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WILL THE U.S. BANK RECAPITALIZATION SUCCEED? EIGHT LESSONS FROM JAPAN

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ABSTRACT

During the financial crisis that started in 2007, the U.S. government has used a variety of tools to try to rehabilitate the U.S. banking industry. Many of those strategies were used also in Japan to combat its banking problems in the 1990s. There are also a surprising number of other similarities between the current U.S. crisis and the recent Japanese crisis. The Japanese policies were only partially successful in recapitalizing the banks until the economy finally started to recover in 2003. From these unsuccessful attempts, we derive eight lessons. In light of these eight lessons, we assess the policies the U.S. has pursued. The U.S. has ignored three of the lessons and it is too early to evaluate the U.S. policies with respect to four of the others. So far the U.S. has avoided Japan's problem of having impaired banks prop up zombie firms.

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1. Introduction

The U.S. government has taken a schizophrenic policy approach to the ongoing credit crisis that began in August 2007. For the first year of crisis, there were no significant legislative changes. Instead, the existing toolkit was stretched to combat problems as they appeared. By October 2008, in the midst of the panic that ensued after the failure of Lehman Brothers, the Treasury went to Congress proposing the idea of purchasing troubled assets to stabilize the financial system. Thus, the Troubled Assets Relief Program (TARP) became the central part of the Emergency Economic Stabilization Act. But within a week of passing the legislation, attention shifted to buying equity in financial institutions. Subsequently, the Capital Purchase Program (CPP) within the TARP was unveiled and within weeks $145 billion was allocated to nine major banks. Asset purchases were delayed.

By November, one of the recipients of the CPP, Citigroup, had received a second round of government assistance and in January 2009, Bank of America also was given additional government support. The Obama administration, upon assuming office, changed course again and called for a set of "stress tests" to determine the capital adequacy of major banks and a new program for asset purchases was unveiled. Upon conclusion of the stress tests banks were given target levels of capital that they were required to achieve. Some banks that initially received capital assistance were allowed to repay the government, while others began selling assets and issuing equity to meet the terms of the tests. The asset purchase programs through the middle of 2009 remained a minor component of the actual policies that were undertaken.

For anyone familiar with Japanese financial crisis from a decade ago these events would seem familiar.[1] Almost all of the policy options deployed in the U.S. were attempted in Japan. Because the Japanese episode is now complete, it seems useful to look at how the programs in Japan fared. The goal of this paper is to assemble the evidence on these programs, offer an assessment of their effectiveness, and reflect on the U.S. policy choices in light of the Japanese experience.

[1] Udell (2008) points out further similarities in the evolution of the governments' responses in Japan and the U.S. He summarizes by saying "More generally, as new events unfolded in Japan, regulators…had to use a combination of existing tools, new tools that stretched the regulatory limits of existing institutions, and go to the legislature for new authority and funding. We witnessed the same combination in the evolution of the response of U.S. authorities."

In retrospect, there were in fact three phases of the Japanese saga. The first part is from the early 1990s until November of 1997 when asset prices crashed and Japan's slow growth period began. The first set of government interventions in the financial system occurred during this period. But we argue that the most important lasting effect was from the political dynamics that developed over this period.

The second phase in Japan was from November of 1997 to March of 1999. We show that there were many very close parallels between this period in Japan and the developments in the U.S. from 2008 through mid-2009. This part of the Japanese slowdown was associated with exceptionally tight credit and a sharp growth contraction.

The third phase of the Japanese crisis, from 1999 through 2003, saw a resumption of lending. But the lending was misdirected and the economy under-performed. The lending problems during this period were no longer tied to the initial asset price declines that were important in the first phase of the crisis. Instead, they were a product of changes in lending that came in part from the policies adopted in phase two.

To be sure, the shocks hitting the Japanese and U.S. economies were not identical. There are some similarities that we identify, but there are some important differences too. Nonetheless, we identify eight lessons that emerge from Japan's many policies and use these lessons to inform discussions about the risks associated with various U.S. policies.

Overall, this paper makes three contributions. First, it provides a concise summary of the Japanese experience. While there are numerous studies of the Japanese financial crisis, we are not aware of any retrospectives looking across the whole 20 years of Japan's problems and focusing on the policy responses. Second, we provide new analysis of the main Japanese interventions that sheds light on the variation in success. This leads to the eight key lessons that we see from Japan for other countries. Third, we offer a brief comparison of the different U.S. policies through the lens of Japanese experience. A contemporaneous assessment is bound to be incomplete, and perhaps once all the events have concluded, may prove to be of limited use. But, at the very least documenting things that were knowable when choices were being made should be useful for future accounts.

To lay a common background for the policy evaluation, we start with a brief description of the key facts about U.S. events and policies. Next, Section 3 provides more details on the three phases of the Japanese crisis. Section 4 analyzes the success and failure of the various Japanese programs, so as to deliver some lessons for other countries. Section 5 reviews the U.S. policy responses in light of the lessons from Japan. Section 6 concludes.

2. The U.S. Financial Crisis, 2007 to mid-2009

Given ever expanding set of surveys of this financial crisis, we do not attempt to provide a full account of it.[2] Instead we focus on the facts needed to put the major policy choices in context.

The problems for the U.S. financial system started with increased defaults of subprime and other nontraditional mortgage loans as the housing boom came to an end. During the housing boom of the 2000s, risky mortgage loans were securitized, structured into various types of financial products, and distributed to investors all around the world. But the risk diversification was far from complete and many financial institutions increased their ownership of real estate related assets. For example, Udell (2008) points out that large U.S. commercial banks increased the proportion of real estate loans in their portfolio from 44% in 2003 to 53% by 2007. As the underlying mortgages become non-performing, the values of their derivative securities declined, and the financial institutions that held the securities started to suffer losses. Given the leverage in the financial system these losses were significant relative to the equity of these firms (Greenlaw et al., 2008).

By early 2008, the losses started to jeopardize the viability of large financial institutions. In March 2008, the Bear Stearns nearly failed and was rescued by JP Morgan with financial assistance from the Federal Reserve System.

By September, more financial institutions encountered serious funding problems and asked for government assistance. First, Fannie Mae and Freddie Mac, the two government sponsored mortgage giants, were rescued by the government. Shortly afterwards, Lehman

[2] A detailed list of prominent events in the United Sates is available at http://timeline.stlouisfed.org/ and http://www.ny.frb.org/research/global_economy/Crisis_Timeline.pdf . For a lengthy discussion and analysis of crisis, including global aspects, see Bank for International Settlements (2009).

Brothers, a major investment bank, also sought help. The government was reluctant to provide financial assistance to Lehman and encouraged other financial institutions to rescue it. No financial institutions were willing to step up without government help. Running out of alternatives, Lehman filed for bankruptcy on September 15.

Financial market conditions shifted notably in the week that followed. The cost of insuring the debt of many other financial institutions jumped noticeably (Veronesi and Zingales (2009)). Stock markets around the world dropped sharply. A money market mutual fund informed investors that it would not be able to redeem claims at par value. Press reports described credit markets as frozen. Financial firms' ability to issue commercial paper for more than a week seems to have disappeared: the average maturity of newly issued commercial paper dropped from over one month to less than 5 days. Another troubled investment bank, Merrill Lynch, was acquired by Bank of America. The U.S. government rescued the largest U.S. insurance company, AIG Insurance. The deal to support AIG had to be renegotiated multiple times over the coming months.

Toward the end of that week, the regulators announced several measures aimed at calming the markets. The Federal Reserve decided to insure investments in money market funds. The Treasury announced the idea of setting up a facility to buy non-performing assets from financial institutions. The Securities Exchange Commission imposed a temporary ban on short sales of financial stocks.

Nonetheless, the banking turmoil continued. On September 25, Washington Mutual and Wachovia, two financial intermediaries which had assets of more than $300 billion and $800 billion respectively, were taken over by the authorities. WaMu was subsequently sold to JP Morgan Chase, while Wachovia eventually was acquired by Wells Fargo.

The Treasury's interest in purchasing non-performing assets from major financial institutions was formalized as the Troubled Asset Relief Program (TARP) which was included in the bill for the Emergency Economic Stabilization Act. Many politicians worried about committing $700 billion to a program that would be run by the Treasury without much oversight, and the bill was initially voted down by the Congress. The government quickly revised the bill, adding various measures unrelated to financial firms, and the revised bill passed the Congress on October 3. The TARP, the central part of the bill, did not change very much in the revision.

Within a week, the Treasury started to shift the focus from the original idea of buying troubled assets to buying bank shares to increase the bank capital. On October 14, the Treasury announced that it would use $125 billion to inject capital into nine large financial institutions by buying preferred shares that came with warrants to buy common shares. The Republicans lost the Presidential election on November 4. On November 12, the Treasury announced that the original TARP plan of buying troubled assets would be postponed indefinitely.

Over the following week, rumors of problems at Citigroup emerged. On November 21, the Treasury, Federal Reserve, and Federal Deposit Insurance Corporation (FDIC) acted collectively to provide assistance to Citigroup. The joint press release by the agencies described the package as a combination of guarantees, liquidity access, and capital.

On November 25, the Federal Reserve announced the creation of its Term Asset-Backed Securities Lending Facility (TALF). The TALF allowed holders of AAA-rated asset-backed securities, backed by recently originated consumer and small business loans, to qualify for a non-recourse loan from the Federal Reserve Bank of New York. The Fed takes the collateral at a pre-specified haircut and receives credit protection from the TARP. This program was intended to jump start securitization which had ground to a halt after the Lehman failure.

By December, the proposed merger between Merrill Lynch and Bank of America seemed to have encountered an impasse and Bank of America was privately telling the government that it was hesitant to proceed. The merger was ultimately consummated on January 1st, but by the time it was completed the government had agreed to provide additional assistance. On January 16, the Treasury, FDIC, and the Federal Reserve announced a package of guarantees, liquidity access and capital for Bank of America.

During December 2008, TARP funds were also offered to non-financial firms for the first time. General Motors and Chrysler, two of the three major auto manufacturers, were given loans on December 19th totaling $17.4 billion. General Motors subsequently received additional TARP assistance for its former financing subsidiary, General Motors Acceptance Corporation.

As the change in administrations was approaching in January 2009, press reports indicated that the Obama administration was set to announce the creation of an "aggregator bank" that would buy bad assets so that they could be removed from the balance sheets of banks. When the first plans of the administration were announced, the aggregator bank idea was dropped, in part reportedly because the funding requirements would have been huge.

Instead, the Treasury's Financial Stability Plan had three components designed to revitalize the financial system. The first component was a series of bank inspections intended to gauge the capital levels of banks under different economic scenarios over the next two years. These stress tests were intended to force the banks to use common economic assumptions about the path of the economy and similar rules to estimate losses expected from hard to value assets. The banks were required to have sufficient equity capital to meet the expected losses under an "adverse" economic scenario in two years (2009 and 2010) and to still clear the minimum capital level at the end of 2010. Essentially, the analysis boiled down to taking starting levels of capital, adding profits over the two years and subtracting losses to derive a final level of capital that would be compared to the benchmark established by the regulators. This exercise was proposed for the 19 largest bank holding companies in the U.S.

The second component was an extension of the TALF. The Fed would be prepared to lend up to $1 trillion under the program and the Treasury would offer $100 billion in TARP funds to protect the Fed from credit losses.

The third component was the Public-Private Investment Program (PPIP) aimed at removing troubled assets from the banks' balance sheets. The details on this aspect of the plan were initially quite vague and seem to have been interpreted as showing that the government had no clear plan, so the market reaction to the announcement was quite negative: the stock market dropped over 8% on the day of the announcement. When the details were revealed 6 weeks later, it was announced that the PPIP would allow private sector investors to borrow money from the FDIC and then have the equity investment matched by the Treasury in order to buy mortgages. In principle, the investors could leverage their capital by more than a factor of 12 for each dollar they contributed.

Between the initial announcement of the Treasury plan on February 10 and when the details were provided on March 23, the deadline for the payment of $165 million in bonuses for certain employees at AIG passed. The bonuses had been promised several times and Secretary Geithner had concluded that there was no legal basis for voiding the payments. But the public and political outrage was remarkable. The House of Representatives went so far as to pass a bill calling for 90% tax on any executive bonus payments made to employees of firms that had received more than $5 billion in TARP assistance.

In early May the results of the stress tests were announced and it was concluded that 10 of the 19 major institutions had sufficient capital to withstand even the adverse simulations. The remaining 9 organization were deemed to have insufficient common equity; although all were deemed to have other forms of capital that keep them above the legal minimums for total capital as required by current regulations. These banks were ordered to raise $185 billion in common equity. Accounting for planned asset sales and profits in the first quarter of 2009 that exceeded the levels assumed by the regulators, the actual amount of capital to be raised fell to $75 billion. Part of the recapitalization was accomplished by converting preferred shares (including the ones the government purchased using TARP funds) to common shares. The banks were given until November to come up with the equity or they would need to seek equity from the government.

Among the 10 banks that were already sufficiently capitalized, many had taken TARP funds in the autumn of 2008. Several began the process of repaying the TARP funds so that they could operate without any restrictions on pay, dividends or other activities.

In contrast to the relatively favorable market reaction regarding the process surrounding the stress tests, the response to the PPIP was much less enthusiastic. It took the Treasury several months to work out the details for how the program would operate and the interest of many potential investors seems to have waned. As of August 1, 2009, no transactions had taken place.

Finally, Chrysler and General Motors both filed for bankruptcy. Each emerged from the court supervision quite quickly and was operating with a restructured set of labor agreements and capital structure. Chrysler exited the bankruptcy in June 2009 and most of the assets were merged with Fiat. General Motors exited the bankruptcy in July 2009. AIG was reorganized outside of bankruptcy.

3. Japan's Crisis

In reviewing the Japanese experience, it is helpful to distinguish three somewhat separate phases.[3] The initial stage runs from the early 1990s until November of 1997. Asset prices crashed and Japan's stagnation began. The government's initial policy interventions, including

[3] Contemporaneous descriptions and analysis of the Japanese banking crisis can be found in Cargill, Hutchison, and Ito (2001), Hoshi and Kashyap (2001, Chapter 8), and Nakaso (2001).

establishing asset management companies and extending deposit guarantees, occurred during this period. The government policy was overall characterized by regulatory forbearance with the notable exceptions occurring for clearly insolvent financial institutions.

The second, acute phase of the crisis runs from November 1997 to March 1999. The period started with unexpected failures of major financial institutions including Yamaichi Securities and Hokkaido Takushoku Bank in November 1997. This period was marked by exceptionally tight credit. As we show below, there were many very close parallels between this period in Japan and the developments in the U.S. from late 2007 through 2009 especially in terms of the policy responses.

The third phase is from April 1999 to early 2003 when the economy finally bottomed out. The bank recapitalization of March 1999 succeeded in restoring the credit flows. The lending, however, was often misdirected to poorly performing firms, sometimes with explicit guidance from the government. After short-lived recovery in 2000, the economy reverted to stagnation, non-performing loans continued to accumulate, and banks eroded their capital once again. The non-performing loans during this period were no longer tied so much to the initial asset price declines that were important in the first phase of the crisis. Loans to loss-making companies, especially small and medium enterprises, became a more important problem.

This section reviews Japan's experience during the three phases of the financial crisis. We review the policy responses as well, but the full analysis of the policies is saved for the next section.

3.1. Phase One: 1991-1997

When asset prices collapsed in the early 1990s, Japanese banks were highly exposed to real estate price shocks, directly, through loans to real estate developers and indirectly, through loans to commercial and industrial firms that were secured by real estate. Many Japanese banks also owned and lent money to the *jusen*, financial institutions which were originally created as niche housing loan companies in the 1970s.

In the 1980s, as the financial markets were deregulated and the lines of separation between various financial institutions in Japan blurred, the *jusen* faced increased competition in the home mortgage market from banks. The *jusen* began lending in other markets, notably to

real estate developers. The land price boom in the late 1980s intensified this trend. The founder banks of the *jusen* also "introduced" high-risk loans that they themselves would not make, but instead would steer to the *jusen* for a "finder's fee."

Thus, it was no surprise that the *jusen* got into trouble as soon as the land prices started to decline. By 1991, the non-performing loans at the *jusen* amounted ¥4.6 trillion, or 38% of their total loans.[4] The founder banks and the Ministry of Finance (MOF) put together a rescue plan including loan concessions and interest rate reductions by the founder banks, new loan support from non-founders, and cost-cutting measures at the *jusen*. The rescue plan failed to improve the financial condition of the *jusen* and the non-performing loans continued to increase.

In 1993, the MOF put together a second rescue plan. Under this plan, the founder banks reduced their interest rates to the *jusen* to zero. Non-founder banks reduced the interest rate to 2.5%. Agricultural co-ops, which also heavily lent to the *jusen*, were required to reduce their rates to 4.5%. The plan was based on a presumed economic recovery that was expected to include a 25% increase in real estate values in the following 10 years.

The economy did not recover as quickly as the MOF hoped. By 1995, 75% of *jusen* loans were non-performing and 60% were considered unrecoverable. The MOF finally decided to abandon the *jusen* companies. After a lengthy deliberation in the Diet, the total loan losses of ¥6.41 trillion was born by the founder institutions (¥3.50 trillion), agricultural co-ops (¥0.53 trillion), other lenders (¥1.70 trillion), and taxpayers (¥0.68 trillion). The remaining assets that were thought to be possibly recoverable (¥6.6 trillion in book value) were transferred to the newly created Housing Loan and Administration Corporation (HLAC).

The size of the *jusen* problem was substantially smaller than the non-performing loan problem of banks that would subsequently emerge. The MOF repeatedly orchestrated *jusen* rescues (mainly by founder banks), but the restructuring plans were often based on overly optimistic forecasts. Eventually, despite repeated promises that no taxpayer assistance would be needed, the government had to ask taxpayers to share the losses. Although the amount of public funds used was tiny (¥0.68 trillion), the public outrage over repudiation of the promise meant that passing the legislation was contentious and the opposition harnessed this anger to nearly

[4] Over the course of the Japanese crisis, the yen/dollar exchange rate fluctuated between 80 and 125, but for order of magnitude purposes that are relevant for this analysis, the yen figures we quote can be divided by 100 to get a rough dollar estimate.

cripple the government (Miller and Milhaupt, 2000). The legacy of this experience was long lasting because it made the government very reluctant to ask for the much larger sums that would be needed once the troubles of the commercial banks became evident.

The collapse of the *jusen* was the most spectacular example of the financial failures in the early 1990s, but some non-*jusen* financial institutions also suffered from the declining real estate places and failed. The failures during this period were usually resolved by the MOF asking a healthy bank to absorb the failing bank often with assistance from the Deposit Insurance Corporation (DIC). For example, Toho Sogo Bank failed in 1991 and was absorbed by Iyo Bank with assistance from the DIC. Toyo Shinkin Bank failed in 1992 and absorbed by Sanwa Bank with assistance from the DIC, Industrial Bank of Japan (IBJ) and Zenshinren.

The instability of the banking system peaked in the summer of 1995. Two large credit unions, Cosmo Credit Union and Kizu Credit Union failed in July and August respectively. In the Kizu failure depositors ran to the branches as soon as they heard a rumor (which was later confirmed) that Kizu was closing down. In August, Hyogo Bank, one of the Tier II regional banks, failed. It was later reorganized as Midori Bank with financial assistance from the DIC, city banks, and the Bank of Japan (BOJ). The crisis in August 1995 led to the emergence of "Japan premium," a premium on the interbank loans that major Japanese banks were asked to pay compared with their counterparts in the U.S. and Europe.

In the same Diet session as the one that passed the law to liquidate *jusen* companies, the Deposit Insurance Act was revised to allow the DIC to offer financial assistance that exceeded the cost of paying off insured depositors (that is, up to ¥10 million per depositor). Thus, by 1996 Japan had a *de facto* policy of guaranteeing all deposits.

Throughout this period, the MOF was reluctant to force the banks to disclose the true extent of the non-performing loan problem. Before March of 1993, the banks did not disclose any numbers on non-performing loans. When the banks started to disclose the non-performing loans for the first time, only major banks published any estimates and the definition of non-performing loans was limited to loans to failed enterprises and loans on which payments were suspended for more than six months. Only in March 1998 did all the banks finally start to disclose the non-performing loans on a consistent basis. The definition of non-performing loans then included loans to failed enterprises, loans on which payments were suspended for more than three months, and loans with relaxed conditions (restructured loans). Thus, during this first

phase of the crisis, the Japanese regulators hoped that banks could work off the non-performing loans quietly and gradually without disclosing the true extent of the problem to the public. Such regulatory forbearance seemed to be working when the economy showed signs of recovery in the mid-1990s.

Although the non-performing loans at banks continued to rise and a few small banks failed, the economy seemed to have entered a recovery phase. 1996 was a boom year, with real GDP growth now estimated to have been 5.1%.

However, the recovery did not last long. By the mid-1997, the Japanese economy was back in recession and financial instability reemerged. The Deposit Insurance Act was changed again to allow the DIC to provide financial assistance for mergers that did not involve failing banks, as well as mergers between failed banks. In October 1997, exploiting this change, the DIC provided funds to facilitate a pair of mergers involving four very weak banks in the Kansai area: Fukutoku with Naniwa and Kofuku with Kyoto Kyoei.

3.2. The Acute Phase: 1997-1999

The acute phase of the crisis began when a mid-sized securities firm, Sanyo Securities, declared bankruptcy in early November 1997. This resulted in Japan's first interbank loan default. Two weeks later a major bank, Hokkaido Tokushoku, lost the ability to borrow in the interbank market and was forced to declare bankruptcy. This was the first major bank failure in postwar Japan. A week later one of the four major securities dealers, Yamaichi Securities, failed after rumors (subsequently shown to be true) that it had accumulated massive off balance sheet losses through an illegal *tobashi* scheme.[5] Finally, before the month ended, Tokuyo City Bank, a regional bank, also failed.

Figure 1 shows the Japan premium calculated as the difference between 3-month Eurodollar Tokyo Interbank Borrowing Rate (TIBOR) and the 3-month Eurodollar London

[5] In a *tobashi* scheme, a security company hides capital losses of one corporate customer by selling a part of the portfolio at an inflated price to another customer (whose accounting period is different from the first customer's so that they did not have to disclose the losses at the same time). When the second customer's accounting year end arrives, the portfolio is sold to another customer (who may be the same as the first) to hide losses again. Barring a reversal of market prices, the cycle cannot continue forever and the securities company ends up shouldering the losses eventually.

Interbank Borrowing Rate (LIBOR).[6] Relative borrowing costs for both banks jumped immediately on the news of Sanyo's demise (November 3, 1997).

The stress was evident in the domestic interbank loan market (call market) as well. Figure 2 shows the difference between the maximum and the minimum of the overnight call rate (uncollateralized) for each day from November 1997 to April 1999.[7] As Fukuda (2008) points out, the difference reflects not only the range of intraday fluctuations of the call rate but also the difference between the rates for the most creditworthy bank and the least creditworthy bank. The figure shows that the spread jumped in November 1997 and stayed high for the next 16 months, suggesting some banks had extreme trouble borrowing even for just one night.

In December 1997, the government decided that public funds would be needed to deal with the financial crisis and announced that it planned to earmark ¥10 trillion to put into the banking sector. While the discussion of how to use the public funds was underway, the government approved a pair of accounting changes that were designed to allow the banks to make their public financial statements look better than was truly warranted. These rules allowed the banks to choose to use either market or book values for the banks' holdings of stocks in other firms and for the banks' real estate holdings.

Virtually all the banks' real estate assets were on their books at the historical acquisition prices (typically decades old), so even though land prices were well below peak values, a switch to market values instantly raised the value of the banks' assets. Conversely, the banks were harvesting capital gains on their stock holdings in order to report positive earnings. By early 1998 the banks had about ¥24 trillion of stockholdings on their books. Typically upon selling the shares to collect the capital gains the banks would quickly buy back the shares to retain the relationships with their clients. By 1998, the market price for many of the shares that had been

[6] We thank Kimie Harada and Takatoshi Ito for providing the data for the figure. Eurodollar TIBOR is calculated by QUICK, a financial information company, as the average interbank rate of the middle 9 of 13 reference banks (the highest two and the lowest two banks are excluded). The 13 banks include two non-Japanese banks, but their rates were almost always excluded as the two lowest, making TIBOR effectively the average rate for Japanese banks. Eurodollar LIBOR is calculated by the British Bankers Association as the average interbank rate of the middle 8 of 16 reference banks. Three Japanese banks are included in the 16 reference banks, but their rates were almost always excluded as three of the four highest rates, making LIBOR effectively the average rate for non-Japanese banks. See Ito and Harada (2005).

[7] We thank Shin-ichi Fukuda for providing the data for the figure.

sold and re-purchased was below the book value for these shares. Hence, the banks could further inflate the value of the assets by recording value of the shareholdings at book value.

On February 16, 1998, the Diet passed the Financial Function Stabilization Act, which allowed the government to use ¥30 trillion of public funds (¥17 trillion for protecting depositors of failed banks and ¥13 trillion for bank recapitalization). As we describe below, the government used ¥1.8 trillion out of the ¥13 trillion to recapitalize major banks in March of 1998, but it was unsuccessful in stabilizing the situation. Public dissatisfaction with the government's response continued to build through the spring and in June, the Liberal Democratic Party, the dominant partner in the ruling government coalition, lost 17 of its 61 seats in the Upper House election. The Hashimoto government resigned and a new government led by Keizo Obuchi assumed power.

The new government immediately began formulating further plans for dealing with the banking problems. By October, another major bank, Long-Term Credit Bank of Japan (LTCB), was on the brink of failure. The legislature at that point reached agreement on two pieces of compromise legislation (between the government and the leading opposition party) to deal with both insolvent institutions, which was the focus of the opposition, and to help solvent, but under-capitalized banks, which the LDP's concern.[8] In October, LTCB was nationalized using the new framework. In December, Nippon Credit Bank, NCB, was nationalized.

As noted earlier, from 1996 onward an unlimited deposit guarantee was already in place in Japan. In November of 1997, following the default of Sanyo Securities, the BOJ informed market participants that interbank loans were also protected (*Kin'yu Business,* February 1998, p.7). For both LTCB and NCB, all the creditors (including subordinated debt holders) of the banks were fully paid, although the existing equity holders saw their stakes eliminated.

The second major recapitalization of the banks using mostly preferred share purchases by the government was undertaken in March 1999. From Figure 1, we can see that the Japan premium declined after this injection. At that time, some observers thought this would prove to be a turning point in the Japanese crisis.

[8] The Financial Revitalization Act set up the framework to restructure failing systemically important banks through nationalization, and the Prompt Recapitalization Act allowed the government to inject capital into healthy banks. See Fukao (2000) for more details on these laws.

One noteworthy aspect of this entire period was the divergence between the government's characterization of the condition of the banking industry and that of outsiders. For example, in the August 1998 IMF Article 4 consultation, the IMF's Executive Directors were very frank in calling for much more aggressive action by the government:

> Rigorous enforcement of the self-assessment framework is needed so that banks recognize and provision against the full extent of bad loans. Several Directors suggested that these results be published for individual banks to increase transparency.

In contrast, on February 2, 1999 as the second capital injection was being debated, Eisuke Sakikabara, the Vice Minister of Finance, declared that the banking crisis would be over within 2 weeks. By the end of the month the U.S. Deputy Treasury Secretary, Lawrence Summers, gave a speech asserting that even with the capital infusion anticipated by Sakakibara, the Japanese banks remained significantly undercapitalized.

3.3. Phase Three: 1999-2003

The 1999 recapitalization calmed the financial markets. The Japan premium disappeared quickly and the credit started to flow (Peek and Rosengren, 2001). However, the problem of non-performing loans remained and the capital shortage soon re-emerged. Kashyap (2002) reports, for example, estimates from six private-sector bank analysts on the health of the banking system showing that each analyst estimated that the system was insolvent as of August 2002. So the capital shortage was universally acknowledged by all parties except the government.

To give a rough benchmark of the size of the problems, Table 1 shows data from Fukao (2008) on the condition of capital in the banks. At the end of March, 2002, for example, Japanese banks collectively had ¥30.2 trillion of core capital (equity capital and capital reserves) to buffer the risks associated with assets of ¥756.1 trillion, meaning that stated capital was equal to 4.0% of the assets. However, ¥10.6 trillion of core capital was in the form of deferred tax assets, which are tax deductions coming from past loan losses that the banks would be able to claim in the future if they became profitable. If the banks did not regain their profitability within five years, these tax credits disappear.

In addition to relying on questionable tax credits to boost capital, the banks provisioning practices were questioned. Fukao (2003) estimated the amount of under-reserving, which should be really written off from the current capital. This deficit represents a failure to set aside "adequate" reserves. To calculate adequate reserves, the amount of classified bad loans is multiplied by one minus the expected recovery rate for each class of loans, which is estimated using the data from the 1990s. This leads to two potential biases. On the one hand, because the recovery rate from bad loans improved after the late 1990s this procedure is likely to overestimate the level of adequate reserves (and hence under-reserving) during the 2000s. On the other hand, because many outside observers believed that the banks were consistently overstating the quality of their loans the estimates for the level of adequate reserves would have been too low. As of March 2002, Fuako concludes that banks reserves were ¥6.8 trillion too low.

To give a rough sense of the capital deficit, we subtract the deferred tax assets and under-reserving from the official capital to arrive at what we call "modified capital." As of March 2002, modified capital was just ¥12.8 trillion, of which ¥7.2 trillion had been contributed by the government, so the Japanese banking sector had hardly any private capital.

As a point of reference, we can compare the modified capital to the capital that the banks would have if they had equity equal to three percent of assets. We call the difference between modified capital and this lower bound the capital gap. As shown in the last column of Table 1, this gap was consistently positive between 1997 and 2005. The gap declined after the 1999 recapitalization, suggesting the policy had a favorable impact, but grew again soon afterwards.

The nature of the non-performing loans seems to have changed during this period. Up to the acute phase of the crisis, the non-performing loans were most closely tied to real estate related lending. Using panel regression analysis, both Ueda (2000) and Hoshi (2001) found that the more a bank had exposure to the real estate industry the higher was its non-performing loan ratio. From 2000 onward problems associated with small and medium enterprise lending became important. The government required the banks that received public capital to increase lending to these businesses. This forced lending to poorly performing firms seems to have led to new set of non-performing loans.

Table 2 reports a series of cross-section regression analysis of non-performing loan ratios of Japanese banks. The specification of regressions is very similar to those in Ueda (2000) and

Hoshi (2001): the ratio of the reported amount of non-performing loans to total loans is regressed on the proportion of loans to the real estate developers and the proportion of loans to small and medium enterprises. Dummy variables to distinguish five types of banks (city banks, long-term credit banks, trust banks, tier I regional banks, and tier II regional banks) are also included in the regression, although we do not report the coefficient estimates on those dummies. To conserve degrees of freedom, we allowed for a single lag of the past loan percentages to affect bad loans, but we experimented with different lag lengths. So each column header in the table describes a different regression specification. For example, "lag 1" means that the non-performing loan ratio of this year is regressed on the proportions of real estate loans and small and medium enterprise loans in the last year.

Each cell shows the coefficient estimates on the proportion of loans to the real estate developers and the proportion of loans to the small and medium enterprises with their standard error estimates in the parentheses. From 1997 to 2000, we see that the coefficient estimate on the proportion of loans to the real estate developers is statistically significant. but that on the proportion of loans to the small and medium enterprises it is not significant. Starting in 2001, the small and medium enterprise loans started to become the more important determinant of the overall non-performing loans ratio with real estate loans often losing their statistical significance. This is especially clear for 2004 and 2005: the small and medium enterprise loan ratio is highly significant and the real estate loan is not. The results do not seem too sensitive to the assumed lag length in the specification.

Though simple, our regression analysis suggests the nature of the non-performing loan problem in Japan shifted in the early 2000s. The problem ceased to be tied to the collapse of land prices in the early 1990s and instead became more dependent on the exposure of small and medium enterprises. That lending to the latter set of borrowers was explicitly encouraged as a condition of receiving public capital suggests that the conditionality did not seem to have helped the banks.

The aggressive closure policy for failing banks that began with the nationalization of the two long-term credit banks continued for about a year. The Financial Reconstruction Commission (FRC), which was in charge of resolving troubled banks under the Financial Revitalization Act (FRA), closed down several regional banks and put them under the receivership. After the first chair of FRC, Hakuo Yanagisawa, was replaced in October 1999,

the policy turned more accommodative. The FRA expired in 2001 and the FRC was subsumed into the Financial Services Agency (FSA).

Yanagisawa was brought back as the Minister in charge of the FSA and he called for a "final resolution" of non-performing loans. Yanagisawa's FSA conducted "special inspections" of major banks focusing on loans to large customers. The inspections were completed in April 2002 and added to the published non-performing loan numbers, but the FSA also announced that all banks were well capitalized. Yanagisawa appeared unwilling to admit the capital gaps were growing again.

In September 2002, Yanagisawa was replaced by Heizo Takenaka, who finally started to address the non-performing loans problem seriously. Within a month of his appointment, Takenaka announced the Financial Revival Program (*Kin'yū Saisei Program*) that called for (1) more rigorous evaluation of bank assets, (2) increasing bank capital, and (3) strengthening governance for recapitalized banks (Omura, Mizukami, and Kawaguchi, 2006, p.4).

The FSA followed the "Takenaka Plan" and became tougher in its audits of the banks. In the early part of 2003, this pressure led many of the largest banks to issue shares (typically through private placements) to improve their capital ratios. Resona Bank's capital ratio for March 2003 fell below 4% after it was not allowed to count five years worth of tax deferred assets as capital. The FSA used the Deposit Insurance Act (Section 102-1) and injected capital into Resona Bank.

In August 2003, the FSA also issued business improvement orders to fifteen recapitalized banks and financial groups, including five major ones (Mizuho, UFJ, Mitsui Sumitomo, Mitsui Trust, and Sumitomo Trust) for failing to meet their profit goals for March 2003. They were required to file business improvement plans and report their progress each quarter to the FSA.

UFJ Holdings was found to have failed to comply with its revised plan in March 2004 and received another business improvement order. The CEOs of UFJ Holdings, UFJ Bank, and UFJ Trust were forced to resign, and the salaries for the new top management were suspended. The dividend payments (including those on preferred shares) were stopped. Salaries for the other directors were cut by 50%, their bonus had already been suspended, and the retirement

contributions for the management were also suspended. The number of regular employees was reduced and their bonuses were cut by 80%.[9]

Finally, there was a shift in the government's policy regarding distressed borrowers. The Industrial Revitalization Corporation of Japan (IRCJ) was created in April 2003 as the government institution to buy non-performing loans from non-main banks and work with their main banks to reorganize the poorly performing customers to restore their health. The Resolution and Collection Corporation (RCC), a government asset management company that already existed, also shifted their activities to put much more emphasis on reorganizing troubled borrowers. Figure 3 shows that the origination of new Non-Performing Loans (shown in the top half of the graph) began to slow from 2003 onwards. Perhaps more importantly, from 2003 to 2005, a substantial number of bad loans were removed from the banks' balance sheets, suggesting the powerful effect of government's increased emphasis on reorganizing troubled borrowers.

Following Takenaka's reform, the Japanese banks finally started to rebuild their capital. Table 3 offers a closer look at the evolution of capital between 2003 and 2007. Over this period the banks' official capital grew by ¥15 trillion. There were two big sources of gains. The first was improved operating performance that led to higher retained earnings. This is consistent with the improved loan loss performance indicated in Figure 3. The second major contributor was capital gains on the stock portfolio.

Table 4 gives some annual figures on the nature of the gains. We see two important patterns in this table. First, the operating performance improves sharply in 2006 and 2007. The profitability in the prior two years is unremarkable. This is particularly interesting because GDP growth was respectable from 2003 onwards. So there was a lag between the macroeconomic improvement and the performance of the banks. Looking more closely at the income and expense data shows that 2006 was time when the banks were able to substantially raise revenue and cut costs.

The second, hardly surprising, observation is that the capital gains tracked the movements in aggregate stock prices. As shown in the bottom of the table, the Nikkei 225

[9] UFJ Holdings, 2004, *Keiei no Kenzenka no tame no Keikaku no Gaiyo (Management Revitalization Plan: Abstract)*. (http://www.fsa.go.jp/kenzenka/k_h160924/ufj_a.pdf)

average showed two big jumps during this period, one between March 2003 and March 2004 and then a second between March 2005 and March 2006. Combining these two observations suggests that in Japan, the performance of the aggregate economy was paramount in the recovery of bank capital.

Finally, we would be remiss if we did not note that the main cost of allowing the banks to operate with a capital shortage was not a prolonged credit crunch. Rather the under-capitalization limited the banks willingness to recognize losses and they took extraordinary steps to cover up their condition and in doing so retarded growth in Japan (Caballero, Hoshi and Kashyap, 2008 and Peek and Rosengren, 2005).[10] More specifically, the slowdown in productivity that extended the slump was concentrated in the parts of the economy where zombie firms were most prominently being supported by weak banks.

4. Japan's policy responses

We continue by examining the major responses by the Japanese government to the financial crisis and deriving some general lessons. We group the policy responses into four categories: (1) asset management companies, (2) recapitalization programs, (3) resolution mechanisms of failed banks introduced by the Financial Revitalization Act of 1998, and (4) the Takenaka plan of 2002. After reviewing the various programs, we offer our conclusions about the strengths and weaknesses of the different options.

4.1. Asset Management Companies

Assessing the asset purchase plans is complicated because this was done in a piecemeal fashion over more than a decade. The full list of entities spawned during the crisis is presented in Table 5.

The first asset management company (AMC) in Japan was the Cooperative Credit Purchasing Company (CCPC) established in December 1992. The CCPC, described best by

[10] See Peek (2008) for a survey of the evidence on the behavior of the banks in the 1980s and 1990s. He also presents new analysis showing that bank assistance to distressed firms during the 1990s was different (and less effective) than the aid in the 1980s.

Packer (2000), was a private entity. The government was not involved because of the vigorous public resistance to proposals to use of taxpayer funds to rescue banks. Failing to get direct government help, the private sector banks then created the CCPC, presumably with encouragement from the government.

The CCPC used funds loaned by the founding banks to buy bad loans. The loan sales to the CCPC generated tax benefits for the banks because upon the transfer to the CCPC the selling banks could recognize losses immediately that reduced their taxes. The CCPC was also supposed to collect on or sell the purchased loans, but this process was extremely slow. In the first five years, the CCPC sold only a third of the loans it bought. Its loan disposal became somewhat faster after 1998. The CCPC was liquidated in 2004. Over the 12 years of its existence, the CCPC bought the bad loans of only ¥15.4 trillion in face value and ¥5.8 trillion in appraised value.

A second asset management company, Tokyo Kyodo Bank was set up in January 1995 using a combination of government and private funds. The Bank of Japan financed more than 90% of its capital. The rest of the capital came from private-sector banks. Tokyo Kyodo was originally formed to manage the assets held by two failed credit unions in Tokyo, Tokyo Kyowa Credit Union and Anzen Credit Union. Later, Tokyo Kyodo absorbed assets of other failed credit unions and was renamed the Resolution and Collection Bank (RCB).

A third asset management company, the Housing Loan and Administration Corporation (HLAC), was established in 1996 to manage loans of failed *jusen* that were taken over by the government and wound down in 1996. The HLAC was financed by both private banks and public funds. Both the RCB and HLAC dealt with assets of failed institutions and did not buy loans from supposedly solvent banks. Because the regulators were not able to put banks into receivership until the passage of the Financial Revitalization Act in 1998, the scope and effectiveness of these entities was necessarily limited.

The RCB and the HLAC were merged to create the Resolution and Collection Corporation (RCC) in 1999. This new institution was allowed to buy bad loans from solvent banks (though solvent banks were not compelled to sell anything) and was charged with managing the assets of failed financial institutions. From 1999 until the RCC stopped buying assets in June 2005, the RCC spent a mere ¥353 billion to purchase 858 loans with a face value of ¥4.0 trillion from solvent banks.

Starting in 2001, the RCC also started to reorganize the borrowers behind the non-performing loans. From 2001 to 2008, the RCC restructured 127 borrowers. The RCC also participated in the reorganization of 450 borrowers in its role as a major creditor. In total (for these 577 borrowers), ¥6.2 trillion of debt was restructured.

The RCC also started selling and collecting the loans aggressively. From March 2001 to March 2008, the amount of loans on the RCC balance sheet declined by ¥4.7 trillion (from ¥5.8 trillion to ¥1.1 trillion).[11] Most of those loans were sold at prices above the RCC acquisition prices: from 2001 to 2008, the total revenue from disposing of these loans amounted to ¥6.2 trillion.

The final AMC, the Industrial Revitalization Corporation of Japan (IRCJ), was established in 2003 with the purpose of restructuring the bad loans they purchased and turning around the borrowers. The IRCJ was set up as a joint stock company almost exclusively owned by the Deposit Insurance Corporation and its debt was guaranteed by the government. The IRCJ had two years to buy non-performing loans and an additional three years to finish restructuring them. IRCJ bought and successfully restructured non-performing loans for 41 borrowers of the total face value of ¥4.0 trillion, which included several notable companies like Daiei and Kanebo, and finished all the restructuring by April 2007, one year earlier than the initial deadline.

4.2. Bank Capital Injections in Japan

To attack the undercapitalization more directly, the Japanese government eventually opted for a series of public re-capitalization programs. A list of the programs is shown in Table 6.

As mentioned previously, the Financial Function Stabilization Act made ¥13 trillion of government money available to buy subordinated debt (or preferred shares in a few cases) in undercapitalized, but supposedly solvent banks. Subordinated debt can be counted as a part of regulatory capital (as long as it does not exceed Tier I capital) and would give the purchasing bank a buffer to absorb losses without having to default on promises to depositors.

This program was initially shunned by the banks. There are two reasons why the banks might not have wanted the assistance. One explanation is that the banks feared applying for the

[11] The accounting figures are from the RCC web site: http://www.kaisyukikou.co.jp.

funds would be admitting to larger future losses than had been previously disclosed (or that their ability to raise funds elsewhere would be missing). This negative signal would push down the value of existing equity.

A second logical possibility is that the banks balked because new securities would be senior to the existing equity claims. Were the banks to recover, the existing owners would not be able to reap the benefits until after the government's claims were paid. This type of debt overhang problem would be particularly likely if the bank had long-term debt that was trading at a deep discount, in which case the value of the debt would appreciate from the additional financing. As a legacy of the Japan's past banking restrictions, up until 1998, only long-term credit banks could issue long term debt. Hence, as a practical matter, debt overhang considerations do not seem to have been important in Japan. Nonetheless, accounting for the incentives of the existing equity holders may be important in designing recapitalization schemes.

After some cajoling by the government, each of the major banks applied for almost an identical amount of public funds. Table 7a, compiled from the data on the Deposit Insurance Corporation web site (http://www.dic.go.jp/english/e_katsudou/e_katsudou3-2.pdf) shows the amount and type of public funds each bank received. Eight of nine received ¥100 billion in the form of subordinated debt or loans, although the interest rate on subordinated debt was different, presumably reflecting the perceived health of the institution. The other one (Dai-ichi Kangyo) received almost the same amount (¥99 billion) in return for preferred shares which included an option to convert them into common shares. The focal amount of ¥100 billion was set at the level that the healthiest bank, Bank of Tokyo Mitsubishi, was willing to ask for, so for most of the banks, the amount was far less than they needed to restore their capital. In total, only ¥1.8 trillion was distributed to 21 banks in the spring of 1998.

Nippon Credit Bank (NCB) and Long-Term Credit Bank of Japan (LTCB), the two banks that would fail later in the year, each received funding under this program in the form of preferred shares. For both banks, the government also acquired the option to convert the preferred shares into common shares starting on October 1, 1998. The conversion period was 9.5 years for the LTCB and 19.5 years for the NCB. Thus, the NCB, which was considered to be weaker of the two, was subject to a longer threat of (partial) government takeover. NCB also applied for a ¥230 billion subordinated loan, but the loan was not approved (*Kin'yu Business,* May 1998, p.8). Ultimately the preferred shares of these two banks were converted into common

shares when each was nationalized (October 28, 1998 for LTCB and December 17, 1998 for NCB).

The second recapitalization, briefly mentioned earlier, took place on the heels of these failures in the spring of 1999. The size of the second program was larger, with ¥25 trillion available for recapitalization.[12] All the major banks except for the healthiest one (Bank of Tokyo Mitsubishi) applied. This time, the government (specifically, the Financial Reconstruction Commission: FRC) evaluated the applications using the inspection information provided by the FSA and the BOJ. Perhaps most importantly, the FRC checked whether the amount of capital each bank requested would be sufficient to cover the under-reserving for non-performing loans once they applied reasonable provision rates (70% for doubtful loans and 15% for loans requiring special attention, for example).

Although the FRC did not turn down any applications, this time, the capital injections after the bank inspections were better conceived than the ones in 1998. The government ultimately put ¥7.5 trillion into the 15 banks in the form of preferred shares and subordinated debt with various terms and conversion options into common shares. Nakaso (2001) argues that this amount was sufficient to cover the under-reserving and unrealized capital losses of shareholdings at these 15 banks.

Table 7b, created from the data published by the Deposit Insurance Corporation (http://www.dic.go.jp/english/e_katsudou/e_katsudou3-1.pdf) shows the deals for each bank. Most banks sold multiple instruments to the government. As with the previous year's plan, most of the preferred shares gave the government an option to convert them into common equity over a certain interval. If the government still held any preferred shares at the end of the interval, the government was required to convert all of these shares into common shares. This requirement implies that the government would suffer a capital loss if the conversion option was out of the money at the end of the interval.

It would have been possible to design these securities so that weak banks would face the threat of conversion and dilution of existing shareholders sooner than healthy financial institutions, but this is not what happened. If anything, the tables show a tendency for healthier

[12] The government also set aside ¥18 trillion for nationalization of failed banks. Combined with the ¥17 trillion for depositor protection (mentioned earlier), the total size of the financial stabilization package was ¥60 trillion.

financial institutions to have earlier initial conversion dates. Stronger banks would favor earlier conversion so that they could lower the dividend rate on preferred shares.

The government did not seem to optimally exercise the conversion option. For instance, Omura, Mizukami, and Yamazaki (2002) give an example where the fair value of the convertible preferred shares exceeded what the government had paid early in the conversion period, but the government failed to exercise the option before the bank stock declined. Had the government acted, it could have recovered twice as much as was possible in 2002. They suspect that the government never intended to exercise the options. Instead this instrument could rationalize the low dividend rates that were intended to provide a subsidy to the banks. The use of multiple securities with various terms also obscured the cost of the bailout.

The Prompt Recapitalization Act expired on March 2001, but capital shortages continued to be a problem and so the government put together a couple more small scale recapitalization programs. First, the revision of the Deposit Insurance Act allowed the government to provide public capital to banks. Specifically, Section 102-1 of the revised Deposit Insurance Act justified the use of public funds to help troubled (but not failed) systemically important banks. This was used to prop up Resona Bank in June of 2003. The government bought ¥0.33 trillion of common shares and ¥1.66 trillion of preferred shares of Resona.

Second, the Act of Strengthening Financial Functions (ASFF) was passed in June 2004. The law allowed the government to inject public capital into banks without justifying their systemic importance. In 2006, ¥40.5 billion was injected into two regional banks under this law. It expired at the end of March 2008, but was revived in December 2008 so that the government could continue to inject capital into the banking sector when it deemed it necessary. In March 2009, ¥121.0 billion was provided to three regional banks.

4.3. Nationalization of failed banks

Despite the 1998 capital injection, the financial crisis deepened over the course of that year, leading the government to pass the Financial Revitalization Act, which allowed a government committee to reorganize insolvent (or near insolvent) banks through temporary nationalization or receivership. The Financial Reconstruction Commission (FRC) was created, and it nationalized the Long-Term Credit Bank of Japan (LTCB; October 1998) and the Nippon

Credit Bank (NCB; December 1998). The management of nationalized banks was replaced by new teams immediately. In evaluating the value of assets and liabilities of each bank, the FRC concluded that both were insolvent at the time of nationalization and the fair share price (both common and preferred) was zero.

Both LTCB and NCB were long-term credit banks, which raised funds mainly through issuing financial debentures rather than collecting deposits. All the liabilities, including deposits, debentures, interbank loans, and derivative transactions were protected, using financial assistance from the DIC.

The balance sheets of nationalized banks were cleaned up by separating uncollectible loans from collectible loans. The loans that were considered uncollectible were sold to the DIC and then to the RCC. After selling off the non-performing loans, the government started to find new investors to buy the nationalized banks.

After long negotiations, the LTCB was sold for ¥1 billion to a group of investors led by Ripplewood, a U.S. fund (Tett, 2003). The new investor group added ¥120 billion for common shares and the government added ¥240 billion in the form of preferred shares, using the framework of the Prompt Recapitalization Act. The new bank, Shinsei Bank, eventually recovered and was listed on the Tokyo Stock Exchange in February 2004.

The NCB was sold to a group of investors led by Softbank for around ¥1 billion. Softbank group added about ¥100 billion in common shares and the government injected about ¥260 billion in preferred shares. The new bank, Aozora Bank, also came back to be listed on the Tokyo Stock Exchange in November 2006, but suffered a loss of ¥200 billion for the accounting year ending in March 2009, including losses associated with investments placed with Bernard Madoff. As of this writing (August 2009), Aozora is set to merge with Shinsei in late 2010.

In both cases, the sales contract included a provision allowing the buyer to force the Japanese government to buy back loans that have lost substantially more than expected. Both Sinsei and Aozora used this "put option" to return impaired performing loans to the government.

4.4. Takenaka Plan

As we noted in Section 3, the capital shortage of Japanese banks continued despite the repeated recapitalization programs. The Takenaka plan that started in late 2002 played an

important role in narrowing the capital gap. In September 2002, Heizo Takenaka was newly appointed to head the government's financial reform efforts.

Takenaka, in his memoirs, explains that he attempted to use six measures to end the non-performing loans problem at major Japanese banks. Specifically he sought (1) to have banks make more rigorous evaluation of assets using discounted expected cash flows or market prices of non-performing loans, (2) to check cross-bank consistency in classifying loans to large debtors, (3) to publicize the discrepancy between the banks' self evaluations and the FSA's evaluations, (4) to be prepared to inject public funds if necessary, (5) to prohibit banks from declaring unrealistically large deferred tax assets, and (6) to impose business improvement orders for banks that substantially underachieved the revitalization plans.

Some of these measures were actually implemented before Takenaka became the Minister. For example, the FSA conducted special inspections of major banks from October 2001 to March 2002 and published the result in April 2002 (http://www.fsa.go.jp/news/newse/e20020412-1.html). However, the use of the discounted cash flow method in an attempt to achieve consistent evaluation of non-performing loans to large debtors was new, and introduced as part of Takenaka's special inspection for March 2003. He was successful in implementing all of these six with possible exception of (5) (which in the end he had to leave to the discretion of banks and their accountants).

As we saw in Section 3, the FSA followed the Takenaka plan, inspected the banks' books more rigorously, and forced many banks to recapitalize themselves. This stopped the process of ever growing non-performing loans and the banks started to accumulate capital through retained earnings over the next 5 years.

4.5. Eight Lessons from the Japanese experience

The Japanese experience with various policies provides a number of useful lessons. The most obvious is that offering government assistance means that policies may encounter political resistance. In Japan, political backlash was at times very important. Because there are so many ways that the political constraints can arise and we expect all policymakers to try to garner political support, we will not dwell on this issue—even if it might be the most critical challenge

in a financial crisis. Instead, we will concentrate on the lessons regarding the design aspects of the specific policies that were pursued in Japan.

First, banks may refuse public funds, as we observed for the 1998 recapitalization program in Japan.[13] In the Japanese case, the problem was solved by all major banks asking for the same amount of public funds, which turned out to be too small to resolve the capital shortage for most banks.

Many programs, including the 1998 recapitalization and many asset purchase programs, were too small. Table 8 shows the history of loan losses in Japan. Cumulatively over the years between 1992 and 2005, Japanese banks wrote off about ¥96 trillion, roughly 19% of GDP.[14] So the size of the problem required considerably more resources than most of the AMCs were given. Even the most comprehensive of the recapitalization programs, under the Prompt Recapitalization Act, injected only ¥8.7 trillion, which was about 1 percent of total bank assets (and less than 2% of total loans). Thus, the second lesson that the Japanese experience suggests is that programs of asset purchase and recapitalization must be big enough.

How much bigger a recapitalization would have been sufficient? To answer this question, Table 9 shows the financial situation as of March 2002 for the major banks that received capital injections in 1998. We calculate the modified capital and capital gap for each bank using the same approach as the one we use for the banking sector as a whole in Table 1. The last row shows the total for these 18 banks.

The official capital for the major banks at this point stood just below ¥19 trillion. But deferred tax assets were over ¥8 trillion. Moreover, the level of reserves set aside against losses appeared to be about ¥10 trillion less than required. Hence, modified capital is estimated to have been less than ¥0.4 trillion, leaving a capital gap ¥15.4 trillion. Aside from Shinsei and Azora, which had been already scrubbed up, all the other banks were seriously short of capital.

As with Table 1, this calculation trades off two biases. First, the estimated level of necessary reserves may have been too high when the recovery rates on bad loans started to improve. Since this improvement had not really started in early 2002, this bias is expected to be small for this calculation.

[13] See Diamond and Rajan (2009) for a theoretical model why this would be rational and why asset sales may not succeed either.

[14] The figures are from the web site of the Financial Services Agency: http://www.fsa.go.jp.

The second bias, however, can be large. Through 2002, it was widely believed that the banks were still under-reporting their problem loans. In August 2002, just before the Takenaka reforms began, Kashyap (2002) surveyed a number of prominent bank analysts and private sector economists following the Japanese economy and asked for "their estimate of the difference in the market value of Japanese banks' assets and liabilities." The lowest estimate reported was ¥19 trillion. Keeping in mind that this would leave the banks with zero equity value, it seems like the estimate in Table 9 is exceptionally conservative. Given that the these banks received slightly less than ¥8 trillion in the 1999 recapitalization, our calculation suggests that a recapitalization that was at least two and a half times bigger in 1999 was needed; put differently, this extremely conservative estimate of the Japanese capital shortage would suggest that another three percent of GDP was needed.[15]

While three percent of GDP is a large amount under normal conditions, it is useful to keep in mind that Japanese debt grew by more 60 percent of GDP during the crisis, with little discernible effect on interest rates. We think there is no doubt that the government could have marshaled more resources to combat the problem if it had wanted to do it. Indeed, Paul Sheard, Chief Economist for Japan at Lehman Brothers at that time, in estimating the degree of banking system insolvency stated "To restore the health and credibility of banking system would probably require ¥30 to ¥50 trillion." He explicitly went on to say "the deposit insurance fund has ¥49 trillion of untapped capacity. Thus, the infrastructure and budgeting are in place if there were political will to act." So, even contemporaneous accounts indicate that lack of resources was not the problem.

A third, more fundamental lesson is that buying troubled assets alone is not likely to solve the capital shortage. It is possible that a much bigger, comprehensive program might have eliminated the uncertainty of the value of assets that remained on banks' balance sheets and allowed them to find willing investors to contribute new capital. But, because none of the Japanese AMCs were designed to overpay for the bad loans, just removing some of the assets did not rebuild capital. The Japanese experience suggests that a recapitalization program is necessary in addition to an assets purchase program in order to solve the capital shortage.

[15] Another reason why this is a lower bound is that this figure does not count the public fund used to clean up the balance sheets of two nationalized banks,

Fourth, recapitalization programs must be preceded by rigorous inspection to determine the size of the problem. The 1998 recapitalization program just distributed capital to major banks without any inspections, in part to induce the banks to accept the public capital without stigma. As a result of the banks' hesitation to appear needy, the size of the program ended up too small. The 1999 recapitalization was better in that it followed inspections of those banks, but the regulators did not force the banks to clean up their non-performing loans. Instead they were allowed to operate even with huge amounts of non-performing loans on their books. The amount of non-performing loans (disclosed by banks) actually increased from ¥29.6 trillion (March 1999) to ¥42.0 trillion (March 2002), and started to decline only after rigorous inspections under the Takenaka plan.

Fifth, troubled assets purchased by AMCs need to be put back into the private sector or restructured swiftly in order to prevent further deterioration of the value of those assets. Especially in early years, the Japanese AMCs were slow in selling off the loans they purchased and just functioned as warehouses of bad loans. Land prices were still falling and they presumably did not want to realize capital losses. Not until the early 2000s, did they begin attempting to restructure the loans and rehabilitate the underlying borrowers thus addressing the source of the bad loan problem.

Sixth, nationalization can be useful to wind down systemically important banks. It is important to note that both LTCB and NCB had international counterparties. So the winding down of these institutions was not just a purely domestic matter. As part of the nationalization, the international transactions were guaranteed and the resolution process did not create much turmoil in the financial markets.

Seventh, targeting total lending or lending to specific sectors can be counter-productive. As we saw in Section 3, the nature of non-performing loan problem changed in the early 2000s, and the loans to small and medium enterprises, which the government required the recapitalized banks to increase, became the central problem rather than the real estate related loans.

Finally, recapitalization was ultimately driven by macroeconomic recovery. Since macroeconomic recovery also depends on a healthy functioning of the financial system, the causality runs two ways. In the Japanese case, export expansion to large and growing economies, especially China and the U.S., contributed to the macroeconomic recovery in the mid-2000s

independent of the recovery of the financial system. To the extent that macroeconomic policy can successfully stimulate the recovery that will also help recapitalization.

5. Evaluating U.S. policies

In assessing U.S. policies during the crisis it is essential to realize that there are some noteworthy respects in which the U.S. and Japanese crises differed. Most importantly, the problems in the U.S. regarding the breakdown of securitization and the collapse of the "shadow banking system" were not an issue in Japan. Hence, many of the bold and most controversial programs instituted in the U.S. have no parallels in Japan. Accordingly, we limit our evaluation to the areas where Japan's experience could be informative. As we point out, in some cases the solutions suggested from Japan might help with the unique aspects of the U.S. crisis. For example, Diamond and Rajan (2009) show that cleaning up of the balance sheets of financial institutions and recapitalization could help with the credit crunch problem. To organize the discussion, we focus on the eight lessons from Japan that were just described and ask whether they informed the U.S. choices.

5.1. Lessons Not Learned

There are at least three of the eight Japanese lessons that were either not heeded or had to be relearned. Most obvious was the hesitation of the banks to admit publicly their need for government assistance. Some of the original TARP 9 institutions were adamant in their insistence that they did not need public support. Soon after receiving TARP money in October, both Citigroup and Bank of America ended up needing much more assistance. Though the case of Bank of America may be explained by surprisingly large capital shortage caused by the acquisition of Merrill Lynch, Merrill was also one of the TARP 9 and it was not transparent about its capital needs.

The initial TARP capital purchases were also done without rigorous audits and inspections. It is an interesting counter-factual to think about how the AIG, Citigroup and Bank

of America bailouts would have been structured if more accurate information had been available at the time the funds were committed.

The third area where the Japanese history seems to have been ignored regards the willingness to nationalize an institution and wind it down. At least at the time of the second Citigroup intervention, the government could have tried to buy a controlling stake in the firm and pushed the company into bankruptcy. The government has discussed a longer term plan to split Citigroup into two parts. Even if this eventually happens, however, this will not force the long-term debtholders of Citigroup to bear losses, whereas a bankruptcy would have.

A major constraint on the government throughout the crisis has been the lack of a resolution procedure that could work for a complex financial holding company. To take one example, existing law makes it impossible for the government to take over a company and continue to run its swap contracts. This makes the resolution costs much higher than if the government could assume the contracts and continue making and receiving payments, rather than having to close them out. Had the U.S. tried to buy Citigroup and push it through bankruptcy using the existing law it would have been operating in uncharted territory.

In contrast, in Japan a major piece of the legislation was enacted during the crisis precisely to make it possible to fail major financial institutions. The Japanese government also used this authority in at least two very visible cases. Federal Reserve and Treasury officials have repeatedly asked Congress to pass a bill creating the authority to resolve a large, complex financial institution. With two years having passed since the start of the crisis, the lack of any movement on this front suggests that the Japanese experience was ignored.

5.2. The Ambiguous Cases

Ultimately, the U.S. did pursue the stress tests and the initial market reactions once the results were announced were quite favorable. It is too early to tell whether they will be deemed a long run success. There are two open questions that must be resolved to reach a longer term judgment.

At its core the stress test amounted to a comparison of impending losses with the resources available to buffer the losses. The technical document, Board of Governors of the

Federal Reserve (2009), released in conjunction with the tests was very transparent about the assumed loss rates for various types of assets. For instance, the loss assumptions used by the Fed can be easily compared to those used by the International Monetary Fund, IMF, (2009)—see Tables 1 and 1.3 respectively—and show the Fed's estimates are quite reasonable.[16] Indeed, the commentary we have seen on these assumptions and our own judgment leads us to conclude that these estimates were credible.

This stands in clear contrast to the assumptions regarding future earnings prospects for the banks. There is no recent history that can be used to judge how profits will evolve if the unemployment rate rises and continues to stay high (say above 10 percent) through 2010. Some banks are insistent that they can generate substantial profits. In fact, at least one firm, Wells Fargo, has publicly announced that it does not intend to raise as much capital as the stress test suggests is necessary because during first three quarters of 2009; they expect to earn more than the regulators assumed in the stress test.

Alternative forecasts of even near term earnings for the banks show considerable heterogeneity.[17] For instance, the IMF assumes that the entire banking system in the U.S. will have $300 billion in net retained earnings over 2009 and 2010, while the Fed's estimates for just the 19 organizations in the stress test assumes $362 billion in resources available to absorb losses. The IMF numbers suggest extremely low earnings, and many industry forecasts for earnings are much higher than those used in the stress tests. For instance, Goldberg (2009) notes that even if pre-provision operating income were forecast to decline by 7% in 2009 and another 7% in 2010, yielding the worst performance for the banking industry since 1938, then earnings available as a buffer would still be $343 billion. Grasek (2009), writing before any 2009 performance data was available, estimates that over 2009 and 2010 the banking industry could earn roughly $570

[16] For a very detailed description of worst case loss assumptions, see Mattu and Subramanian (2009). The Fed's total two year loss assumptions were $599 billion for the top 19 bank holding companies, while the IMF's were $550 for the industry. Mattu and Subramanian's range with their extreme loss rates range from $1.1trillion to $1.4 trillion for the industry.

[17] One challenge in comparing estimates is that until the Fed released its findings, the details of how the calculations would be conducted were not known, so other analyses differ in the exact definitions of the various inputs to the calculations. A further challenge is that pre-provision net revenues is not an accounting number that analysts typically concentrate upon.

billion. Given the unusual macroeconomic environment any forecast is bound to be fraught with error, so we see no convincing way to judge whether the earnings numbers assumed in the stress test were unreasonably high or low.

The second major question is whether the threshold level of capital that is mandated in the stress tests is high enough. The banks are being asked to have more common equity than the regulatory minimum, and to meet the minimum level of capital after absorbing the losses foreseen in the stress test. Presumably this would be enough to prevent insolvency if any subsequent interventions are done promptly.

But the larger motivation for the government's intervention was to prevent a meltdown of the financial system from crushing economic growth—the two-way causality problem. The amount of capital that banks may need to expand their balance sheets and support a recovery could be much higher than the minimum. Thus, it is unclear whether the resources that have been marshaled to combat the crisis will prove adequate.

Two of the major lessons from Japan involved the use and design of asset management companies. The U.S. record in this regard is mixed. The U.S. has avoided the Japanese mistake of trying to do small asset purchases to solve a serious capital shortage problem.

The ambiguity comes because even though essentially no money has been spent, the U.S. government has spent a lot time trying to design asset purchase plans and made various public announcements suggesting that asset purchases were impending. The two publicly discussed cases involve the original TARP plan, which was abandoned, and the PPIP which has been very slow to start and appears destined to be only a small part of the overall U.S. spending on the crisis. In addition, many press reports suggest that during the period between President Obama's election and his inauguration, considerable planning to create an aggregator bank was undertaken.

These efforts have been costly in tying up Treasury and Federal Reserve staff and management on programs which were not critical. More importantly, they have created some confusion with the public and politicians over the intended government response. The various stops and starts have left doubts about the government's commitment to remove non-performing

assets from the financial system. This in turn has left doubts about why so much emphasis was placed on asset purchases if they are not needed.

In the meantime, the troubled assets still remain on most institutions' balance sheets. This leads to three ongoing problems. First, the management of the banks must continue to devote effort and capital to monitoring the risks associated with holding these assets. Some commentary from regulators suggests that this diversion of attention is costly.

Second, to the extent that any of the major banks are still seriously undercapitalized, the presence of the assets creates an incentive to gamble for reclamation. For a clearly solvent bank, the decision to hang on or dispose of the assets would be based on a profit-maximizing motive. For a bank that is close to insolvent, the incentive to remove the risk is much lower. If the assets lose value and drive the bank into insolvency then the inability to resolve such an institution could create a zombie bank.

Lastly, the presence of the impaired banks that are filled with hard to value securities can distort the incentives of other healthy institutions. As modeled by Diamond and Rajan (2009), if the troubled banks could wind up being forced to sell the assets quickly so that prices are depressed below fundamentals, other potential buyers of the assets (i.e. the healthy banks) would choose to avoid making loans that tie up their capital. The presence of the banks that they dub the "walking wounded" can, therefore, create a credit crunch.

Collectively these three considerations suggest that there are costs to leaving the toxic assets on the balance sheets. But notice that the costs are greatly reduced if the banks are well-capitalized. Well-capitalized banks have no incentive to gamble for reclamation. A well-capitalized bank that finds that the assets are diverting attention can afford to sell them, and if many banks are clearly solvent there would be plenty of potential buyers so that the fire-sale would be much less likely. Hence, we see the uncertainty over asset quality being intimately tied to the size of the capital shortage.

Finally, on the big question of how much sustained macroeconomic growth will help the bank recapitalization, it is too early to tell. On the one hand, in Japan export growth was a driver of macroeconomic growth in the mid-2000s. Yorulmazer (2009) suggests that same was true in

the Swedish banking crisis in the early 1990s. Given the size of the exports in the U.S. economy, it is unlikely that a pure export boom would enough to lift bank profitability on a sustained basis if the domestic economy remains weak.

On the other hand, U.S. macroeconomic policy has also been very different than in Japan. The Federal Reserve cut the policy rate almost down to zero and has been trying various non-traditional means to stimulate the economy. Massive fiscal stimulus package was also applied within 18 months of the onset of the crisis. If these policies deliver growth, the prospects for bank recapitalization in the U.S. will be much brighter.

5.3. The Good News

Finally, the U.S. scores well on avoiding policies that force the banks to have lending targets either in aggregate or to specific sectors. Perhaps the closest policy in this respect is the funding to the auto industry. The support given to General Motors Acceptance Corporation is at risk for being used to support purchases that might temporarily prop up one of the troubled auto companies. But thus far the banking problems have not spilled over to create a set of non-financial zombie companies.

6. Conclusions

The U.S. financial system remains in fragile condition. It is too early to tell how the crisis will play out. As the events unfold it may be helpful to judge them against two very extreme alternatives. The both scenarios turn on three crucial dimensions: growth, exit from current programs, and regulatory reform.

In the optimistic outcome, the macro recovery proceeds smoothly. This alone will help the banks rebuild their capital. Stabilizing the economy and financial system were the goals behind many of the policy actions. The confidence boost from a growing economy will lend support to the other policy actions needed to complete the rest of the recovery.

The second dimension would be a successful wind down of many of the extraordinary guarantee and liquidity programs. Growth could continue without sustained government support

for the financial system. The best case would include minimal losses to the taxpayer for the assistance that has been provided in the course of the crisis.

The third element of the favorable ending is that policies are put in place to limit the likelihood of another crisis or at least give the government authorities a full set of tools to manage better in another crisis. There are many aspects of the crisis that extend beyond the bank recapitalization that has been the focus of our analysis. Reforms to address many of the weaknesses described by the U.S. Department of Treasury (2009) would occur. Within the confines of the banking problems, the obvious missing tool is a resolution procedure that could have been used for the large financial firms including bank holding companies.

Perhaps the most daunting task in the optimistic outcome is to undo the moral hazard that has been created through the myriad of government interventions. It would take a whole another paper to thoroughly discuss this challenge and the potential ways to address it. But the issue is likely to be important well after a recovery takes hold.

The pessimistic scenario is made up of the opposite outcomes on the three key dimensions. The starting point would be an anemic recovery that involves very little growth. The weak macroeconomic environment would weaken the banks and renew the negative feedback between the condition of the economy and the health of the banks. The fiscal position of the government would constrain additional policy options. If another bout of panic similar to the fall of 2008 erupts, political paralysis would be likely and the adverse effects may go on for some time.

In this scenario, the exit strategy from the various guarantees and liquidity programs would be complicated. They may be extended because the financial system is so impaired that it cannot operate without them. The eventual taxpayer losses from the programs would be substantial.

Furthermore, the moral hazard from the various rescue packages would have created even more distortions in the financial system. The Federal Reserve would be under siege for its decisions that will have turned out badly. Regulatory reform will have been sidetracked due to the finger pointing from the failed rescues.

Neither of these extreme scenarios is particularly likely. The actual outcome will be somewhere between those, depending on how growth, the exit strategy, and general regulatory reform proceed.

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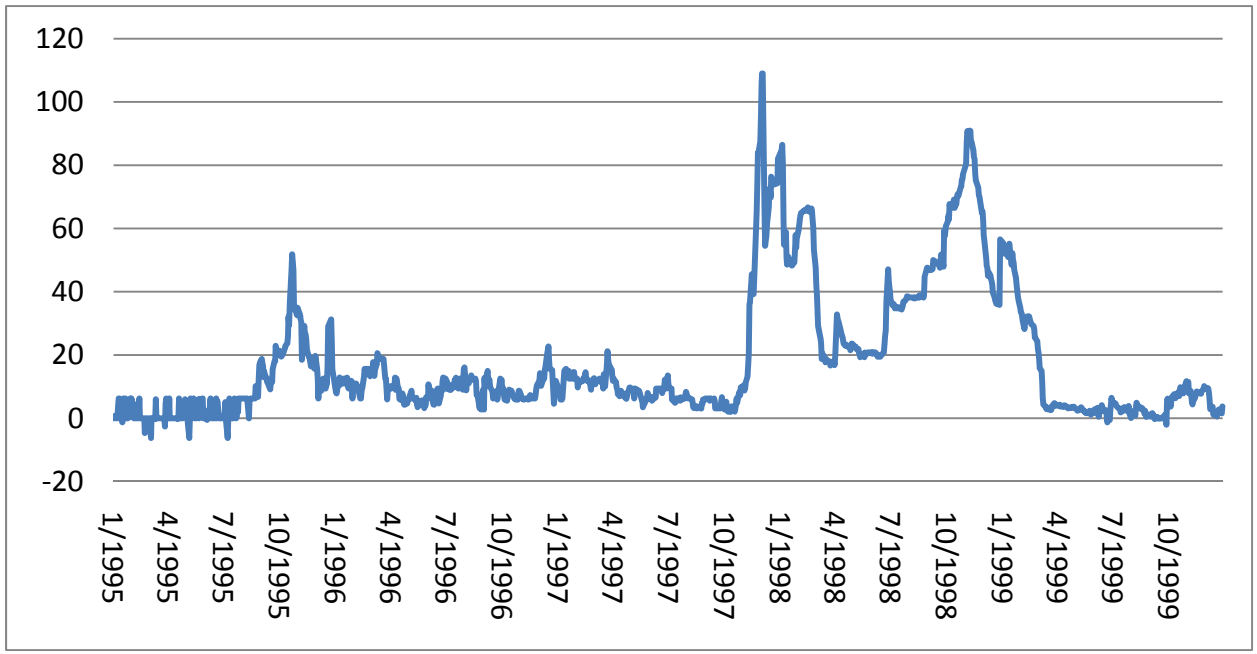
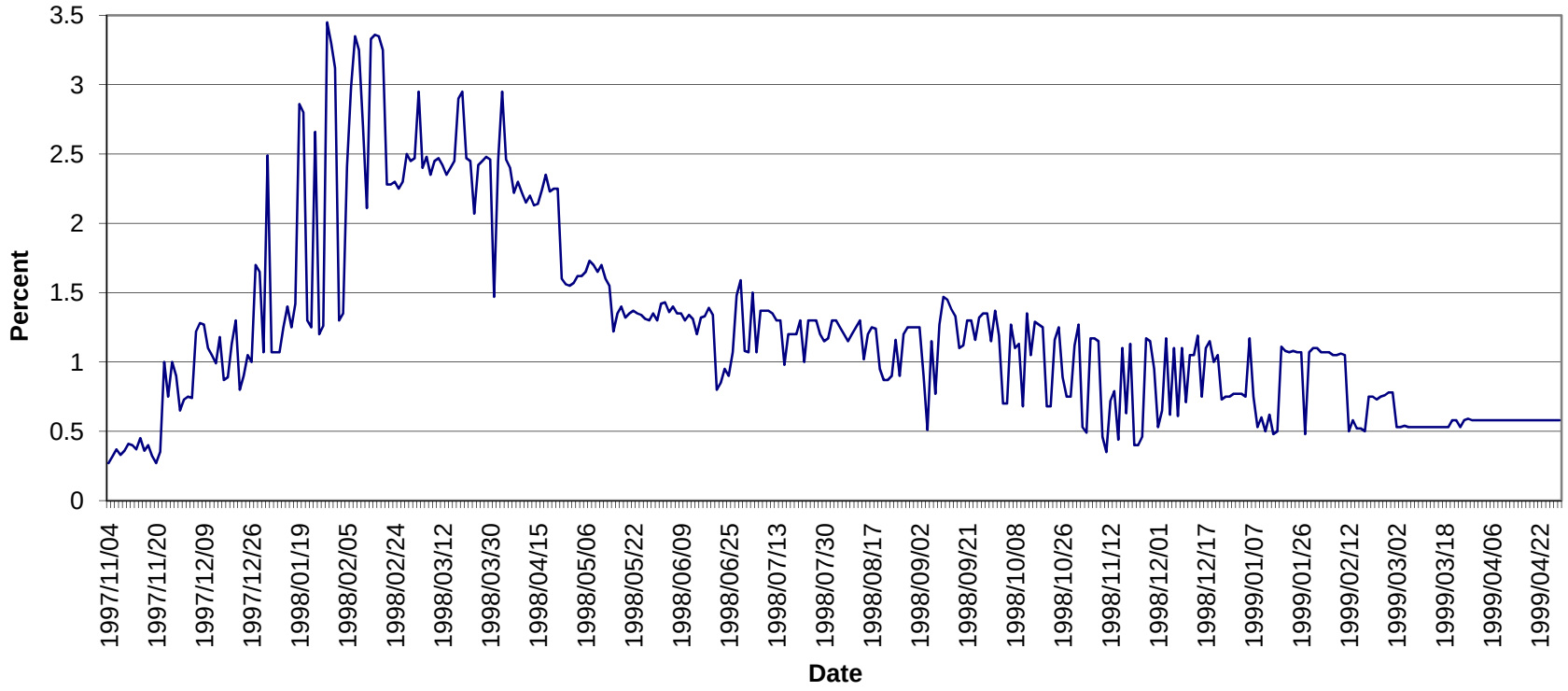
Figure 1: Difference in Inter-bank Borrowing Costs for Japanese and Non-Japanese Banks, 1995-1999

(Basis Points)



Source: Ito, Takatoshi, and Kimie Harada, 2005, "Japan Premium and Stock Prices: Two Mirrors of Japanese Banking Crises," *International Journal of Finance and Economics*, 10, 195-211.

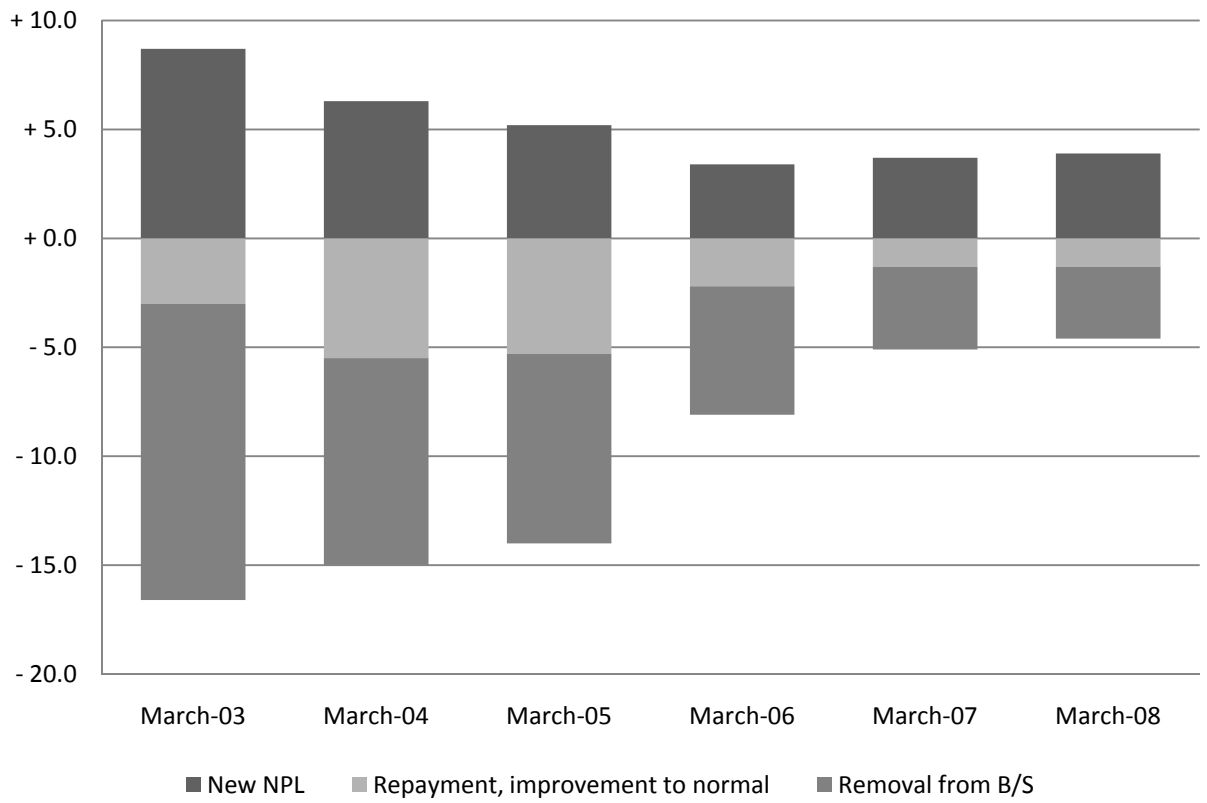
Figure 2: Difference Between the Daily Maximum and Minimum Overnight Call Rate



Source: Fukuda, Shin-ichi, 2008, "The Role of Monetary Policy under Financial Turbulence: What Role did the Quantitative Easing Policy Play in Japan?" CIRJE Discussion Paper, J-205.

Figure 3: Changes in Non Performing Loans

(¥ Trillion)



Source: Financial Services Agency (http://www.fsa.go.jp/en/regulated/npl/20090807.html), Table 2.

Table 1: Capital in the Japanese Banking System

(¥ Trillion)

Date	**Official Core capital**	**Deferred Tax Assets**	**Estimated Under-reserving**	**Modified Capital**	**Capital held by the government**	**Bank Assets**	**Capital Gap**
	A	**B**	**C**	**D≡A-B-C**	**E**	**F**	**G≡0.03*F-D**
Mar-96	27.9	0.0	NA	27.9	0.0	846.5	-2.5
Mar-97	28.5	0.0	15.0	13.5	0.0	856.0	12.2
Mar-98	24.3	0.0	4.9	19.4	0.3	848.0	6.0
Mar-99	33.7	8.4	4.0	21.3	6.3	759.7	1.5
Mar-00	35.6	8.2	5.8	21.6	6.9	737.2	0.5
Mar-01	37.6	7.1	7.5	23.0	7.1	804.3	1.1
Mar-02	30.2	10.6	6.8	12.8	7.2	756.1	9.9
Mar-03	24.8	10.6	5.4	8.8	7.3	746.3	13.6
Mar-04	29.0	7.2	5.7	16.1	8.9	746.7	6.3
Mar-05	31.4	5.7	6.9	18.8	8.1	745.9	3.6
Mar-06	37.3	2.3	8.3	26.7	5.2	766.9	-3.7
Mar-07	40.0	1.3	9.4	29.4	3.5	761.1	-6.5
Mar-08	34.8	3.6	10.2	21.0	3.1	780.7	2.4

Source: Assets and core capital are from the Bank of Japan for all domestically licensed banks. Deferred tax and under-reserving estimates are from Fukao (2008) based on "Analysis of Bank Financial Statements," various issues and securities reports for individual banks.

Note: Core capital, sometimes referred to as Tier I capital, includes equity capital, capital reserves and other items shown in Table 3. Deferred Tax Assets are credits against future taxes that are counted in core capital. As described in the text, Estimated Under-reserving is the difference between adequate reserves for losses estimated by Fukao and actual loan loss reserves. Fukao estimates the adequate reserves as the sum of 100% of Category IV (uncollectible) loans, 70% of Category III (doubtful) loans, 20% of Category II (special attention) loans, and 1% of Category I (normal) loans. Capital held by the government is the value of equity owned by the government. Bank assets are total assets. Modified capital and the capital gap are computed as indicated. Fukao also estimates that prior to 2001 there were substantial unrealized portfolio gains that could have been available as capital. The after tax amounts he reports from 1996 to 2000 are 12.8, 6.7, 3.1, 2.6 and 6.1 trillion yen respectively.

Table 2. Changes in the Determinants of Non-Performing Loans over Time

Year	Independent variable	Lag 1	Lag 2	Lag 3	Lag 4
1997	Real estate loan	.221	.215	.225	.242
		(.058)	(.045)	(.041)	(.045)
	SME loan	.040	.057	.036	.037
		(.025)	(.024)	(.017)	(.022)
1998	Real estate loan	.348	.359	.317	.312
		(.083)	(.081)	(.063)	(.065)
	SME loan	.038	.028	.053	.027
		(.026)	(.027)	(.020)	(.021)
1999	Real estate loan	.653	.687	.687	.684
		(.174)	(.176)	(.171)	(.165)
	SME loan	-.021	-.036	-.049	-.051
		(.041)	(.047)	(.050)	(.053)
2000	Real estate loan	1.534	1.042	1.136	1.132
		(.573)	(.537)	(.549)	(.553)
	SME loan	-.082	-.010	-.025	-.029
		(.114)	(.102)	(.106)	(.108)
2001	Real estate loan	.430	.374	.330	.388
		(.164)	(.240)	(.220)	(.233)
	SME loan	.201	.067	.083	.075
		(.083)	(.035)	(.036)	(.041)
2002	Real estate loan	.242	.308	.307	.213
		(.079)	(.108)	(.103)	(.069)
	SME loan	.111	.081	.054	.062
		(.024)	(.026)	(.045)	(.032)
2003	Real estate loan	.141	.148	.172	.134
		(.056)	(.060)	(.061)	(.059)
	SME loan	.108	.090	.086	.083
		(.018)	(.019)	(.020)	(.019)
2004	Real estate loan	.009	.038	.032	.045
		(.044)	(.046)	(.049)	(.048)
	SME loan	.101	.107	.103	.097
		(.014)	(.016)	(.017)	(.017)
2005	Real estate loan	.006	-.015	-.024	-.039
		(.054)	(.052)	(.054)	(.054)
	SME loan	.066	.075	.085	.085
		(.017)	(.015)	(.017)	(.018)

Note: The dependent variable is the amount of non-performing loans divided by total assets. The columns labeled "Lag" show different regression specifications. In each case one independent variable is the ratio of real estate loans divided by total assets and another is small and medium enterprise loans divided by total assets. The independent variables are lagged by the number of years indicated at the top of the column. Separate regressions are estimated for each year (specified as row). Each regression also includes the constant term and four bank type dummies (long-term credit bank, trust bank, tier I regional bank, or tier II regional bank). The numbers in the parentheses are standard errors, corrected for potential heteroskedasticity.

Table 3: Capital Evolution for Japanese Banks 2003-2007

(¥Trillion and percent)

	March-07	March-03	Change	Percent contribution to change
Official Core Capital	**40.0**	**24.8**	**15.2**	**100.00%**
Capital stock and surplus	18.0	18.8	-0.8	-5.26%
Retained earnings	13.4	4.4	9.0	59.07%
Net unrealized gains on stocks and other securities	8.2	0.1	8.1	53.25%
Revaluation reserve for land	1.0	1.5	-0.6	-3.70%
Net deferred gains on hedging instruments	-0.3	0	-0.3	-2.07%

Source: Japanese Bankers Association, *Financial Statements of All Banks* (http://www.zenginkyo.or.jp/en/stats/year2_01/index.html)..

Note: Official Core Capital includes all the other items listed in the table, plus some other very small components that have been omitted to save space. Capital stock and surplus correspond to the book value of common equity. Retained earnings are the year's unappropriated profits that have been added to capital. Net unrealized gain on stocks and other securities include gains or losses on non-trading securities available for sale, net of taxes . Revaluation reserve for land is the increase in capital resulted from the revaluation of land that was allowed under the Act on Land Revaluation enacted in 1998. Net deferred gains on hedging instruments are the unrealized gains on hedging instruments that will be recognized when the hedged asset is disposed of. Because some small components of capital have been omitted, and because of rounding, components may not sum to totals.

Table 4: Profit Decomposition for Japanese Banks 2004-2007

(¥ Trillion, except Nikkei and GDP growth)

	Cumulative (3/04-7/03)	March-07	March-06	March-05	March-04	March-03	Difference (3/07-3/04)
Net income	8.1	3.4	4.2	1.3	-0.8		4.2
Operating profits	11.5	4.3	4.8	1.9	0.5		3.8
Extraordinary profits - Extraordinary losses	2.8	0.4	1.2	0.7	0.5		-0.1
Operating income		19.2	18.0	16.9	17.6		1.6
Operating expenses		14.9	13.3	15.0	17.0		-2.2
Unrealized capital gains		8.2	6.8	3.7	3.1		5.1
Nikkei 225		17,287	17,059	11,688	11,715	7,973	
Real GDP growth (percent change from one year earlier)		2.3	2.3	2.0	2.1	1.1	

Source: Japanese Bankers Association, *Financial Statements of All Banks* (http://www.zenginkyo.or.jp/en/stats/year2_01/index.html). GDP growth rates are from Economic and Social Research Institute (ESRI), Cabinet Office, Government of Japan (http://www.esri.cao.go.jp/en/sna/qe091-2/gdemenuea.html).

Note: Operating profits are the difference between operating income and operating expenses. Operating income is the sum of interest income, fees and commissions, trading income, and gains on foreign exchange transactions, gains of sales of bonds and gains on the redemption of bonds. Operating expenses are the sum of interest expenses, fees and commissions, losses on foreign exchange transactions, losses on sales of bonds and losses on the redemption of bonds, losses on devaluation of bonds, transfer allowances for possible loan losses, debenture expenses and general and administrative expenses. Extraordinary profits and losses are profits and losses resulting from transactions that are not considered to be routine, and typically include profits and losses from sales of land and other assets. Net income is the sum of operating profits and extraordinary profits less extraordinary losses less taxes.

Table 5: Asset Management Companies in Japan
(¥ Trillion)

Name	Dates (purchases)	Target Purchases	Actual Amount Spent [book value]	Amount Collected	Comments
Cooperative Credit Purchasing Co.	12/1992-3/2001	Non-performing loans with land collateral of contributing banks	5.8 [15.4]	NA	Bank financed, created tax benefits by buying loans Liquidated in 3/2004
Tokyo Kyodo Bank	1/1995-4/1999	Initially assets of failed credit unions, later assets of any failed banks	4.718 [NA]	5.362	Reorganized as Resolution and Collection Bank (RCB) in 9/1996
Housing Loan and Administration Corp. (HLAC)	7/1996-4/1999	Loans of failed *jusen* (specialty housing loan companies)	4.656 [NA]	3.233	Financed with mix of public and private money
Resolution and Collection Corp.	4/1999-6/2005	Combined RCB and HLAC, mandate extended to allow purchases of assets from solvent banks	0.356 [4.046]	0.649	Starting in 2001 also reorganized loans, ultimately involved in restructuring 577 borrowers
Industrial Revitalization Corp. of Japan	5/2003-3/2005	Buy non-performing loans through 2005, restructure them within 3 years	0.53 [0.97]	NA [0.094 surplus as of 5/2007]	Restructured 41 borrowers with 4 trillion total debt Closed in 5/2007

Source: Authors' calculations.
Notes: "Target purchases" describe the set of assets and set of institutions permitted to sell the assets to the asset management company. The amount spent includes the undiscounted total amounts spent by the asset management company, along with the original value of the purchased assets where available. The amount collected is the total amount realized over time from asset sales and loan collection.

Table 6: Capital Injection Programs in Japan

(¥ Trillion)

Legislation	Date of Injection	Securities Used	Number of financial institutions (# with nonzero outstanding balance)	Amount Injected	Amount Sold or Collected to date (as of July 2009)
Financial Function Stabilization Act	3/1998	Preferred shares, subordinated debt	21 (2)	1.816	1.653 [1.626 (book)]
Prompt Recapitalization Act	3/1999 - 3/2002	Preferred shares, subordinated debt	32 (10)	8.605	8.820 [7.817 (book)]
Financial Reorganization Promotion Act	9/2003	Subordinated debt	1 (0)	0.006	0.006 [0.006 (book)]
Deposit Insurance Act (Article 102-1)	6/2003	Common shares, preferred shares	1 (1)	1.960	0.111 [0.035 (book)]
Act for Strengthening Financial Functions	11/2006-3/2009	Preferred shares	5 (5)	0.162	0.000

Sources: Deposit Insurance Corporation of Japan (DIC). http://www.dic.go.jp/english/e_katsudou/e_katsudou3.html

Notes: Securities used describe the types of securities obtained by the government in exchange for the capital it contributed. Number of financial institutions reports the total number of institutions that actually sold securities to the government in the program. The outstanding balance shows the number of participating institutions with securities that were still outstanding as of July 2009. Amount injected is the total amount spent by the government. Amount sold is the total proceeds collected by selling the securities owned by the government through July 2009.

Table 7a March 1998 Capital Injection Terms
(¥ billion)

			Preferred shares					Subordinated debt/loans			
	S&P Rating	Total Funds	Type	Amount	dividend rate	Conversion start date	Forced conversion date	Type	Amount	yield for 5 years	yield after 6th year
City banks											
Dai-ichi Kangyo	BBB+	99	CPS	99	0.75	7/1/1998	8/1/2005				
Fuji	BBB+	100						SDP	100	L+1.10	L+2.60
Sakura	BBB	100						SDP	100	L+1.20	L+2.70
Sanwa	A-	100						SD10	100	L+0.55	L+1.25
Sumitomo	A-	100						SDP	100	L+0.90	L+2.40
Tokyo Mitsubishi	A	100						SDP	100	L+0.90	L+2.40
Asahi	BBB+	100						SLP	100	L+1.00	L+2.50
Daiwa	BBB-	100						SLP	100	L+2.70	L+2.70
Tokai	BBB+	100						SDP	100	L+0.90	L+2.40
Long-term Credit bank											
Industrial Bank of Japan	A-	100						SD10	100	L+0.55	L+1.25
LTCB of Japan	BBB-	177.6	CPS	130	1.00	10/1/1998	4/1/2008	SLP	46.6	L+2.45	L+3.95
Nippon Credit Bank	NR	60	CPS	60	1.00	10/1/1998	4/1/2018				
Trust banks											
Mitsubishi Trust	A-	50						SDP	50	L+1.10	L+2.60
Sumitomo Trust	A-	100						SDP	100	L+1.10	L+2.60
Mitsui Trust	BBB+	100						SDP	100	L+1.45	L+2.95
Chuo Trust	NR	60	CPS	32	2.50	7/1/1998	8/1/2018	SLP	28	L+2.45	L+3.95
Toyo Trust	NR	50						SDP	50	L+1.10	L+2.60
Regional Bank											
Bank of Yokohama	BBB	20						SLP	20	L+1.10	L+2.60
Hokuriku Bank	NR	20						SLP	20	L+2.45	L+3.95
Ashikaga Bank	NR	30						SDP	30	L+2.95	L+4.45

Notes. S&P Rating shows the rating of the bank's long-term debt given by Standard & Poor's as of March 1998. We thank Kaoru Hosono for sharing the rating data. Total Funds show the total amount of public capital injected into each bank. If preferred shares were used for injection, the type of preferred shares (convertible or not), the amount purchased, the dividend rate, the date when the government can start converting preferred shares into common shares (if convertible), and the date after which the government has to convert the preferred shares into common shares (if convertible), under the columns beneath the heading "Preferred shares." If subordinated debt or a subordinated loan was used, the type of subordinated debt (bond or loan and maturity), the amount purchased, the interest rate for the first five years, and the interest rate after the first five years, under the columns beneath the heading "Subordinated debt/loans." L: 6-month yen LIBOR, CPS: Convertible Preferred Shares, SDP: Perpetual Subordinated Debt, SLP: Perpetual Subordinated Loan, SD10: 10-year Subordinated Debt.

Table 7b March 1999 Capital Injection Terms

(¥ billion)

			Preferred shares					Subordinated debt/loans				
	S&P Rating	Total Funds	Type	Amount	dividend rate	Conversion start date	Forced conversion date	Type	Amount	yield	yield after step-up	step-up date
City banks												
Dai-ichi Kangyo	BBB	900	CPS	200	0.41	8/1/2004	8/1/2006	SD10	100	L+0.75	L+1.25	4/1/2004
			CPS	200	0.70	8/1/2005	8/1/2008	SD11	100	L+0.75	L+1.25	4/1/2005
			NCPS	300	2.38							
Fuji	BBB+	1,000	CPS	250	0.40	10/1/2004	2/1/2009	SDP	200	L+0.65	L+1.35	4/1/2004
											L+2.15	4/1/2009
			CPS	250	0.55	10/1/2006	2/1/2011					
			NCPS	300	2.10							
Sakura	BBB	800	CPS	800	1.37	10/1/2002	10/1/2009					
Sanwa	BBB+	700	CPS	600	0.53	7/1/2001	8/1/2008	SDP	100	L+0.34	L+1.34	10/1/2004
Sumitomo	BBB+	501	CPS	201	0.35	5/1/2002	2/27/2009					
			CPS	300	0.95	8/1/2005	2/27/2009					
Asahi	BBB+	500	CPS	300	1.15	7/1/2002	12/1/2009	SLP	100	L+1.04	L+2.54	4/1/2009
			CPS	100	1.48	7/1/2003	12/1/2014					
Daiwa	BB+	408	CPS	408	1.06	6/30/1999	4/1/2009					
Tokai	BBB-	600	CPS	300	0.93	7/1/2002	3/31/2009					
			CPS	300	0.97	7/1/2003	3/31/2009					
Long-Term Credit												
Industrial Bank of Japan	BBB+	600	CPS	175	0.43	7/1/2003	9/1/2009	SDP	250	L+0.98	L+1.48	4/1/2004
			CPS	175	1.40	9/1/2003	9/1/2009					
Trust banks												
Mitsubishi Trust	BBB	300	CPS	200	0.81	7/31/2003	8/1/2008	SDP	100	L+1.75	L+2.25	4/1/2004
Sumitomo Trust	BBB	200	CPS	100	0.76	4/1/2001	3/31/2009	SD12	100	L+1.53	L+2.03	4/1/2006
Mitsui Trust	BBB-	400	CPS	250.3	1.25	7/1/1999	8/1/2009	SLP	150	L+1.49	L+1.99	3/31/2004
Chuo Trust	NR	150	CPS	150	0.90	7/1/1999	8/1/2009					
Toyo Trust	NR	200	CPS	200	1.15	7/1/1999	8/1/2009					
Regional Bank												
Bank of Yokohama	BBB	200	CPS	70	1.13	8/1/2001	7/31/2009	SDP	50	L+1.65	L+2.15	4/1/2004
			CPS	30	1.89	8/1/2004	7/31/2009	SL10	50	L+1.07	L+1.57	4/1/2004

Notes. S&P Rating shows the rating of the bank's long-term debt given by Standard & Poor's as of March 1999. We thank Kaoru Hosono for sharing the rating data. Total Funds show the total amount of public capital injected into each bank. If preferred shares were used for injection, the type of preferred shares (convertible or not), the amount purchased, the dividend rate, the date when the government can start converting preferred shares into common shares (if convertible), and the date after which the government has to convert the preferred shares into common shares (if convertible), under the columns beneath the

heading “Preferred shares.” If subordinated debt or a subordinated loan was used, the type of subordinated debt (bond or loan and maturity), the amount purchased, the interest rate before the step-up date, the interest rate after the step-up date, and the step-up date, under the columns beneath the heading “Subordinated debt/loans.” L: 6-month yen LIBOR, CPS: Convertible Preferred Shares, NCPS: Non-convertible preferred shares, SDP: Perpetual Subordinated Debt, SLP: Perpetual Subordinated Loan, SDn: n-year Subordinated Debt.

Table 8: Loan Losses in Japan

(¥ Trillion)

Date	Loan Losses	Cumulative Loan Losses since 4/1992	Number of Major Banks
3/1994	3.872	5.512	21
3/1995	5.232	10.744	21
3/1996	13.369	24.113	20
3/1997	7.763	31.877	20
3/1998	13.258	45.135	20
3/1999	13.631	58.766	17
3/2000	6.944	65.710	18
3/2001	6.108	71.818	18
3/2002	9.722	81.540	15
3/2003	6.658	88.198	13
3/2004	5.374	93.572	13
3/2005	2.848	96.420	13
3/2006	0.363	96.783	11
3/2007	1.046	97.829	11
3/2008	1.124	98.953	11
3/2009	3.094	102.046	11

Source: Financial Services Agency (http://www.fsa.go.jp/en/regulated/npl/20090807.html). Loan losses and cumulative loan losses come from Table 5. Major banks are city banks, former long-term credit banks, and trust banks that are reported in Table 6.

Table 9. Capital Gaps of Major Banks: March 2002 (Unit: ¥Billion)

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Bank name	Core capital	Deferred tax assets	Loan loss reserves	Adequate reserves	Modified capital ≡ (A-B+C-D)	3% of total assets	Capital gap ≡ (F-E)
Industrial Bank of Japan	1,091	632	359	852	-34	1,172	1,206
Shinsei Bank	617	18	371	727	244	251	7
Aozora Bank	476	10	293	298	461	171	-291
Daiichi Kangyo Bank	1,924	901	853	1,789	87	1,560	1,474
Fuji Bank	2,063	763	477	1,102	675	1,497	823
Bank of Tokyo-Mitsubishi	2,450	746	1,036	2,023	717	2,207	1,490
Asahi Bank	752	424	533	985	-124	751	876
UFJ Bank	2,452	1,218	1,376	3,297	-688	2,064	2,752
Sumitomo Mitsui Banking	3,196	1,741	1,972	3,666	-238	3,062	3,301
Daiwa Bank	418	285	397	901	-370	442	812
Ashikaga Bank	130	166	99	357	-295	159	454
Bank of Yokohama	448	142	105	363	48	320	272
Hokuriku Bank	179	103	157	348	-116	179	295
Mitsubishi Trust & Banking	741	255	397	614	269	610	341
Mizuho Trust & Banking	268	141	132	290	-31	189	219
UFJ Trust Bank	374	24-	127	381	-119	222	341
Chuo Mitsui Trust & Banking	527	382	177	552	-229	390	619
Sumitomo Trust & Banking	652	247	217	494	128	503	375
Total	18,758	8,414	9,077	19,038	384	15,749	15,365

Source: Authors' calculation. The original bank balance sheet data are taken from Nikkei Financial Database for Financial Institutions. Core capital includes equity capital, capital reserves and other items shown in Table 3. Deferred tax assets are credits against future taxes that are counted in core capital. Loan loss reserves are what each bank reports on the balance sheet. Following Fukao (2003), we estimate the adequate reserves as the sum of 100% of Category IV (uncollectible) loans, 70% of Category III (doubtful) loans, 20% of Category II (special attention) loans, and 1% of Category I (normal) loans. Capital held by the government is the value of equity owned by the government. Bank assets are total assets. Modified capital and the capital gap are computed as indicated.