and the Fed's relaxed stance on credit risk also may account for the Fed's more interventionist policies.

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1 Introduction

As the U.S. economy struggled to emerge from recession in the first years of the decade, slow economic growth, falling inflation, and near-zero interest rates came together to create a worrying macroeconomic scenario. It seemed at the time as if the U.S. might suffer the same fate as Japan, and sink into a protracted slump in which the zero lower bound on the interest rate would limit the scope for monetary policy. Deflation was a real possibility, and unconventional policy measures were on the table. Policymakers at the U.S. Federal Reserve (the Fed) contemplated such actions as the targeting long-term interest rates, purchases of privately-issued assets, and explicit commitments to a path for the federal funds rate. Concerns dissipated as the U.S. economy recovered in 2004, however, and the unconventional policy measures under consideration turned out to be unnecessary.

Scarcely five and a half years after the 2003 deflation scare, U.S. policymakers now face a much deeper economic crisis. The deeper financial dimension of the current crisis makes comparisons with the Japanese experience of the 1990s more relevant than in 2003. Not only has the Fed reached the limit of conventional monetary policy, it has been compelled to prop up the foundering financial system through massive injections of liquidity and extensive new lending programs. Its balance sheet has more than doubled in size since mid-2008, and its composition has changed almost beyond recognition. At the same time, the Fed has extended funds in highly unconventional ways, to institutions not normally falling under the Fed's aegis.

Extraordinary as these measures are, they are not entirely without precedent. During Japan's lengthy banking crisis of the 1990s and early 2000s, the Bank of Japan (BOJ) also injected an unheard-of volume of liquidity into the financial system, and expanded its lending facilities. While these appear in retrospect to be quite modest relative to the Fed's actions—and to what some had urged the BOJ to do—they were at the time quite novel for modern central banks.

Like the BOJ in the 1990s, circumstances have compelled the Fed to function as the lender of last resort (LOLR) for the financial system. This is a core function of any cen-

tral bank, and there is a long history of liquidity provision during banking panics. The reasoning is that lending to sound institutions facing a temporary shortage of funds would ameliorate bank “runs” precipitated by a deterioration in confidence. This view of the LOLR was articulated by Bagehot (1873), who advised central banks to lend freely, but at a penalty rate, against good collateral. In the 19th century, the Bank of England on several occasions deviated from Bagehot’s advice, lending against a diverse range of assets that included mortgages, railway debentures, and even unimproved land. During the postwar era, however, the central banks of industrial countries, including the Fed, have been quite conservative in their exercise of the LOLR option.

There are two reasons why central banks have historically been loath to lend directly to private entities. The first stems from a reluctance to interfere with the markets’ allocation of credit and risk. If not priced correctly, central banks’ asset purchases, loans, and loan guarantees represent subsidies to specific institutions. In the present crisis, and to a lesser extent in Japan’s, these interventions have made a difference in terms of which institutions survive (e.g., A.I.G.) and which fail (Lehman). The second reason is the fear of loan losses, and their consequences for inflation and independence.

Much has already been written on the BOJ’s monetary policy response to the economic contraction that began in the early 1990s. These include Jinushi *et al.* (2000), Taylor (2001), Ahearne *et al.* (2002), Okina & Shiratsuka (2002), McCallum (2003), Kuttner & Posen (2004), Harrigan & Kuttner (2005), to cite a few. All of these focus exclusively or primarily on interest rate policy, however. Less has been written specifically about the BOJ’s actions as LOLR, although Kuttner & Posen (2004), in critiquing the application of the Taylor rule to the Japanese experience, observed that the BOJ’s various LOLR functions were not readily incorporated within Taylor’s framework.

With the U.S. now dealing with financial stress comparable to Japan’s, there is much to be learned from a comparison of the two countries’ experiences. This paper’s goal is to examine the episodes’ similarities and differences, while recognizing that the crisis in the U.S. is far from over. Its specific focus is on the steps taken by the Fed and the BOJ in their respective efforts to restore financial system stability. The paper’s comparative approach is

similar to that of Harrigan & Kuttner (2005), who contrasted Japan's situation in the 1990s with that of the U.S. in the early 2000s after the bursting of the tech bubble. That paper's conclusion was that the U.S. was in very little danger of becoming mired in an extended recession, a conclusion that seemed justified by the relative soundness of the U.S. financial system. With many of the nation's largest financial institutions facing a distinct possibility of insolvency, such a sanguine conclusion would reflect wishful thinking. But on the positive side, the Fed's reaction has been faster, and broader in its thrust, than the BOJ's policies of a decade ago.

It is still too early to tell to gauge the efficacy of the Fed's efforts. Arguably the most important question learned from the Japanese experience is that the liquidity and credit extended by the central bank in a crisis situation are at best stop-gap measures: the disposal and workout of non-performing loans is essential to recovery. In Japan, seven years passed between the initial wave of bank failures in 1995 and the resolution of the bad loan problem under the Takenaka Plan of 2002. It remains to be seen whether the U.S. will act with any greater alacrity.

2 A short history of the crises

I will begin with a brief review of the financial crises' inception and progression in Japan and the U.S. While there are some differences, the parallels between the two countries' experiences are striking.

2.1 Japan, 1995 to 2002

The basic outlines of the Japanese experience are familiar. Its distinguishing feature was a dizzying asset price escalation, followed by the collapse depicted in figure 1. Stock prices hit their peak and began a steep descent in 1989. Property prices remained strong for another two years, only beginning their slide in 1991 with the start of the recession. The BOJ responded with a series of interest rate cuts which, while rapid, failed to prevent a

sharp economic slowdown. Whether the BOJ acted with sufficient alacrity has been a topic of considerable debate, but as this paper's focus is on financial policy, there is no need to revisit that debate here.

Interestingly, the Japanese financial system did not experience significant financial stress until several years after the beginning of the macroeconomic downturn. Burdened with trillions of yen in worthless real estate loans, the dire conditions of the *jusen* became increasingly apparent in 1995, and plans to bail out those institutions began to be formulated later that year. Two prominent events during this initial phase of the crisis were the closure of Kizu Credit Association, and the rescue of Cosmo Credit and Hyogo Bank in August 1995. It was only at this point, five years into the downturn, that the BOJ was forced to intervene in the financial markets, and exercise its authority as lender of last resort. The BOJ responded to banks' deteriorating conditions with a series of *ad hoc* credit extensions, under Article 25 under the old BOJ law, and the provision of temporary funding to the Deposit Insurance Corporation (DIC). A selected chronology of the events in Japan is given in table 1.

An acute condition turned critical with the November 1997 closure of Yamaichi Securities, and the collapse of Hokkaido Takushoku Bank. While not a core part of the Japanese financial system, Hokkaido Takushoku's failure in particular was regarded as a major shift in Japanese policymakers' response to financial distress.¹ The decision to allow the bank to fail marked an end to the government's *goso-sendan-hoshiki* ("convoy") policy in which troubled banks were kept alive through mergers with relatively stronger institutions. The market response was dramatic, with the so-called "Japan premium" spiking to nearly 70 basis points. At the same time, the share of borrowers in the Tankan survey reporting tighter credit conditions swung 30 percentage points, from -15 to 15 percent. These two developments are depicted in figure 2.

The next significant milestone was the passage of bank rescue legislation in October 1998. Half of the bill's \$500 billion appropriation provided funds for recapitalizing dis-

¹The second-tier brokerage firm Sanyo Securities also filed for bankruptcy in early November, resulting in the first default in the unsecured call loan market.

tressed banks. The remaining \$250 billion financed a blanket guarantee of bank deposits, and provided for the possible nationalization of failing institutions. The bill was the largest bailout effort up to that point, although there some skepticism that it would be enough to solve the long-term problems facing Japan's largest banks. The bill did, however, make possible the government takeover of failing banks: just days after the bill's passage, Long-Term Credit Bank was nationalized, followed by Nippon Credit in December of the same year. In spite of these failures, the Japan premium fell sharply following the introduction of blanket deposit insurance.

The BOJ took a number of incremental steps to regularize its provision of liquidity in the months following the bank rescue bill. In November 1998, the BOJ announced an expansion of its short-term lending against commercial paper collateral, and its intention to establish a lending facility specifically designed to "support firms' financing activities." It also announced plans to study change in operating procedure, in which funds would be lent against pooled collateral, ultimately backed by corporate bonds and loans on deeds. It announced in September 1999 an expansion in the range of collateral to includes such things as bank debentures and corporate bonds. Those guidelines were subsequently modified, and generally relaxed, in a series of steps over the next several years. The BOJ continued to cut interest rate target during this period, with the call rate reaching zero in March 1999.

Based on the perception that economic conditions were improving, the Policy Board raised the target all rate to 25 basis points in August 2000.² The nascent recovery stalled, however, and in February, the Policy Board cut the call rate target to 0.15 percent. In March 2001, the Policy Board initiated its quantitative easing policy by making banks' current account balances (CABs) the BOJ's operating objective, effectively driving the call rate to zero and further increasing banks' access to liquidity. The Bank at the same time established a Lombard-type lending facility in an effort to stabilize interest rates. In addition, the Bank pledged to leave the quantitative easing policy in place so long as CPI inflation remained negative. The Bank's target level of CABs was lifted in a number of steps be-

²See, "Monthly Report of Recent Economic and Financial Developments, August 2000, The Bank's View," and "Change of the Guideline for Money Market Operations, August 11."

ginning in February 2002, eventually reaching 30 to 35 trillion yen by early 2004. The additional liquidity was provided through a combination of increased short-term collateralized loans, along with outright purchases of Japanese government bonds (JGBs), which more than tripled to 1.2 trillion yen per month by October 2002.

The BOJ followed its introduction of quantitative easing with two new programs that represent its two most conspicuous departures from conventional LOLR operations. The first was its October 2002 announcement of a policy of outright equity purchases. Eight months later, the BOJ announced plans for outright purchases of asset-backed securities (ABS). The Bank began its equity purchases in December 2002, and its ABS purchases in August 2003.

The unwinding of these various credit and monetary measures began in 2005, as deflation receded and the economy began to show signs of a more sustained recovery. In that year, the Deposit Insurance Corporation lifted the blanket guarantee of bank deposits, and the BOJ suspended its ABS purchases. The quantitative easing policy came to an end the spring of 2006, and CABs fell rapidly from its January 2006 peak of 33.6 trillion to 7.5 trillion as of November 2007.

2.2 The U.S., 2007 to the present

The parallels between the U.S. and Japanese financial collapses are striking, but there are some important differences as well. The most obvious similarity is of course the spectacular rise in asset prices, followed by their calamitous and destabilizing collapse. This is shown in figure 3, which plots the level of the S&P500 index along with the OFHEO repeat-sales home price index. Stocks hit their peak in October 2007, and by March 2009 the major stock indices had fallen by 50 percent or more. Real estate prices followed roughly the same trajectory, remaining stable throughout most of 2007, beginning to decline late in the year.³ The official NBER peak turned out to be December 2007, coinciding almost perfectly with the decline in house and equity prices. Unlike Japan, there was virtually

³The Case-Shiller index has the decline in house prices beginning slightly earlier.

no lag between the financial markets' collapse and the deterioration in macroeconomic conditions.

Troubles in the mortgage-backed securities market began to surface during the summer of 2007, and in June Bear Stearns was compelled to rescue two of its troubled hedge funds. As stress mounted in the money market, the Fed made took its first modest steps towards enhancing its LOLR capabilities, introducing in August 2007 a term discount window lending facility to supplement its existing short-term facility. In December, it established the Term Auction Facility (TAF). A chronology of selected events and key Fed policies appears in table 2.⁴

The first major blow to the financial system was the collapse of Bear Stearns, occurring in March 2008, only three months after the official start of the recession. This also marked the Fed's first major credit market interventions, and one of its more controversial: the purchase of \$30 billion of the distressed assets of the failed investment bank Bear Stearns, prior to that company's sale to JP Morgan. Technically, the assets were purchased by a Fed-financed special-purpose vehicle (SPV), named Maiden Lane after the street running behind the New York Fed's building in lower Manhattan. In response to the Bear failure, the Fed established two new facilities for providing liquidity to money markets. The first, the Term Securities Lending Facility (TSLF), expanded an existing securities lending program to accept privately-issued securities as collateral, and extended the duration of the loans. Its second, more far-reaching step was to establish a lending facility, the PDCF, for primary dealers in Treasury securities, which would not otherwise have had direct access to Fed liquidity. Its significance is its unprecedented extension of credit to non-banks.

The summer of 2008 was relatively uneventful, but the FDIC's July seizure of the failed thrift IndyMac foreshadowed the deep problems lurking in the mortgage and mortgage-backed securities markets.

The critical turning point was the September 2008 failure of Lehman Brothers, which neither the Fed nor the Treasury took decisive steps to avert. That Lehman was allowed

⁴A more extensive chronology of the U.S. crisis is maintained by the St. Louis Fed, <http://timeline.stlouisfed.org/>.

to fail was widely interpreted as a signal that the rules of the game had changed, and that there were limits to what the Fed and the Treasury were willing to do to support troubled institutions. In this regard, Lehman's failure is analogous to the 1997 demise of Hokkaido Takushoku.

The Fed reversed itself two days later, lending \$85 billion to insurance giant A.I.G. in an effort to prevent its collapse. The damage had already been done, however. Credit spreads, such as the Treasury-Eurodollar (TED) spread depicted in figure 4, shot up to unprecedented levels. This coincided with a severe contraction in credit conditions, as indicated by the share of banks reporting a tightening loan standards in the Fed's Senior Loan Officer Opinion Survey, also shown in the figure. The fallout from the Lehman collapse was similar to the Hokkaido Takushoku aftermath: sharply rising credit spreads, and a contraction in credit supply.

Another worrying manifestation of the turmoil surrounding the Lehman failure was a deterioration in the market for asset-backed commercial paper (ABCP). The lack of a market for ABCP in turn raised the threat that some money market funds would "break the buck" and be unable to redeem their shares at face value. The Fed's response was to establish another standing facility to lend funds asset-backed commercial paper, the ABCP Money Market Fund Liquidity Facility (AMLF). This action mirrors the BOJ's 1999 decision to accept ABCP as collateral for its short-term funding operations.

October was another pivotal month in terms of the policy responses to the crisis. The Fed established two new facilities with the objective of supporting the money markets, and reducing pressure on money funds. The first of these two was the Commercial Paper Funding Facility (CPFF) in which the Fed, via loans to another SPV, would purchase commercial paper. Within the space of two months, the CPFF had purchased over \$300 billion worth of paper. The Fed also announced it intended to create a similar program targeted specifically at money funds, the the Money Market Investor Funding Facility (MMIFF); and another facility intended to revive the market for ABS (TALF).⁵

Also in October, Federal Deposit Insurance Corporation (FDIC) expanded its deposit

⁵As of mid-March 2009, the MMIFF had purchased no assets.

guarantee to a maximum of \$250,000 per account, up from \$100,000. One month later, the FDIC announced its Temporary Liquidity Guarantee Program, which extended an *unlimited* guarantee of all senior debt and non interest-bearing transactions accounts. The U.S. authorities, like those in Japan a decade earlier, clearly saw the value of deposit guarantees as a means to stem bank runs, and acted accordingly.

Yet another asset purchase plan was announced in November: this one for up to \$100 billion in mortgage-backed securities and the direct obligations of government sponsored enterprises (GSEs) including Fannie Mae and Freddie Mac. As of mid-March, the Fed had accumulated \$69 billion of these assets.

The steps taken during the fall of 2008 together seem to have had the desired calming effect on money markets. Rates on negotiable CDs and financial CP fell from four and three percent, respectively, to less than one percent—much closer to the prevailing Treasury rate. In this regard, the CPFF, perhaps in combination with the FDIC's guarantee, seems to have been more effective than the TAF which, as shown by Taylor & Williams (2009), failed to appreciably reduce key interest rates, such as the closely-watched Libor-OIS. The yield on 30-year conventional mortgages fell by roughly one percent during this period, and the spread over Treasuries narrowed substantially during the first few weeks of 2009.

Also during this period the Fed took the unprecedented step of committing to serve as a credit backstop for a \$306 billion pool of mortgage-related assets. A similar arrangement for Bank of America was announced on January 29. The implications of these guarantees are discussed below in section 4.

Finally, the Fed on March 18 announced three additional major credit market interventions. The first was a significant expansion of its existing program for purchasing MBS and agency obligations: \$750 billion of the former, and \$100 billion of the latter. It also committed to the purchase of up to \$300 billion in long-term Treasury bonds.

3 A comparison of BOJ and Fed policies

The narrative history in section 2 has already highlighted some of the parallels between the Japanese and U.S. experiences. This section presents a more structured comparison of the Fed and BOJ responses along three dimensions: timing, scale and scope. The two institutions have, to a surprising degree, taken their cues same playbook. Both central banks' responses progressed through three stages: first, emergency *ad hoc* lending to specific distressed institutions; second, the regularization and expansion of standing facilities; and third, the direct provision of credit to the private sector. The timing and magnitude of the two central banks' actions differ appreciably, however. Compared with the BOJ, which implemented a series of measured responses over a course of several years, the Fed's reaction has been drastic in both speed and magnitude. And, unlike the BOJ, the Fed has ventured into uncharted territory in its explicit assumption of default risk.

3.1 Timing

Comparisons between two central banks' response speed are complicated by differences in the time lines on which the respective crises progressed. Reflecting this paper's focus on the central banks' response to financial instability, it makes sense to establish chronologies with respect to key points marking the intensification of the crises. As noted above, Japan's financial breakdown began several years after the downturn in macroeconomic conditions and asset prices. If one were to identify the onset of the crisis, a plausible starting date would be the surfacing of the *jusen* problems in mid-1995, or the collapse of Cosmo Credit, Hyogo Bank and Kizu Credit Association in August 1995. In the U.S., on the other hand, the financial dominoes began to fall just a few months after the stock market and macroeconomic peaks. The March 2008 Bear Stearns collapse is arguably the closest equivalent to this first wave of Japanese failures.

Both central banks' responses in this initial phase were relatively modest. The BOJ focused its efforts on emergency lending, but took no formal steps to increase liquidity provision, other than further reduce the target call rate. Like the BOJ, the Fed was also

called upon to assist in bailouts, in the U.S. case by effectively purchasing some of Bear's assets. But at the same time it took steps to enhance liquidity provision through the the PDCF and TAF, along with another cut in the funds rate target.

The Hokkaido Takushoku and Lehman failures were the next significant events. Both were seen as watershed events, failures that revealed the depth of the nations' financial woes, and the limits of government intervention. The progression from acute to critical took 27 months in Japan, but only six months in the U.S. The response in both cases was the enhancement of liquidity provision. The BOJ's reaction was relatively gradual. The first cut in the call rate target occurred nearly a year later, and the first new lending facility was established in November 1998. The expansion in the BOJ's terms of lending occurred nearly two years later, in August 1999. By contrast, the Fed's response was almost instantaneous, with the AMLF established immediately after the Lehman failure, and the CFFF and MMIFF one month later. The Fed's rapid response is clearly evident in the plots of CABs and reserves, figures 5 and 6.

While not under the purview of the central banks, another important milestone is the replacement of *ad hoc* bailouts with a coordinated bank rescue plan. Japan's first systematic attempt at such a package came in October 1998, 11 months after the Hokkaido Takushoku failure. The analogous date for the U.S. is not entirely clear, as efforts thus far have been piecemeal. The initial response, the establishment of the Troubled Asset Relief Program (TARP), was almost immediate, becoming law in October 1998. While the program's objectives seem to change from day to day, the program has provided funds for *ad hoc* bank recapitalizations. Alternatively, the Treasury's February 2009 proposal, which was short on details at the time of announcement, might be analogous to Japan's 1998 package, it remains a work in progress. Consequently, it is not yet clear whether progress towards a definitive resolution is occurring more rapidly in the U.S. than it did in Japan.

3.2 Scope

A useful distinction to make in comparing the scope of the BOJ's and the Fed's response to the crisis is between three distinct forms of central bank intervention in the financial markets: first, the provision of liquidity; second, the supply of credit; and third, the extension of loan guarantees or credit backstops. Table 3 show how the two central banks' various actions as LOLR might be classified along these lines.

3.2.1 Liquidity provision

Liquidity provision is what is traditionally associated with the LOLR function. It is worth noting that there are two senses in which central banks can provide liquidity. One definition focuses on the liability side of intermediaries' balance sheets, and has to do with the availability of credit: institutions are "liquid" if short-term collateralized funding is readily available for financing asset holdings. It was the sudden evaporation of these sources of short-term funding that threatened financial stability in the immediate aftermath of the Bear and Lehman failures. The second usage of the term focuses on the asset side of institutions' balance sheets, and in particular bank reserves.⁶ Liquidity in this sense of the word is in normal times provided through open market operations, or in conditions of more severe financial market dislocation, the extension of secured loans.

These two definitions of liquidity overlap, but they are not interchangeable. Central banks can take certain measures to enhance provide liquidity, in the sense of facilitating short-term funding, without necessarily increasing reserve supply—an example would be the Fed's TSLF. Conversely, the bank reserves supplied by conventional measures, such as open market operations, may fail to restore liquidity to certain financial markets. An increase in bank reserves would, for example, fail to improve the liquidity for non-bank institutions.

The BOJ and the Fed both responded to the crisis with a number of efforts to improve liquidity. The BOJ's measures included the introduction of repo operations, repos on CPs,

⁶Henry Kaufman (2007) emphasizes this distinction.

the relaxation of collateral standards, quantitative easing, and the introduction of repos on JGBs. All were intended either to facilitate institutions' access to short-term funding or, especially in the case of quantitative easing, to increase bank reserves. The Fed also took steps to increase institutions' access to short-term funding, primarily through the establishment of new standing facilities: the Term Discount Window, TAF, TSLF, PDCF, and the AMLF. The additional liquidity, as measured on the asset side of banks' balance sheets, is evident in figures 5 and 6: CABs and reserve balances took off, as overnight lending rates headed towards zero.

3.2.2 Credit supply

As the BOJ, and now the Fed, have discovered, liquidity is not the same thing as credit. The BOJ provided ample liquidity to Japanese banks, especially after quantitative easing went into effect. But with the bad asset problem unresolved, banks remained reluctant to extend new credit, and loan supply shrank. The same is true now in the U.S.: bank lending is falling and markets for asset-backed securities have dried up, despite the Fed's massive injections of liquidity. This problem prompted several efforts at both central banks to restart the flow of credit.

The line between credit supply and liquidity provision is indistinct, but it is useful to distinguish the two in terms of maturity and assumption of risk. Liquidity provision is characterized by short-term secured lending, along the lines laid out by Bagehot. Credit supply, by contrast, can be described as longer-term, non-recourse lending, or even the outright purchases of assets. Such transactions minimize borrowing institutions' exposure to rollover risk, while transferring to the central bank some or all of the credit risk.

In Japan, the first effort along these lines was the awkwardly-titled "Temporary Lending Facility to Support Firms' Financing Activities," announced in November 1998. Four years later, the BOJ made a foray into the stock market, with its equity purchase plan of October 2002. While other motives have been attributed to the BOJ, the stated purpose of the program was to free banks' balance sheets of the burden of equities, which would presumably

make them more willing to extend new credit. The BOJ's third effort to increase credit supply was its June 2003 plan to resuscitate the ABS market through outright purchases of those securities. The Bank's stated rationale for the policy is consistent with its interpretation as an effort to boost credit supply. According to the press release, its purpose was to encourage "...the development of the ABS market by directly taking credit risks through purchases of ABSs as a temporary measure. By encouraging the development of the ABS market through this unprecedented scheme for a central bank, the Bank could strengthen the transmission mechanism of monetary easing against the background of banks' weak financial intermediary function."

The Fed's largest credit-supplying effort to date is the \$300 billion CPFF program, established in October 2008, which conducts outright purchases (via a Fed-financed SPV) of commercial paper (CP) issued by nonfinancial corporations. The purpose was clearly credit supply. As Fed chair Bernanke described it, "our commercial paper facility has helped American businesses finance their payrolls and other operational obligations by significantly lowering rates on the paper and opening access to financing at terms longer than a few days."⁷ The Fed began to purchase significant quantities Agency issues in September 2008, MBS in January 2009, in a similar effort to restore the flow of credit to the housing sector. A significant expansion of these purchases was announced on March 18 of this year.

But it is the long-awaited TALF program, intended to finance the purchase of securities backed by consumer and Small Business Administration (SBA) loans, that could have the most far-reaching impact on the credit markets. Like the BOJ's 2003 program, TALF is intended to fill the void left after investors fled the market for these securities. A radical feature of TALF is that it would provide non-recourse funding to private-sector investors, such as hedge funds, would then purchase newly-issued asset-backed securities. This unique arrangement has two implications. The first its use of low-cost Fed-supplied leverage to enhance the returns enjoyed private investors. Second, the non-recourse nature of the funding private investors' risk exposure, with any losses in excess of the investors'

⁷Speech to the Independent Community Bankers of America, March 19.

initial investment absorbed by the Treasury and the Federal Reserve.

These measures have collectively taken the Fed far beyond its traditional LOLR role of short-term collateralized lending to Banks, and take the Fed farther along the road to credit provision. In effect, the provision of credit is becoming nationalized—even as the banks themselves remain in private hands.

3.2.3 Risk backstopping

The Fed's most radical departure from its traditional LOLR role stems from its involvement with the Citigroup and Bank of America rescues in November 2008 and January 2009. The Fed is not doing any actual lending to either institution as part of the deal, and the troubled assets will remain on the banks' books. But the Fed, the Treasury and the FDIC have jointly agreed to limit the institutions' risk exposure. In the case of Citi, the larger of the two deals, the Treasury and FDIC will backstop \$15 billion in losses exceeding \$29 billion, leaving the Fed with an open-ended commitment to absorb losses in excess of that amount.⁸ The BOJ did nothing comparable.

3.3 Scale

Liquidity provision and credit supply swelled the balance sheets of both the BOJ and the Fed, expanding the banks' asset holds to an unprecedented degree. Relative to its initial size, the BOJ's expansion is considerably larger than the Fed's thus far. In contrast to the BOJ's relatively gradual growth, the Fed's expansion has been phenomenally rapid. Moreover, compared with the BOJ, a larger share of the Fed's balance sheet growth is attributable to efforts to supply credit, as opposed to liquidity provision.

Figure 7 plots the overall size of the BOJ's balance sheet, along with a breakdown by major asset classes. In the early 1990s, the Bank owned roughly 40 trillion yen of financial assets. Those holdings rose gradually as the BOJ progressively cut interest rates. The

⁸In theory, the Fed would be extending a collateralized loan to Citigroup to finance the asset pool, but without recourse to Citi's assets, the Fed would experience losses if the value of the collateral were to decline significantly.

volume of assets rose more sharply after the Hokkaido Takushoku crisis, owing partly to the 8 trillion yen in credit extended to the DIC. The bank's assets shrank by a comparable amount as the DIC loan was extinguished, interrupted only by a brief Y2K spike towards the end of 1999.

The Bank's balance sheet again began to expand steadily as the call rate was cut to zero, and especially once the quantitative easing policy was put into place. The volume of assets on the Bank's books over the 2000-2005 period nearly doubled, from roughly 80 to more than 150 trillion. Relative to its 40 trillion level at the start of the decade, the Bank's balance sheet expanded nearly four-fold. As a share of GDP, the Bank's size tripled, rising from one to three percent.

Examining the breakdown by asset class, the expansion in the Bank's balance sheet is largely due to some combination of JGB purchases, and the category labeled in the chart as Short-Term operations. The largest component in this grouping, and the one that accounts for most of the growth in the Bank's balance sheet, is "Assets/Bills purchased," a category the Bank ceased to report after the introduction in April 2006 of funds supplying operations using pooled collateral.⁹

Except for the 1998-99 spike in DIC lending, very little of the increase in BOJ credit can be attributed to unconventional policy actions, such as direct lending to troubled institutions or the purchase of assets other than government securities. The Bank's lending under Articles 33 and 38 peaked at 1.4 and 3.0 trillion yen, representing respectively 1.8 and 3.7 percent of the Bank's balance sheet. The much-publicized stock purchase plan never amounted to more than 2 trillion yen, or 1.4 percent of the Bank's assets. The ABS purchase program had only a trivial impact on the Bank's assets, with a maximum of 291 billion yen, or 0.2 percent of the balance sheet. As shown in figure 8, except for the peak of the crisis in late 1998 and early 1999, these assets collectively comprised approximately 2 trillion yen.

⁹In the BOJ's accounts, "Assets/Bills purchased" is classified as a purchase, while the supply of funds against pooled collateral is a loan. Both presumably involve the extension of credit against privately-issued securities.

This figure may understate the degree to which the BOJ departed from its normal practice, however, as it does not account for the Bank's progressive relaxation of collateral standards for its purchases of bills and other short-term assets. Unfortunately, this is hard to gauge quantitatively, as these purchases took place through existing facilities, rather than the creation of new ones.

The Fed's balance sheet has also grown spectacularly—more rapidly than the BOJ's, and from a relatively larger base. As shown in figure 9, the size of the Fed's portfolio a stable \$850 billion (6 percent of GDP) in the months preceding the September 2008 Lehman crisis. At that point, its asset holdings began to grow, reaching 2.2 trillion by yearend 2008—a 150 percent expansion, representing 16 percent of GDP. Relative to its pre-crisis size, the expansion of the Fed's balance sheet is modest, compared with that of the BOJ.

The Fed's new credit provision facilities promise to vastly expand the scale of its involvement in the financial system, and the size of its balance sheet. The \$300 billion CPFF has been the biggest step so far in this direction. The just-announced purchases of Treasury bonds, Agency issues and MBS would add up to \$1.15 trillion to the \$1.8 trillion of assets currently on the balance sheet. And, if the impending TALF program were to grow to its full \$2 trillion, the Fed's asset holdings could soar to nearly \$4 trillion—a greater-than four-fold increase that would take the size of its portfolio up to an astonishing 32 percent of GDP. Note also that these figures do not include the *off* balance sheet loan guarantees to Citigroup and Bank of America.

Because the Fed's *modus operandi* has been to introduce a distinct facility for each new mode of lending, it is relatively easy to keep track of exactly where the balance sheet expansion is coming from. Lending through the term discount window, PDCF and TAF facilities began to grow after the the Bear collapse, as shown in figure 9, but the Fed restrained total asset growth by running down its holdings of Treasury bills. Lending ballooned after the Lehman collapse, however, and the Fed abandoned its efforts to rein in its balance sheet expansion. The main sources of asset growth have been the loans category (encompassing the discount window, TAF, PDCF, and AMLF), swap lines with other foreign central banks,

and the purchase of commercial paper through the CPFF. Purchases of mortgage-backed and agency securities have also begun to grow in recent months.

Figure 10 shows a more detailed breakdown of several of the Fed's less conventional credit extensions: direct lending to troubled institutions, credit lines for non-bank institutions, and *de facto* asset purchases via SPVs. At their peak in late 2008, these asset classes totaled nearly \$500 billion, approximately 20 percent of the Fed's balance sheet. If all goes according to plan, this figure, and figure 9 will show even more spectacular growth than they do already.

Overall, the picture is one in which an increasing share of the Fed's balance sheet is being allocated to credit supply, relative to liquidity creation. This is a major difference from the BOJ, whose strategy focused primarily on liquidity creation, allocating only a small share of its balance sheet to efforts to supplement the private sector's creation of credit.

4 Accounting for the differences

A partial explanation of the speed of the Fed's intervention must be the very rapid progression of the crisis: there seems to have been a much greater degree of contagion in the U.S. than in Japan, where bank failures dragged on for a period of years. This may be because of the U.S. financial system's much greater reliance on short-term highly liquid sources of funding, particularly repos. At their peak in the second quarter of 2007, 40 percent of the liabilities of U.S. broker-dealers, their balance sheets bloated with questionable mortgage-backed securities and CDOs, consisted of repos. In Japan, the comparable figure in 1995 was only 17 percent.¹⁰ Consequently, U.S. financial institutions such as Bear Stearns and Lehman Brothers were far more susceptible to runs than the typical Japanese intermediary.

Disparities between the two countries' financial structures may account for the divergent approaches to the restoration of credit supply. Japanese firms are far more dependent

¹⁰Sources: Federal Reserve release Z.1 table L.129, and Bank of Japan Flow of Funds series 190L280 and 190L900.

on bank loans than those in the U.S., and conversely U.S. firms rely much more heavily on publicly traded debt securities. In 2006, for example, loans accounted for 82 percent of the debt of Japanese nonfinancial corporations, with debt securities accounting for the remaining 18 percent. The analogous figures for the U.S. are 27 percent for loans (from various bank and non-bank intermediaries) and 73 percent for securities.¹¹ This heavier reliance on publicly-traded debt allows the Fed to supply credit via direct purchases of securities on the open market, as it has done through its purchases of commercial paper, mortgage-backed securities, and GSE debt; as well as by funding private investors' purchases through the TALF facility. Fewer such opportunities exist in Japan's more bank-dependent financial system.

Differing levels of concern about potential loan losses may also have influenced the two banks' intervention in the credit markets. The primary worry is that these losses would ultimately lead to higher inflation. Seigniorage is one channel through which this could occur: in the absence of a government commitment to reimburse or recapitalize the central bank, Ize (2005) and Buiters (2008) demonstrated that solvency would require the monetization of losses. Alternatively, Sims (2004) showed theoretically that the issuance of Treasury securities without an accompanying commitment to increased tax revenues could, by making monetary policy "passive" in the sense of Leeper (1991), cause the price level to explode "exponentially upward," even if the money supply were held constant. The second channel leading to higher inflation is through the loss of central bank independence, which would presumably exacerbate the inflation bias resulting from the Barro-Gordon (1983) time inconsistency problem.

While it is impossible to determine the extent to which risk concerns affected the BOJ's decisions, speeches given by Policy Board members suggest balance sheet risk was a major consideration despite the Bank's relatively small positions in unconventional assets such as equities and ABS. Speeches delivered by Ueda (2003) and Yamaguchi (2001) raise both of the concerns mentioned above, and give particular emphasis to the possibility of an erosion

¹¹Sources: Federal Reserve release Z.1 tables L.102 and L.216, and Bank of Japan Flow of Funds series 410L240 and 410L300.

in independence. This is perhaps understandable given that the BOJ had only been granted an enhanced degree of independence with the passage of the New Bank of Japan Law in 1997. BOJ officials also voiced concerns about the ability to quickly remove reserves from the system by unwinding their positions. This may also explain the Bank's preference for using short-term liquidity provision over longer-term credit supplying operations.

Unlike BOJ policymakers, Fed officials have thus far downplayed the risks associated with nontraditional forms of lending. Chairman Bernanke, in his February 10 congressional testimony and in a February 18 speech, characterized these risks as "exceptionally low."¹² And, while acknowledging some element of risk, Bernanke argued that the costs of *not* engaging in such lending outweighed the risk associated with the loans.

This relatively relaxed attitude towards balance sheet risk represents a major shift in the Fed's thinking. The Federal Reserve, like most central banks, was established on the principle that it would assume little or no balance sheet risk. This principle is embodied in the Federal Reserve Act (FRA) which, narrowly interpreted, restricts the Fed's purchases to risk-free assets—and only from depository institutions.¹³ The Fed has in practice minimized balance sheet risk (and its intervention in private credit markets) by investing of virtually its entire System Open Market Account (SOMA) portfolio in Treasury securities.

However section 13(3) of the FRA permits the Federal Reserve, in "unusual and exigent circumstances... to discount for any individual, partnership, or corporation, notes, drafts, and bills of exchange when such notes, drafts, and bills of exchange are indorsed or otherwise secured to the satisfaction of the Federal Reserve bank," when that institution is unable to secure credit from other banking institutions. The Fed has invoked this provision repeatedly in establishing its new credit lines. Most of the Fed's new arrangements—the TAF, TSLF, PDCF and the AMLF—lie within the scope of section 13(3). In these cases, losses would be realized only if the value of the collateral declines sufficiently and the borrowing institution is unable to make up the difference.

¹²See <http://www.federalreserve.gov/newsevents/speech/bernanke20090218a.htm> and <http://www.federalreserve.gov/newsevents/testimony/bernanke20090210a.htm>.

¹³This conservative view of the Fed's powers is reflected Clouse & Small (2004), a study prepared during the deflation scare of 2003.

Its other lending programs could expose the Fed to considerably more risk. Maiden Lane LLC is one potential source of losses. Financed by a \$28.8 billion non-recourse loan from the Fed and \$1.2 billion in subordinated debt from by JP Morgan, the SPV was set up to purchase \$30 billion in troubled assets from Bear Stearns prior to its sale to JP Morgan. Without recourse to JP Morgans assets, the Fed would stand to lose if the value of the securities owned by Maiden Lane declined by more than \$1.2 billion. There is risk in the Fed's other asset purchases as well: the roughly \$300 billion in commercial paper through the CPFF, plus \$48 billion in mortgage-backed securities and CDOs purchased from AIG by Maiden Lane II and III. The same is true of the Fed's \$85 billion credit line to AIG, despite being secured by A.I.G.'s assets and warrants for a 79.9% equity stake.

It is impossible to gauge with any precision the amount of risk the Fed has assumed, but with \$1 trillion of private-sector assets currently on its balance sheet—and the possibility of a much larger volume in the near future—significant losses are not out of the question. Highlighting this risk is the European Central Bank's March 5 acknowledgment that five counterparties defaulted on 10.3 billion euros worth of secured borrowing, leaving the ECB stuck with its "eligible collateral" consisting of questionable asset-backed securities.¹⁴ And indeed, the fair value of Maiden Lane's assets has already been marked down by \$2.7 billion, leaving the Fed with a paper loss of roughly \$1.5 billion. Working to reduce the Fed's credit risk exposure is the commitment of the Treasury and the FDIC to share some of the risk associated with certain lending programs and credit guarantees. In addition, the Treasury in its March 24 joint statement with the Fed announced its intention to assume ownership of the troubled Maiden Lane vehicles, and the pledge of closer cooperation hints at an implicit commitment by the Treasury to finance at least a portion of any Fed losses.

¹⁴See the March 5 2009 press release on Eurosystem Monetary Policy Operations in 2008, http://www.ecb.int/press/pr/date/2009/html/pr090305_2.en.html.

5 Summary and conclusions

The parallels between the U.S. in 2009 and Japan a decade ago are striking. Both economies experienced spectacular asset price rises, followed by calamitous declines that jeopardized the stability of the financial systems. The two crises have created an opportunity to draw lessons from a comparison of the Bank of Japan's and U.S. Federal Reserve's responses to the financial turmoil. Circumstances compelled both banks to take drastic actions as lenders of last resort. This involved providing funds in the form of short-term collateralized lending through mechanisms which would have been recognizable to Bagehot (1873)—but also in ways going well beyond what Bagehot envisioned.

The BOJ and Fed responses followed broadly similar progressions. The initial reaction was a series of *ad hoc* emergency loans to institutions in imminent danger of collapse. This was followed in both cases by the establishment of new standing facilities for the provision of liquidity, or the expansion of existing facilities. The large scale increase in liquidity led to a massive expansion in both banks' balance sheets: the Bank of Japan's expanded by a factor of four, and the Fed's by a factor of 2.5.

By most any measure, the Fed responded to the crisis much more quickly than the Bank of Japan. The BOJ's balance sheet growth took place over a period measured in years, whereas virtually all of the expansion in the Fed's balance sheet (so far) occurred within just three months. The primary reason for the Fed's alacrity is without a doubt a result of the exceptionally rapid progression of the financial deterioration in the U.S.

The two banks' responses also differ significantly in terms of scope, with the Fed increasingly emphasizing credit creation over liquidity provision. Through its outright purchases of commercial paper, mortgage-backed securities and agency issues, the Fed has already become a major player in several key financial markets, and its involvement could increase significantly with the expansion of the TALF program. The BOJ's unconventional credit provision measures were more circumscribed: a modest short-term lending program and small-scale purchases of equities and ABS. Japan's more bank-dependent and less heavily securitized financial system naturally limited the scope for the BOJ's credit

market interventions. But another factor behind the BOJ's liquidity-focused approach may have been a more cautious stance towards balance sheet risk.

The overarching conclusion to be drawn from all this is that conventional LOLR tools, such as the purchase of government securities and discount window lending, have become inadequate for dealing with modern financial crises like those of the U.S. and Japan. The ever increasing complexity of the financial system compels central banks to offer assistance to a wide range of institutions outside the banking system: mortgage lenders, brokers and dealers, and even insurance companies. The globalization of financial markets requires a greater degree of international cooperation than in the past, as in the Fed's provision of dollar-denominated liquidity via swap lines to other central banks. And the greater degree of opacity of financial instruments makes it much more difficult to distinguish good collateral from bad than it was in Bagehot's day. It *is* a whole new ball game: the rules have changed and the playbook must be revised accordingly.

Table 1: A Chronology of BOJ Actions, 1996–2009

	Announcement (Implementation)
Cosmo Credit, Hyogo Bank and Kizu Credit	August 1995
Emergency loan to Tokyo Kyodo Bank	April 1996
Lending to DIC	September 1996
Emergency loan to Hanwa Bank	November 1996
Introduction of repo operations	October 1997
Emergency loan to Kyoto Kyoei Bank	October 1997
Failures of Yamaichi & Hokkaido Takushoku, emergency loans	November 1997
Emergency loan to Tokuyo City Bank	November 1997
Emergency loan to Fuji/Yamaichi	November 1997
Lending to DIC	February 1998
CP operations for repos	November 1998
Temporary Lending Facility to Support Firms' Financing Activities	November 1998
Zero interest rate target	August 1999
Expansion of eligible collateral	September 1999
Lombard facility	March 2001
Quantitative easing	March 2001
Stock purchases	October 2002 (December 2002)
ABS purchases	June 2003 (August 2003)
Reaffirmation of LOLR function	March 2005
End of quantitative easing policy	March 2006
Introduction of pooled collateral	April 2006
Suspension of stock purchase program	October 2008
Resumption of stock purchase program	February 2009

Table 2: A Chronology of Fed Actions, 2007-2009

	Announcement (Implementation)
Term Discount Window Program	August 2007
Term Auction Facility (TAF)	December 2007
Bear Stearns collapse	March 2008
Term Securities Lending Facility (TSLF)	March 2008
Primary Dealer Credit Facility (PDCF)	March 2008
Maiden Lane LLC	March 2008
Lehman Brothers failure	September 2008
Asset-Backed Commercial Paper Money Market Fund Liquidity Facility (AMLF)	September 2008
Loan to A.I.G.	September 2008
Commercial Paper Funding Facility (CPFF)	October 2008
Money Market Investor Funding Facility (MMIFF)	October 2008 (inactive)
Interest paid on bank reserves	October 2008
Term Asset Lending Facility (TALF)	November 2008 (March 2009)
Maiden Lane II and III	November 2008 (December 2008)
Guarantee of Citi asset pool	November 2008
Guarantee of B of A asset pool	January 2009
Expansion of Treasury, MBS and Agency issue purchases	March 2009

Table 3: A Taxonomy of Fed and BOJ Actions

Type	BOJ	Fed
Liquidity	Repos, Repos on CP, Collateral expansion, Quantitative easing, Repos on JGBs, Pooled collateral scheme	Term Discount Window, TAF, TSLF, PDCF, AMLF Treasury purchases
Credit	“Temporary Lending Facility to Support Firms Financing Activities,” ABS purchases, Stock purchases Collateral expansion	CPFF, MMIFF, TALF MBS, Agency purchases
Risk		Citi backstop BofA backstop

Figure 1: Equity and Real Estate Prices in Japan

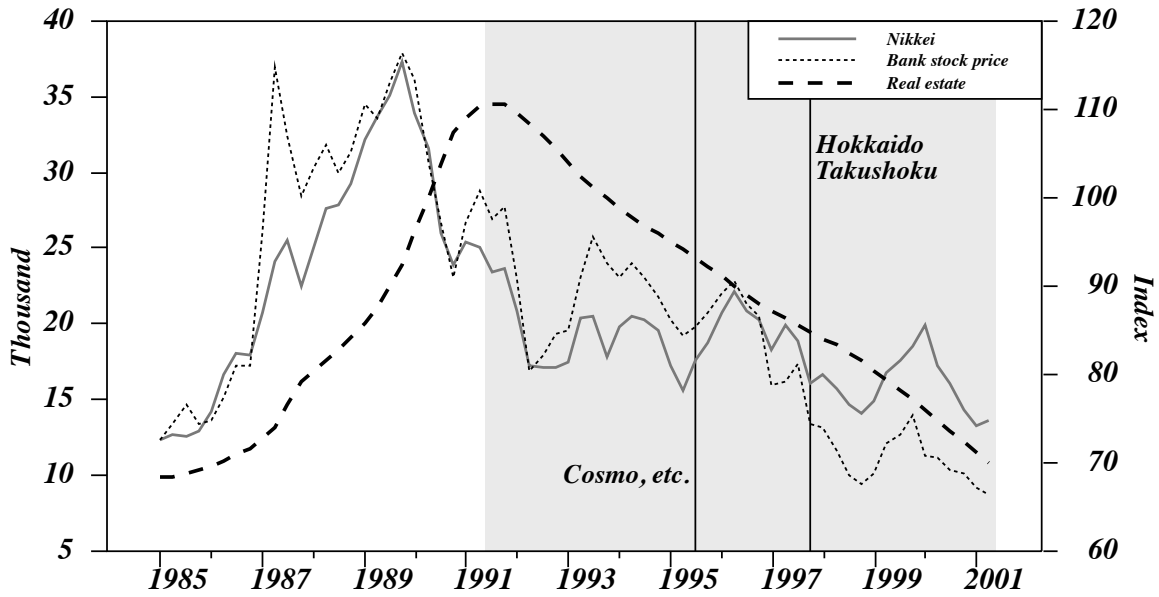


Figure 2: Tankan Lending Attitude and the Japan Premium

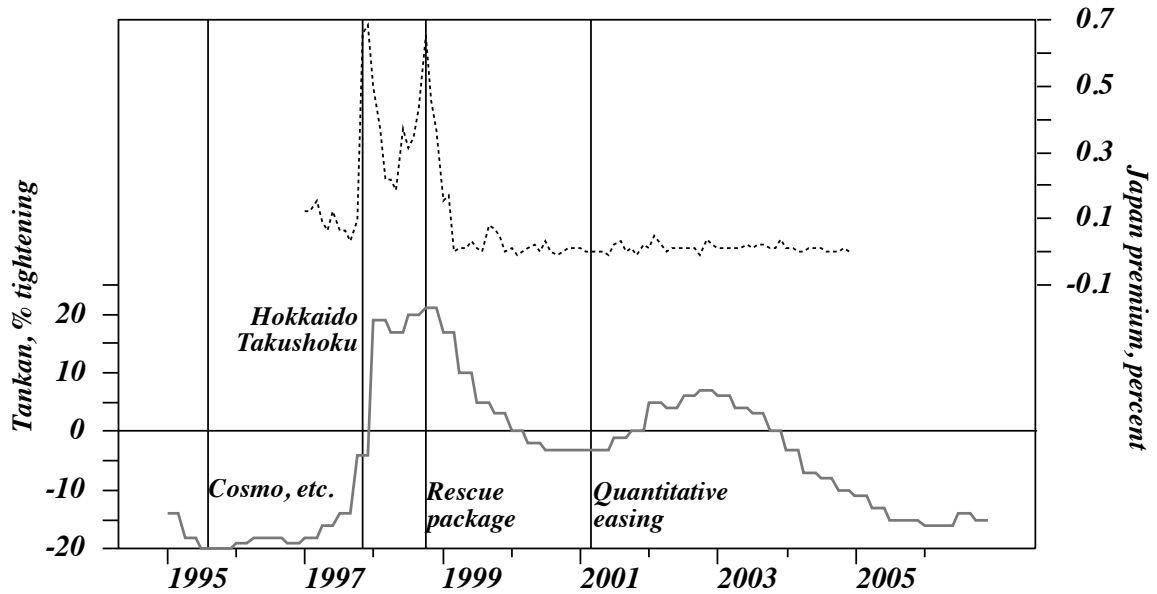


Figure 3: Equity and Real Estate Prices in the U.S.

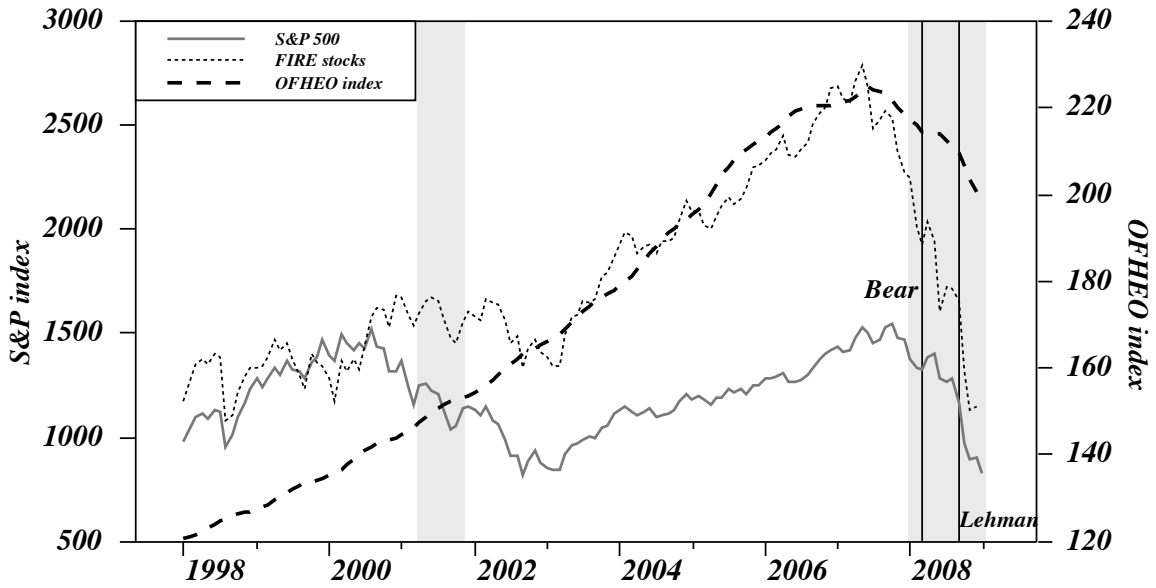


Figure 4: Senior Loan Officer Opinion Survey and the CP Spread

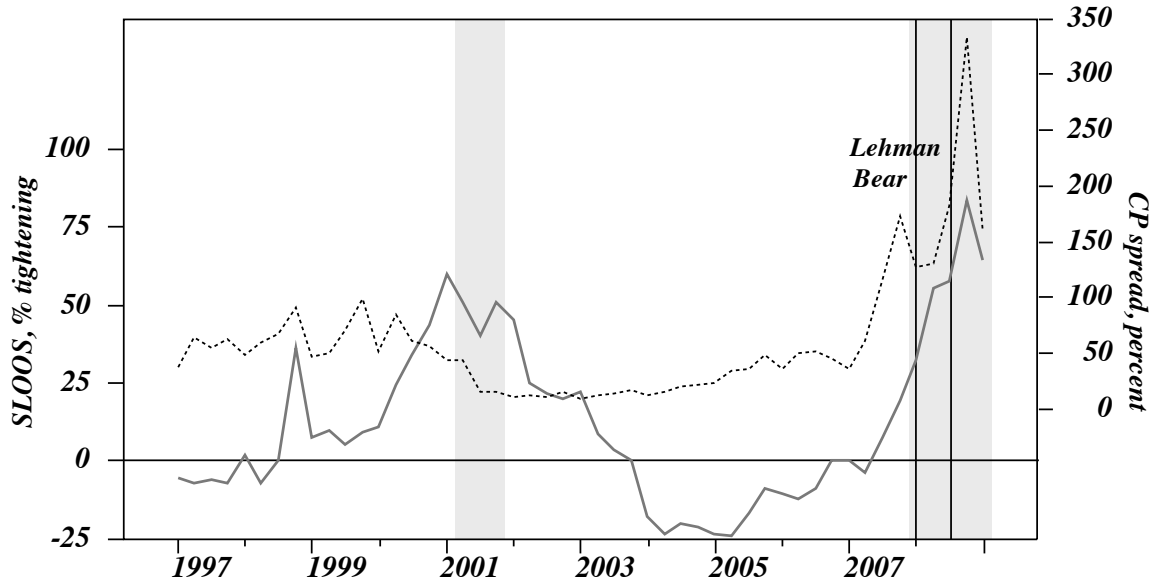


Figure 5: Current Account Balances and the Call Rate

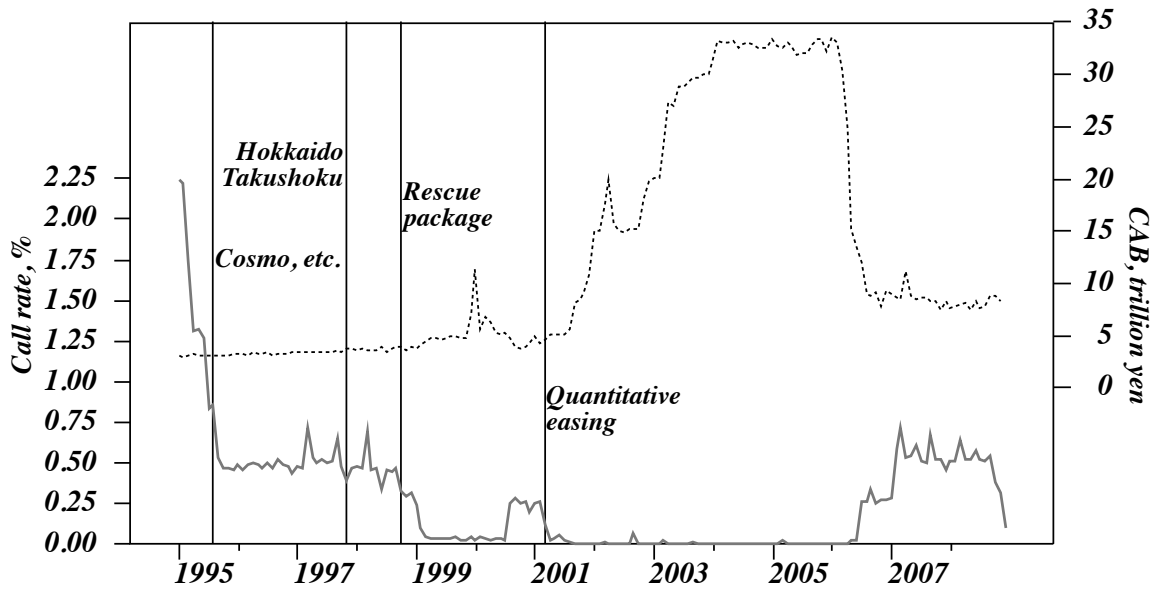


Figure 6: Total Reserves and the Federal Funds Rate

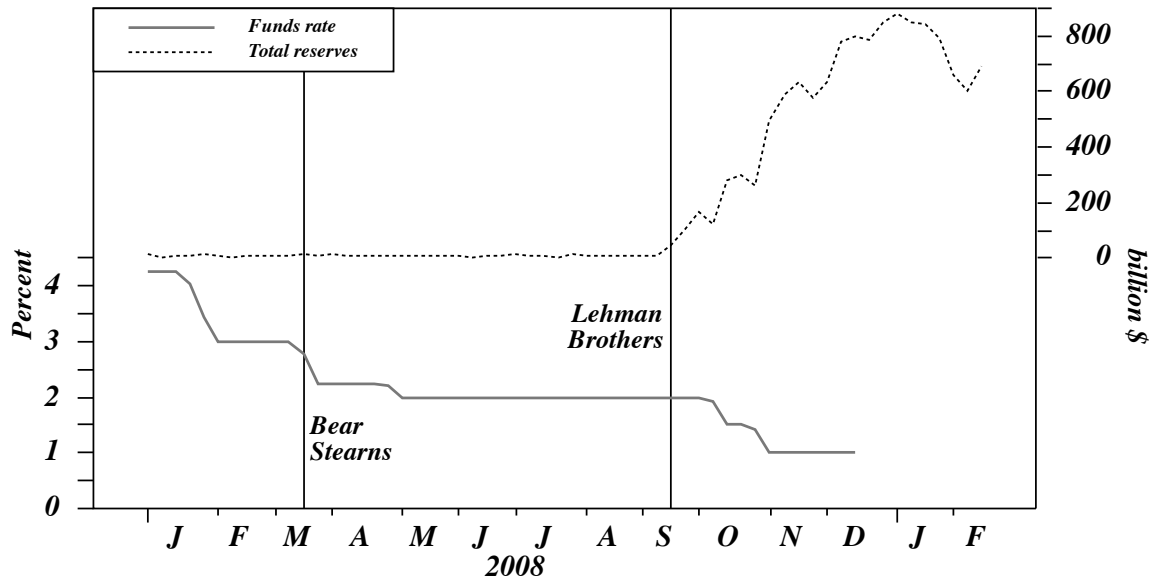


Figure 7: The Bank of Japan's Balance Sheet

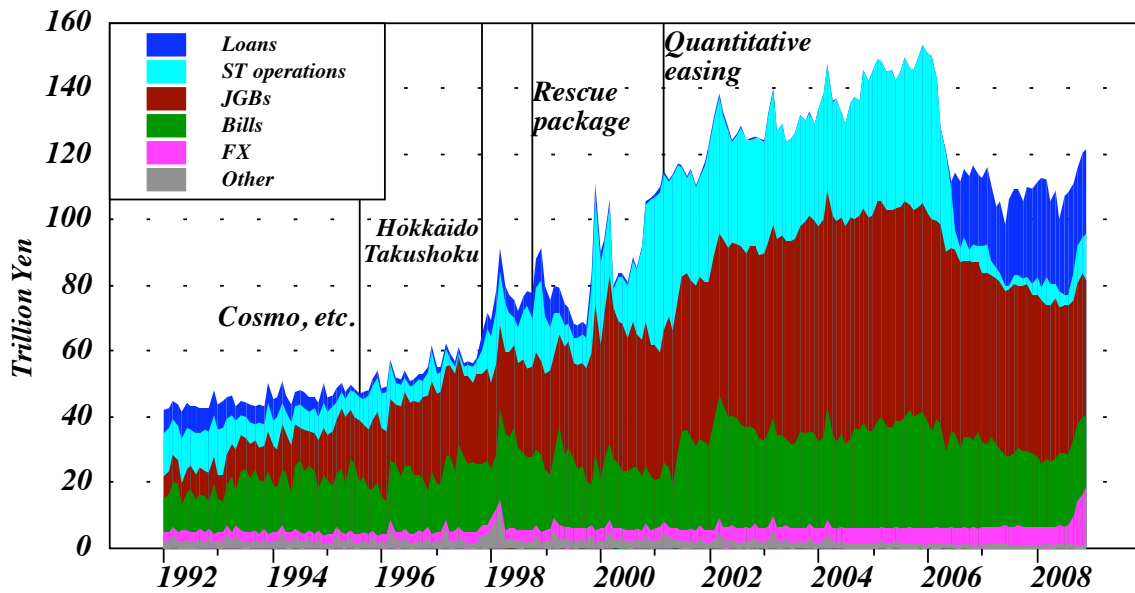


Figure 8: Unconventional Lending by the Bank of Japan

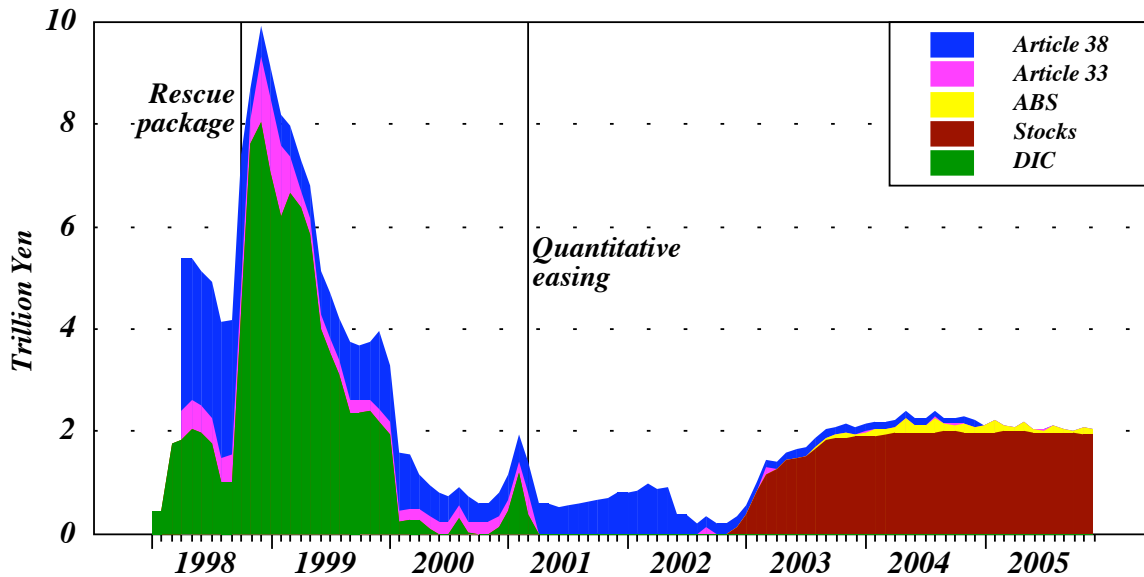


Figure 9: The Federal Reserve's Balance Sheet

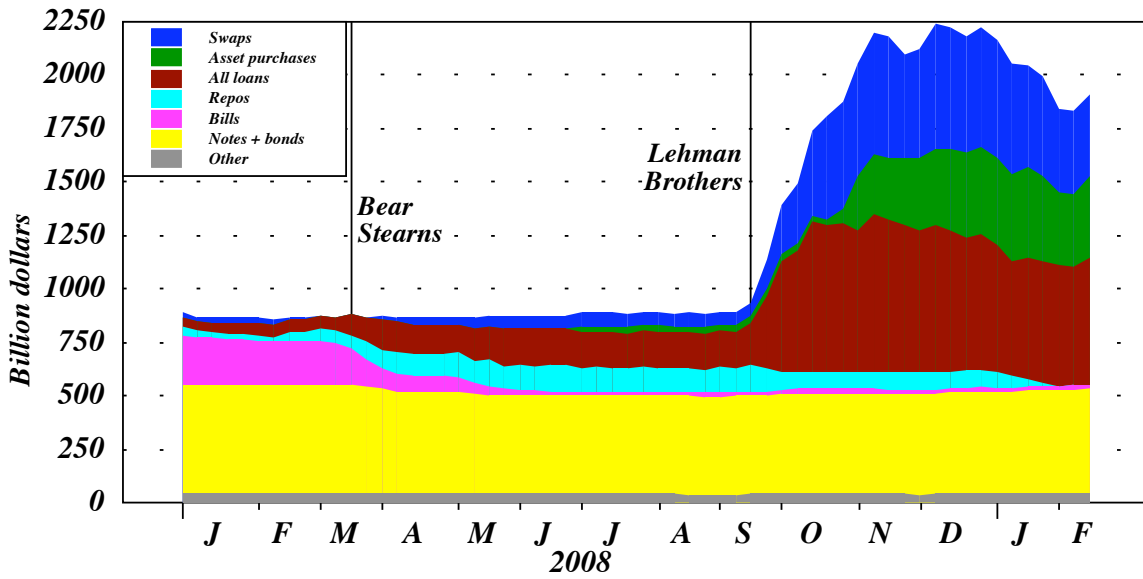
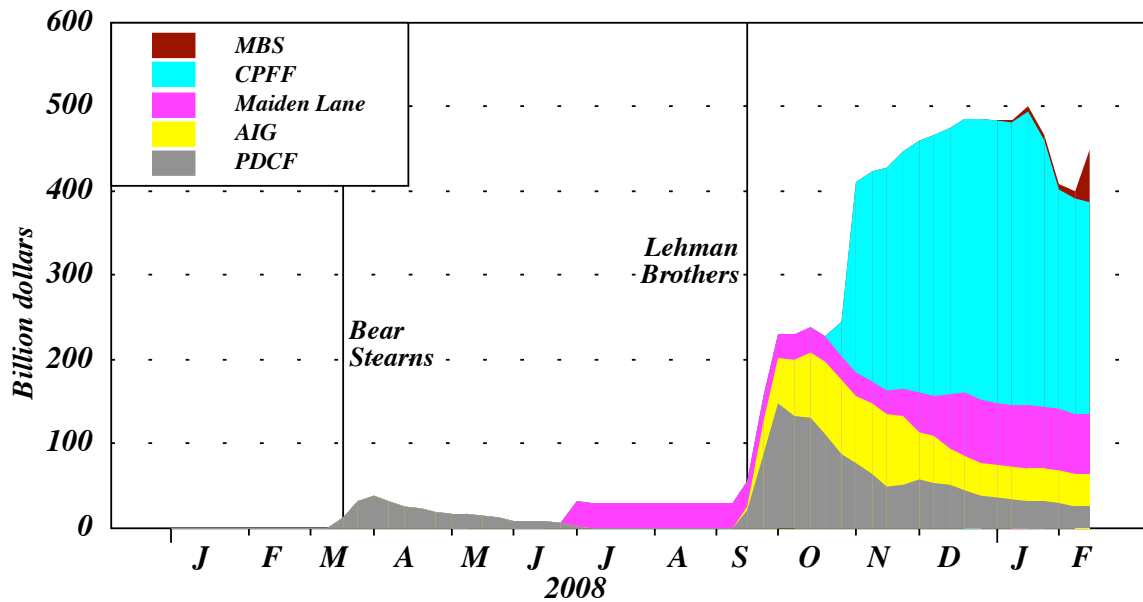


Figure 10: Unconventional Lending by the Federal Reserve



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