BANK FRAGILITY IN JAPAN, 1995-2003

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Abstract

This paper compares different indicators of bank fragility in order to examine which indicator most representatively reflects the financial health of Japanese banks. Japan premium has been a popular proxy for Japanese bank fragility since the 1997 banking crisis in the literature. However, during the 2001-2003 period when Japanese banks suffered another crisis, the Japan premium did not substantially rise as before. It is discovered that Japanese banks are now required to post cash collateral—unusual for interbank loans—so that premium is not charged on them. Japan premium lost its role as the primary proxy for Japanese banking fragility. This paper proposes to use a new indicator for bank fragility, namely credit derivative spread. This paper shows that higher credit derivative spread tends to be associated with lower stock prices and higher Japan premium. Various specifications of time-series, cross-section, and panel regressions produced these tendencies. Our panel regression findings are consistent with our conjectures in that the Japan premium lost a value as an indicator of default probability of Japanese banks, and that the credit derivative spreads represent the bank fragility in recent years in Japan.

JEL Classification: G10, G14, G15.

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1. Introduction

An objective of this paper is to collect and compare different indicators of bank fragility in order to examine which indicator most representatively reflectsthe financial health of Japanese banks. Japan premium—the premium charged by western banks on Japanese banks for interbank lending—has been a popular proxy for Japanese bank fragility since the 1997-98 crisis period in the literature. However, during the 2001-2003 period when Japanese banks suffered another crisis, the Japan premium did not substantially rise as before. It is discovered during our interview with market participants that Japanese banks are required to post cash collateral—unusual for interbank loans—so that premium is not charged on them. Japan premium lost its role as the primary proxy for Japanese banking fragility. This paper proposes to use a new indicator for bank fragility, namely credit derivative spread. The credit derivative spread reflects pricing in the derivative market for credit risk. This is considered to be a more direct measure of market assessment of probability of a particular bank. Although the credit derivative spread has been watched in the market, it has not been used in the academic literature. It is our contribution to show that Japan premium is no longer representing financial fragility (after about 2000) and that a new data set—credit derivative spread—is better for analyzing financial fragility in Japan.

Before going into detailed analysis of credit derivative spread, the bank fragility in Japan should put into a perspective in the discussion of Japanese macroeconomic stagnation. The low growth, asset price collapse, bank failures, and deflation are only a few indicators that characterize the so-called lost decade of Japan. The average growth rate from 1992 to 2002 is just about 1 percent. Many stock and land prices in the spring of 2003 are one-fourth to one-fifth of the peak in 1989-1990 and at about the same level of 20 years ago. The nominal GDP has been deflating since 1997, and it shrank by 5% in five years. Many financial institutions do not have sufficient core capital, and fragility in financial institutions make expansion of bank loans less likely and put a full recovery of the Japanese economy at risk. In a sense it is believed that bank fragility has been a drag on the Japanese economy.

As deflation has continued in the last five years, many consumers and business executives have become to expect that deflation will continue for some time. The long-term (10-year) government bond yield has become significantly below 1 percent in 2002-03, as it reflected pessimistic outlook of the economy and continuing deflation in the future. Deflationary expectation constrains consumption and investment. Low domestic demands keep the GDP gap remain high, and prices go down further. Thus the deflation feeds back itself through deflationary expectation.

On the asset side, a sharp decline in asset prices has made many borrowers practically insolvent.

Many consumers with owner-occupied housing with large mortgages have found themselves to be in negative equity of housing, so that relocation becomes difficult. Corporations that invested in real estates with large bank loans became insolvent on balance sheets and affected adversely on their core businesses. Thus, they are not in the position to make investment in housing or plants and machines even at the zero interest rate. Banks that lent to these borrowers are suffering from nonperforming loans. With deflation, corporations' earning power in nominal terms will decline, and they find it difficult to service past debts. Deflation also means that past debts in real terms become larger and larger. They have to sell assets to make businesses continue, or apply for protection from creditors and restructure. With weak balance sheets, corporations cut prices to win customers. Asset price deflation causes further asset price deflation.

Now that the Japanese economy has been trapped in a deflationary cycle, it seems very difficult to choose monetary and fiscal policy measures to put the economy on the recovery track. The short-term interest rate has been driven down to zero, but deflation means that the *real* interest rate is still positive. The zero bound put limitation on the power of conventional monetary policy. Despite the zero bound of interest rate, monetary easing has continued in the last few years through quantitative easing. The monetary base has increased at 20-30% in 2002, with ample liquidity injection, but there is no sign of end to deflation as of the summer of 2003.

The banking system that is burdened by large nonperforming loans and weak capital base is trying to retrench rather than expand. They put assets into government securities rather than lending to corporations.

Fiscal policy has been applied to stimulate the economy, but repeated large packages in the last ten years put the debt to GDP ratio to 140%, the worst among the G7. Even with the strong stimulus of 6% of GDP deficit financing, the GDP growth rate stays at around 1%. Further fiscal stimulus with deficit financing seems to be a sure way to cause a fiscal melt down sooner than later.

Many reasons have been put forward to explain poor performance of the Japanese economy during the 1990s and well into the 2000s. But, one of the most important problems has been the weak banking problem. Without making the banking system healthier, a chance of strong recovery of the Japanese economy is remote. Conversely, unless corporations become profitable again and deflation problem ends, nonperforming loans problem will not be subdued.

The solution to the troubled economy has to be multi-dimensional, mobilizing monetary, fiscal, and banking policies at the same time. This paper focuses on the banking sector problem. In

particular, the paper will review market indicators of financial vulnerability from 1995 to 2003: the stock prices of banks; the so-called Japan premium; and the credit derivative spread. (For earlier studies on the Japanese financial sector problem, see Horiuchi (1999), Ueda (2000), Cargill, Hutchison and Ito (2000), and Kashyap (2002).) This paper is the first in the literature to analyze the characteristics of credit derivative spread. It will be argued that the Japan premium was a good indicator of bank vulnerability from 1997 to 1999, while the credit derivative spread became an indicator of choice after 2000.

The rest of this paper consists of the following sections. Section 2 will review the continuing saga of a financial crisis in Japan, starting from 1995. Section 3 describes and analyzes the daily series of the three indicators of the bank vulnerability. In Section 4, nonperforming loans and other bank health indicators from bank balance sheets that are available semi-annually are observed. Section 5 examines the relationship among three indicators that are relevant to measure health of the Japanese banks. Section 6, concludes the paper.

2. Brief Review of the Banking Crisis of Japan, 1995-2003

2.1. Chronological Review

The burst of a bubble—a collapse of stock and land prices—in the first half of the 1990s put many construction and real estate companies, which had invested in land and real estate, insolvent. The collapse of stock prices made consumers and companies that had invested in the stock market suffer from negative wealth effects. Some of them stopped payments to banks, but banks continued to lend to them so that companies would not go bankrupt, with a hope that land prices would recover. Lending into nonperforming loans, that is nicknamed as “ever-greening”, was evident in the first half of the 1990s, as lending to real estate and construction companies steadily increased while lending to other sectors started to decline. A rebound of land prices never came, and the problem became worse. The ratio of bad borrowers continued to increase, but it was difficult to grasp the size of the problem, as the full disclosure was not required.

The nonperforming loans problem first emerged to surface in 1995 as the small financial institutions started to fail. But the nonperforming loans problem became larger and larger, as the problem was not dealt with decisively at the early stage. The first institutions to fail in the financial sector were credit cooperatives and housing loan financial institutions (so-called *jusen*). The two credit cooperatives in Tokyo were found insolvent in December 1994, and were closed in 1995. A regional bank and two reasonably large credit cooperatives failed in August 1995. The regional bank, Hyogo Bank, became the first case of a failure of a bank listed in the stock exchange. Seven *jusen* companies were also found insolvent in 1995 and the resolution plan was crafted in December 1995.

A political will to deal with insolvent institutions was first tested in 1995. (See Cargill, Hutchison, and Ito (1997; ch. 6) for a detailed description of the *jusen* problem.)

Both credit cooperatives and *jusen* institutions were insolvent, so that liquidating them meant someone having to assume the losses. For the case of the two credit cooperatives, the Ministry of Finance first tried to ask the Tokyo Metropolitan government that had a direct supervising authority to assume some of the losses. However, the plan was rejected in the vote of the Tokyo Metropolitan Congress. For the *jusen* companies, the Ministry of Finance and the Ministry of Agriculture, Forestry, and Fishery, battled over the issue of who will pay for the losses of seven *jusen* companies, as they were determined to be liquidated. Since agricultural cooperatives and their prefecture organizations had heavily lent into the *jusen* companies, the Ministry of Finance argued that the agricultural institutions should bear the burden. The Ministry of Agriculture, Forestry, and Fishery had argued that banks that had established *jusen* companies and brought in project proposals should take primary responsibility. After the debate was elevated into a Diet (parliament) level, and several revelations of past dealings, in particular an earlier memo from a Director General of the Ministry of Finance assuring his counterpart that no further losses would be shifted to the agricultural cooperatives. Banks shouldered disproportionately large losses from *jusen* companies, beyond their share values and proportionate losses from lending. The agricultural cooperatives refused to assume losses. Therefore, the Ministry of Finance had to ask for the public funds injection—the first ever case of using tax-payers' money to clean up messes in the financial sector.[1] The proposal of using 685 billion yen of public funds in resolving *jusen* companies caused an uproar in the Diet and the public opinion. However, with retrospect, this was literally a tip of iceberg. Three years later, the government would have to propose 30 trillion yen of public funds to support large banks.

Thus, in 1995, the regulatory authorities, along with politicians, miserably failed the test of political will to resolve the financial problem in an early stage. The heart of the problem was a lack of an explicit rule of burden sharing when insolvent financial institutions fail. Any failing institutions before this date had been merged with healthy institutions that are willing to pay premium for a branch network or any other regulatory incentives. Financial deregulation and a stagnant economy erased any rents or goodwill values of a financial institution.

The political turmoil over the 685 billion yen that ensued the proposal prevented the regulatory

[1] The asset values of seven jusen companies were estimated as about 13 trillion yen. For this, only 2.5 trillion yen was considered to be performing. Outright losses were 6.4 trillion yen, the secondary losses would be 1.2 trillion yen, and 2.1 trillion yen were nonperforming.

authorities from proposing any constructive solution to worsening problem of nonperforming loans problem in 1996 and much of 1997, until the failures of large financial institutions in November 1997. The Sanyo Securities, a medium size securities company, the Hokkaido Takushoku Bank, one of the large city banks, and the Yamaichi Securities, one of the Big Four securities firms, failed in November 1997. This suddenly heightened the sense of crisis. The government finally admitted that the situation is bad enough that it had to create a fund to prevent systemic risk and financial melt down.

With little disclosure of reliable financial data, all Japanese financial institutions were under suspicion of insolvency. The "Japan premium", a premium that western banks charge on any Japanese banks for offshore interbank loans, became larger and prominent. It also symbolized the vulnerability of Japanese financial system. (See Hanajiri (1999), Ito and Harada (2000), and Peek and Rosengren (2001) for earlier studies of the Japan premium.)

A plan to inject public funds to large banks to supplement capital was approved, and other safety nets to strengthen the financial system were planned from December 1997 to March 1998. The first public fund injection into large banks was carried out in March 1998. A total of 1.8 trillion yen in the form of preferred shares and subordinated debts was injected into 21 banks. However, this did not stabilize the financial system, as the size of public funds was not sufficient.

From the spring to fall of 1998, new legislations were prepared in parallel with an unfolding crisis at the Long-term Credit Bank (LTCB). As new laws being established, the LTCB was nationalized. In December, another long-term credit bank, the Nippon Credit Bank, was nationalized under the new law. With a sense of spillover to other banks, the government again planned public funds injection to banks' capital with much larger size. A total of 7.5 trillion yen was injected into 15 banks in March 1999.[2]

The capital injection of March 1999, blanket guarantee of deposits, and strengthened deposit insurance system for assisted mergers removed vulnerability in terms of liquidity. The Japan premium that remained high since November 1997 finally became negligible in April 1999. The financial crisis in Japan was over, so perceived by many.

Banks proceeded with dealing with mounting nonperforming loans and business restructuring. With large buffer in capital, major banks did write off a large amount of nonperforming loans, taking

[2] Capital injection under the same scheme with the one for March 1999 continued, and by 2002, when the scheme expired, a total of 32 banks received 8.6 trillion yen of capital injection.

special losses in 1999 and 2000. Some banks also announced mergers. The large three banks, Fuji, Daiichi-Kangyo, and Industrial Bank of Japan, announced a merger on August 20, 1999 (and completed the merger in 2001 as Mizuho Financial Holdings), and the two banks, Sakura and Sumitomo, that had roots in old *zaibatsu*, agreed to merge on October 14, 1999, and to form Mitsui-Sumitomo Financial Group by April 2002, but later accelerated the process to April 2001. The financial group is a holding company to which the bank and other financial institutions belong. There were other financial groups formed among large banks: Asahi and Daiwa merged to become Resona; and Sanwa, Tokai, and Toyo Trust merged to become UFJ. The financial consolidation was first welcomed by analysts, market participants, and the regulator as a promising way to cut costs, to gather together expertise, and as a result to boost their profits. However, it turned out to be the case merging two or three banks was difficult and did not yield benefits, at least in the short run. Bureaucratic corporate governance, egalitarian promotion, and long-term employment practices prevented Japanese banks from reaping benefits of consolidation.[3]

The stock prices (Nikkei 225 index) went up to 19,000 yen in March 2000, the peak of the IT stock bubble. Since Japanese banks hold a large quantity of equities, the rise in stock prices helps by creating unrealized capital gains. The balance sheet of banks seemed to be on the way to become strong again in March 2000, thanks to the massive capital injection a year earlier and higher stock prices.

The stock prices gradually declined to 12,000 level by March 2001. Most of capital gains are gone, and banks started to worry about capital losses on equity holding. Capital losses are particularly damaging to banks, since losses were to be deducted from tier I capital, and tier II capital cannot exceed the amount of tier I capital in calculating an overall capital adequacy ratio.

The Japanese financial system became weaker in September 2001, when the stock prices became below the 10,000 mark. The vulnerability of holding large stocks became apparent. The government, with a pressure from the Liberal Democratic Party, decided to create a fund to purchase stocks held by commercial bank outside the market. The idea of the fund was discussed in the spring of 2001, and the legislation was submitted to the Diet in September. The fund became established in January 2002, and became operational in February 2002 with 2 trillion yen guarantee fund for the 2001 fiscal year, and another 2 trillion for the 2002 fiscal year. However, the fund did not make much progress, because the fund required the banks to pay in 8% of the stock value in case

[3] For example, the Mizuho Financial Holdings had to have three CEOs who represent old three banks, respectively, and each unit has to have three representatives from old three banks. Moreover, they failed to consolidate smoothly three online systems. Many branches were left untouched, although there are many overlapping branch.

that the stock value declined (secondary losses).

From September 2001 to July 2002, the stock prices continued to fluctuate at around 10,000, that was not high enough to lift banks' profits. However, the stock price sharply declined in August and September 2002, affecting the semi-annual profit-loss reporting of September 2002. Stock prices of banks declined disproportionately and bank vulnerability became a top political issue again.

At this point, bank vulnerability stemmed from three aspects. First, banks were still beset with large nonperforming loans, and provisioning toward bad loans was considered by many analysts inadequate. Second, a sharp decline in stock prices deteriorated the tier I and tier II capital, putting at risk maintaining a critical level of 8% (4% for domestic oriented banks) for the capital adequacy ratio of major banks. Third, the proportion of deferred tax asset in tier I had grown to be quite large.

Since provisioning to bad loans have to be done from profits after tax, the taxes paid at the time of provisioning should be paid back to a bank when bad loans were written off from a balance sheet and banks produce profits (so that corporate income taxes are due). The deferred tax asset is the amount of future tax rebate, if banks produce large profit in the future. At the summer of 2002, a majority of bank capital in typical major banks consisted of deferred tax credit and past capital injection by the government. A salient exception was Mitsubishi-Tokyo Financial Group where banks repaid past government capital injection, and the ratio of deferred tax assets is not so high. All other banks would have had below-8% capital adequacy ratio, if deferred tax credit was not counted toward tier I capital.

During the summer of 2002, Minister in charge of Financial Services Agency (FSA), Mr. Yanagisawa, maintained that banks were fundamentally sound, and there is no need to do any special policy changes. Deferred tax credit is appropriate to be counted in bank capital. The Bank of Japan in mid-September announced that it would start buying stocks that are held by commercial banks, a signal to the government that the financial system is vulnerable, and the government fund with a similar mandate was not working.

At the end of September 2002, Prime Minister Koizumi replaced Mr. Yanagisawa with Mr. Takenaka as Minister for FSA. Minister Takenaka spoke with tough language in the first week of his tenure at FSA. He suggested that no big bank is too big to fail, and the use of deferred tax asset should be severely limited. He created a project team to review the banking policy. The stock market responded negatively, and the stock price index declined substantially in the first few weeks of October 2002. It was dubbed as the Takenaka Shock. After being confronted by LDP politicians

and bankers, Mr. Takenaka seemed to have backed down and produced a compromise report at the end of October.[4] Although no explicit limit was placed on the use of deferred tax asset, it was mentioned that auditors had to be prudent in allowing the use of deferred tax asset toward bank capital.

The balance sheet vulnerability continued to put pressure on banks' management. The triple problem of deferred tax asset, stock prices, and nonperforming loans made their capital base deteriorated. The stock market continued to tumble down, and by the end of March 2003, the stock price level became below 8,000, or more than 25% decline in one year. This put significant pressure on banks' balance sheet. The FSA carried out another special examination in late 2002 to the beginning of 2003 to make classification of nonperforming loans rigorous and consistent across banks. Banks were to report another deficit at the fiscal year ending at March 2003.

Finally, the pressure to reduce the amount of deferred tax assets started to bite. With continuing deficits and less optimistic prospect, auditors started to question having a large amount of deferred tax asset. On May 17, 2003, it was announce that the Resona Bank, the major bank in the fifth largest financial group was found to be subject to prompt corrective action, as its capital ratio became less than 4%, or 2.07% to be exact. The FSA applied an article in the deposit insurance law to recapitalize the Resona bank, and to nationalize it as the government would hold more than a simple majority of voting shares.[5] The trigger for the sharp decline in the capital ratio was that the auditor disallowed a portion of deferred tax asset for tier I capital. This was a new way that the bank became subject to a strong regulatory action.

In sum, the Japanese banking crisis first appeared in 1995 among small financial institutions. That was the first regime change. The government was not ready to deal with insolvent financial institutions. It did not have a tool to force weak institutions to fail before insolvency or to manage insolvent institutions with losses to be filled by the public funds if necessary. The regulator continued to take forbearance and tried to arrange rescue mergers. Events in 1995 made it clear to informed observers that the old regime could not continue. But, institutional changes did not take place in time. The failures of major financial institutions in November 1997 were the beginning of the second regime change. It became clear that even large institutions were vulnerable. Again, the regulatory authority responded tentatively, as opposed to decisively, and wasted precious time. The 1998 capital injection was too small, and did not differentiate strong and weak banks; and the 1999

[4] The stock prices declined from 9,383 yen at the end of September to 8,686 yen at the end of October.

[5] Article 102, measures under item (1). See http://www.dic.go.jp/english/e_laws/2002.9.10.pdf.

capital injection was success in stabilizing the weak financial system—eliminating Japan premium. However, bank management became too complacent after the 1999 capital injection. Bank mergers were a new trend, but cost reduction and pursuing a new business model did not materialize. In the meantime, capital base was again deteriorated in 2002 and 2003 by stock price declines, an unrealistically large size of deferred tax asset, and ever-increasing nonperforming loans and strict provisioning.

The banking crisis in Japan has been protracted unnecessarily too long. Regulatory forbearance, no leadership in the political arena, and moral hazard among bank executives are to blame. The saga of bank fragility may continue for some time, as a way out of current problems is not obvious. The Japanese banking system can overcome the problems only many ifs are satisfied: If banks reform itself in organization, if nonperforming loans are separated to a bad bank for a quick disposal, if deflation ends so that no new nonperforming loans will emerge, and if stock prices will rise substantially.

2.2. Bank Stock Prices

Stock prices of Japanese commercial banks used to more closely with a market-wide stock price index. Before the bubble burst, banking was a industry with few risk. They took deposits and lent for companies with a steady spread and avoided too much fluctuation in profits as deposit rates were regulated and no hard competition with respect to lending rates. Since the weight of capitalization of the banking sector was reasonably high, the banking sector index (BINDEX) and the overall stock price index (TOPIX) behaved similarly from the pure statistical reason: a large part of TOPIX was indeed banking.

Figure 1 shows the time series of TOPIX and BINDEX. They moved closely together until the mid-1990s. However, in the second half of 1995, the two indices started to deviate from each other. The BINDEX exceeded that of TOPIX. This was the first obvious sign that the banking sector was in a big trouble. The timing of this deviation is consistent with the events explained in the preceding subsection: The first sign of nonperforming problems emerged and a first set of medium-size financial institutions failed in 1995. The deviation of BINDEX from TOPIX seemed to have widened in 1997-1998, and then again after 2000. These timings also reflect the banking crisis of 1997-98 and continued weakness of the banking sector after 2000. The bank stock price index in relative to the overall stock price index seems to be a good indicator of the market perception of financial soundness of the banking sector.

Insert Figure 1

It is suspected that bank stock prices were affected by bad news for banks, for example, the news of a failure of a bank. The next set of Figures show the behavior of bank stock prices (BINDEX), Nikkei 225, the stock price of failed bank, the weighted average of stock prices of banks with credit rating of Baa3, and that of Baa2 (For the case of Hyogo Bank, the weighted average of stock prices with lower ratings was Baa2 and Baa1 since there was no banks with credit rating of Baa3): Figure 2 shows the "before" and "after" of the failure of Hyogo Bank, August 1995; Figure 3 shows for the case of the failure of Hokkaido Takushoku Bank, November 1997; and Figure 4 shows that of Long-Term Credit Bank of Japan (LTCB). At the time Hyogo Bank failed, other bank stock prices, even those with low credit rating, did not show any effects compared to the overall stock price index. The failure must have been judged by the market as an isolated event.[6] When Hokkaido Takushoku Bank failed in November 1997, other bank stock prices fell sharply and weaker bank (Baa2, Baa3) stock prices fell more than other banks. There may be two reasons for this. First, Hokkaido Takushoku Bank was a large bank with a nationwide branch network. It was much bigger than Hyogo Bank. So the impact to the industry was serious. Second, by this time, the fragility of the banking sector as a whole seemed to have been recognized by the market participants. Many had a concern of the spillover effect to other banks from the failure of Hokkaido Takushoku Bank.[7] In contrast to the Hyogo Bank or the Hokkaido Takushoku Bank, the case of the LTCB failure was not a surprise by the time it was so announced. The Diet had debated how to deal with the failing bank, and the LTCB was decided to be nationalized under a new law that would fail a bank with protection of all creditors and depositors of the bank. There was less concern on the spillovers to other banks. The response of other bank stock prices reflect this. Later in the year, Nippon Credit Bank (NCB) was nationalized under the same scheme, and the reaction of other bank stocks was not so serious either.

Insert Figures 2, 3, 4

3. Three Market Indicators of Bank Fragility

3.1. Summary of Indicators

Banks are considered to be "fragile" when their capital base is deteriorated (9 low capital adequacy ratio), when a large portion of their loans are nonperforming (future losses), and when potential losses from other sources are apparent (exposures to interest rate risk, currency risk, loan guarantees,

[6] We examined other two bank failures in 1995 and 1996, namely Taiheiyo Bank and Hanwa Bank. Similar characteristics, that is no effect to other bank stock prices, was observed.

[7] In November 1997, the Sanyo Securities and the Yamaichi Securities also failed. A similar pattern of strong spillovers to bank stock prices are observed for these cases.

and others). However, a true position of each bank is hard to observe in a timely manner. For example, disclosure of nonperforming loans is only twice a year, and self-assessment in classifying bad loans is sometimes questioned. Market participants—interbank counterparties, stock market investors, and derivative speculators—are trying to estimate risks and to reflect risks on pricing every minute of the trading days. They use all the information available at the time to assess the bank vulnerability.

It is commonly observed that fragility of Japanese banks are reflected in the three indicators: (1) Japan Premium (for interbank borrowing); (2) Credit derivative (credit default swaps); and (3) Bank stock price. However, each indicator may depend on different (combinations of) risks. Perception of increased risk of default will raise (1) and (2) and decrease (3).

Credit derivative is the most direct way to measure credit risk, since it is pricing the default event. Stock prices reflect the residual values of company assets as well as the discounted sum of future profit streams. Even if the event of failure is remote, stock prices fluctuate due to changing prospects of profitability, reflecting both market - and economy-wide shocks as well as individual bank shocks. The Japan premium reflects the probability of interbank default. Interbank default may occur even for a solvent bank, if, for some reasons, a bank cannot obtain (dollar or yen) liquidity. On the other hand, interbank liability may be protected at the end, even in the event of bank failure. Interbank credits are considered to have a higher priority in repayments than equity stake holders.

Japan premium received a spot light as an indicator of Japanese banks' vulnerability in 1997-1998. Western banks required higher interest rates when Japanese banks wanted to borrow in the offshore interbank market. The premium was much higher in the US dollar interbank market, than the yen interbank market. This was thought to reflect the risk that Japanese banks would not be able to obtain enough dollars to repay the interbank loans, as their bank soundness was questioned. In 1997 and 1998, Japanese banks had to pay nearly 100bps more than US and European banks to borrow dollars.

When vulnerability of Japanese banks reappeared in 2001-2002, there was no significant increase in the LIBOR rate for Japanese banks. The magnitude of Japan premium in 2001-2002 was at most 10 basis point. However, the low Japan premium does not necessarily prove that the markets are less pessimistic about Japanese banks this time compared to in 1997-98. First, weaker banks disappeared from data or exited form the market, either by withdrawing from the interbank market or by being merged with other healthier banks. Second, even for the remaining banks, they are required to put up cash collaterals to obtain interbank funds. Collaterals protect creditors from losses even in the

event of counterparty (Japanese bank) failure. Third, even in the three cases of the Japanese banks failure in 1997-98, interbank obligations were repaid promptly. The western banks may be optimistic about Japanese regulators' competence and willingness to carry out interbank obligations promptly.

3.2. Japan premium

The Japan premium is a premium imposed on Japanese banks' borrowing rate by U.S. and European banks in the Eurodollar and euroyen market. It reflected counter-party risk based on the western banks' belief that Japanese banks had higher risk of default. In Ito and Harada (2000), the Japan premium is defined as the difference between the Eurodollar TIBOR (the Tokyo interbank offered rate, or the Eurodollar interbank borrowing rate in Tokyo) and the Eurodollar LIBOR (the London interbank offered rate, or the Eurodollar interbank borrowing rate in London) since by construction, TIBOR reflects the rate among Japanese participants while LIBOR reflects the rate changed by the western banks on the Japanese banks.

It reflects counter-party risk based on the western banks' belief that Japanese banks had higher risk of default, especially in the dollar market. In particular, the dollar liquidity was a concern at the time of the 1997-98 crisis. In this paper, Japan premium is defined as the difference between the interbank euroyen rate quoted by Japanese banks and the average of the rate quoted by the non-Japanese banks in the euroyen LIBOR samples. The reason we used Euroyen rate rather than Eurodollar rate is availability of samples. Sample banks are very limited if Eurodollar market is examined.

It is said in the market that Japanese banks use cash collaterals in interbank transactions since the spring of 1999. Default risk does not appear in the Japan premium any more. We define the Japan premium as the following form;

$$JP_{it} = LIBOR3M_{it} - LIBOR3M_{t}$$

where JP_{it} is the Japan premium of bank i, $LIBOR3M_{it}$ is the euroyen 3 month interbank rate quoted by bank i and $LIBOR3M_{t}$ is the euroyen 3 month market rate at time t.[8]

3.3. Credit derivatives [9] [10]

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[8] The euroyen LIBOR is calculated by the British Bankers' Association as the average of the yen interbank offered rates. Although the premium in the dollar market was more pronounced rather than that in the euroyen market as described in Saito and Shiratsuka (2001), euroyen LIBOR is used in this paper since the sample Japanese banks in the euro dollar is very limited.

[9] We wish to acknowledge kind help by Mr. SAEKI Nobukazu of Mitsubishi Tokyo Financial Gropu and Ms. KAWAI Yuko of RP Tech for their answering our questions on the structure of the credit derivatives market.

[10] The market size is based on the officially surveyed statistics of the Bank of International Settlements,

Credit derivatives are over-the-counter financial contracts that have payoffs contingent on charges in the credit of a firm. It also reflects default risk. Default risk of a firm, bonds, loans or other credit contracts can be transferred by a credit derivative agreement. Total return swaps, credit default swaps, and credit-linked note are three major products in the market where credit risks are traded. Among them, credit default swaps are financial contracts that provide insurance against credit-related losses and the most commonly traded product in the Japanese market. The basic structure of credit default swaps are given in the below Box 1.

Box 1 Credit Derivatives

A Credit Default Swap is a bilateral contract in which the credit protection buyer pays a premium on a predetermined amount in exchange for a contingent payment from the credit protection seller to cover losses following a specified "credit event" on a specific asset which is called reference asset. Credit events generally follow the definitions promulgated by ISDA, or the International Swaps and Derivatives Association. Standard credit events are Failure to pay; Bankruptcy; Acceleration; Repudiation or moratorium and Restructuring. (Restructuring, however, tends not to be included as one of the credit event after a controversy over restructuring arose in the US market in 2001. This trend is also applied to Japanese credit derivatives market.) The premium, notional principal, reference asset, credit instrument, and credit events, as well as other terms of the contract, are negotiated between the protection buyer and seller. A Protection buyer pays LIBOR plus a spread to a protection seller. The main protection sellers of CDS are foreign securities companies and hedge funds, not Japanese banks, meanwhile Japanese banks participate as protection buyer. A protection seller has to pay obligations to the protection buyer if a credit event occurs. Since regular trading unit of notional principal is 10 million dollars, multiplying 10 million dollars by a spread gives the payment that a protection buyer pays. This is settled by either bonds or in cash.

In Japan, credit derivatives market has started to become active around the beginning of 1998. This was a relatively late start compared with other developed countries. The market is still immature but it has advanced considerably since banks started relying on securitized products constructed with derivatives such as CDO, collateralized debt obligation, and CLO, collateralized loan obligations. These let the banks shift credit risk off balance sheets while keeping loans themselves, which count as assets, on them (*Financial Times*, September 15, 2003). In a synthetic CDO, a bank as a credit protection buyer transfers default risk of a firm or a portfolio by a credit derivatives. (For the relationship between synthetic CDO and credit derivatives, see FITCH's Structured Finance Reports presented in Appendix 1.

or R&I, Japanese top rating agency's papers that are provided on their homepage. For the relationship between credit derivatives as well as credit risk and financial market behavior, see Neal (1996)).

An example taken from Hull and White (2000):
Suppose that two parties enter into a five-year credit default swap over Bank A on March 1, 2000. Assume that the notional principal is $100 million and the buyer agrees to pay 90 basis points annually for protection against default by the reference entity. If the Bank A (the reference entity) does not default (that is, there is no credit event), the buyer receives no payoff and pays $900,000 on March 1 of each of the years 2001, 2002, 2003, 2004 and 2005. If a credit event occurs, a substantial payoff from the seller to the buyer is likely. Suppose that the buyer notifies the seller of a credit event (say, a failure of Bank A) on September 1, 2003 (half way through the fourth year). If the contract specifies physical settlement, the buyer has the right to sell $100 million par value of the reference obligation (say, Bank A's debt instrument) for $100 million. If the contract requires cash settlement, the calculation agent would poll dealers to determine the mid-market value of the reference obligation a predesignated number of days after the credit event. If the value of the reference obligation proved to be $35 per $100 of par value, the cash payoff would be $65 million. In the case of either physical or cash settlement, the buyer would be required to pay to the seller the amount of the annual payment accrued between March 1, 2003 and September 1, 2003 (approximately $450,000), but no further payments would be required.

Source: Hull and White (2000); FITCH (February 6, 2001) "Synthetic CDOs: A growing Market for Credit Derivatives", R&I (June 30, 2003) "The relationship between Ratings and Default. The Broad-Definition Default Ratio and the Rating Transition Matrix", Mitsubishi Tokyo Financial Group's presentation material, and Financial Times article (September 15, 2003).

The average of offer and bid rates denominated in the US dollar and posted by brokers are at the close of the Tokyo market. When both bid and offer are missing for day t, then data of day t-1 is substituted in. When one of a bid or an offer is missing, the value is substituted between observation days so that the bid and offer would not be reversed. When missing days continue for a couple of days, we eliminated the period form our samples. However, these missing days were rare since June 1998. Samples are for the Bank of Tokyo-Mitsubishi (later Mitsubishi-Tokyo Holdings), Fuji Bank, Daiichi Kangyo Bank, Industrial Bank of Japan (later those three becoming Mizuho Holdings), Sanwa Bank (later UFJ Holdings), Sumitomo Bank (later Sumitomo-Mitsui Holdings), and Sovereign Japan. Credit derivative spread extracting Japanese bank's provabilities of default risk is;

$$CDS_{it} = BANK_{it} - JAPAN\ sovereign_t$$

where CDS_{it} is the credit derivative spread of bank i, $BANK_{it}$ is credit default premium of bank i and $JAPAN\ sovereign_t$ is sovereign premium at time t. Subtracting sovereign Japan (average of offer and bid rates of it) from each banks' credit derivatives swap is defined as a most direct measure of bank soundness.[11]

3.4. Bank stock prices

The individual bank stock price relative to the market is constructed by subtracting TOPIX from individual bank stock. That is, the specific bank stock price is controlling for general stock price movements. The bank stock price movements and the market index are defined as the relative stock price index;

$$STOCK_{it} = \log(stock)_{it} - \log(TOPIX)_t$$

where $STOCK_{it}$ is the log difference of bank i's stock price and market index $TOPIX_t$ at time t. The movement of specific bank stock price relative to other sectors can be examined.

4. Deposits and Nonperforming Loans

This section looks at different aspects of the Japanese financial system by focusing on less-frequently available data.[12] Deposits may show depositors' behavior in response to bank fragility, if depositors are concerned about the possibility of bank failure. Although deposits are explicitly and implicitly protected, the bank failure may cause temporary inconvenience. Deposit shift would be a strong signal of bank having a serious trouble. Another indicator of bank fragility is the non-performing loan ratio of a bank. As banks continued to struggle with nonperforming loans in the second half of the 1990s.

4.1. Changes in Deposits

Depositors had incentives to disregard risk of bank failure because the blanket deposit guarantee that was implemented in June 1996 had removed the market discipline among depositors.

The deposit Insurance Corporation (DIC) was established in 1971. DIC covers deposits in deposit taking institutions-----commercial banks, long-term credit banks, trust banks, regional banks, shinkin banks, and credit cooperatives. There were no bank failures and no DIC payouts until in the

[11] Our sample period reflects the availability of the CDS data since the market has started in the beginning of 1998. The premium of credit derivatives of sovereign Japan was not high compared with those of banks. Sovereign Japan usually traded below 50bp while some banks' charged more than 300bp. Subtracting sovereign Japan from

[12] Appendix 2 shows major banks credit rating changes.

beginning of 1990s. In 1991, for the first time in the post war period, resources from DIC was used for assisting the mergers of insolvent depository institutions. By 1995 DIC's reserves were almost exhausted. In spite of the DIC resource constraint, the Ministry of Finance announced in 1996 that all bank deposits would be guaranteed until March 31, 2001, by using a special fund contributed in terms of government bonds (For details, see Cargill, Hutchison and Ito (2000)).

The Deposit Insurance Corporation Law was revised in 1996 to expand its role in financial markets. The revised law allows DIC to pay off depositors and represent depositor interests in the bankruptcy proceedings. DIC also was allowed to purchase bank assets, so the payoff ceiling was removed. For the enhanced role, the premium was raised from 0.012% to 0.084% in 1996, to 0.094% in 2002. As its revise (The law was revised three more times in 1998, 2000 and 2001), a series of strengthening measures are taken for DIC. The blanket guarantee by the government until March 31, 2001 was extended by one year to March 31, 2002. The guarantee prevented bank runs. However, it may have increased moral hazard among depositors.

Table 1 shows three categories of major banks and their deposit asset ratios, capital asset ratios, and bad loan asset ratios from 1998 September, midyear to 2001 March, that is the end of year fiscal year 2000.

Insert Table 1 about here

Depositors do respond to deposit insurance and blanket guarantee. In April 2002, blanket guarantee for time deposits accounts were lifted and replaced by regular deposit insurance (with a ceiling of 10 million yen). Depositors have fled from time deposit accounts to demand deposit accounts that were kept under the blanket guarantee. The total balance of time deposit accounts declined by 15% from July 2001 to July 2002, while demand deposits increased by 36% during the same period. It was also the case that larger banks collected more deposits than smaller banks. Thus, for some events, the loss or gain of deposits reveal depositors' assessment of banks' health. However, the frequency of such a deposit shift is very low, so that deposits are difficult to be used in the regression analysis.

4.2 Disclosed nonperforming loans

The Ministry of Finance officially redefined categories of non-performing loans in January 1998. The amount under the new definition was far larger than the previous estimates. The new loan categories were based on possible risk assessment in addition to previous overdue and bankrupt borrowers by individual banks. This classification scheme has become the standard for assessing the non-performing loan problem in Japan. The non-performing loan in Table 1 is based on this

classification.

Banks are required to classify their outstanding loans into four categories. Class I consists of loans with little or no risk of default. Class II consists of loans with some risk that requires monitoring. Class III consists of loans that are unlikely to be repaid, and Class IV consists of loans to bankrupt borrowers and unrecoverable. There was, however, a question as to whether internal estimates of problem loans under the classification scheme would be accurate.

Major banks continued paying dividends and management stayed on despite poor performance. Many suspected that banks' classification of bad loans was questionable in some cases, and provisioning for nonperforming loans were inadequate. Suspicion was that banks wrote off bad loans, and recognized new bad loans as much as they can afford without jeopardizing minimum profits to justify paying out individual. Official nonperforming loans ratios are not a good indicator for bank fragility for our purpose.

5. Correlation among Indicators

5.1. Daily Indicators for each bank

Although we cover the period from June 1998 to May 2003, there was a major change in the scenery of Japanese banking. After mergers of several banks and trust banks, the four major banking groups emerged. Due to the mergers, some banks are not comparable before and after these mergers. Therefore we break the sample into two, the First half: from June 1998 to September 1999, and the second half: from April 2001 to May 2003 (For analysis in subsection 5.2 and 5.3, first period is June 1998 to September 1999 and second period is April 2001 to September 2002).

Three indicators for each bank in our sample are shown in Figure 5 (Panels 5-1 to 5-6) for the first period and Figure 6 (Panels 6-1 to 6-4) for the second period. STOCK represents level of bank stock price, LIBOR (In the figures, LIBOR is denoted by LIBOR 3.) is the Japan premium, the difference between individual bank's euroyen 3 month interbank rate and market rate, and CDS is representing credit derivative spread, credit default premium of bank i minus sovereign premium. LIBOR in the figures is ten times larger than original level for convenience.

Insert Figures 5-1 to 5-6 about here

In the first period, three indicators of all six banks show a similar time-series pattern. (1) Japan premium (LIBOR) shows quite dramatic increase from June to November 1998, and then decreased

gradually in April 1999, just after the second round of capital injection. (2) Credit derivative spreads show a similar pattern, but peaking slightly earlier than LIBOR and decreased more gradually than LIBOR. (3) Stock prices had a sharp decline from June to September/October 1998, and then started to recover. After April 1999, all indicators are more or less calm. (4) Japan premium and CDS basically disappeared after April 1999, when the second capital injection was completed, except Fuji, IBJ, DKB having a return of high LIBOR in the summer and fall of 1999. The correlations among the three indicators are fairly high between June 1998 and April 1999.

An examination of these three indicators reveals that the market had discriminated quality of these banks. The indicators tend to agree on the health of individual banks.

(1) In the first period, Fuji Bank was regarded by the market as the riskiest among the six. It had highest LIBOR, highest CDS, and most stock price decline. In the second period, Mizuho was the worst in terms of the stock price change, the peak level of LIBOR (tie with UFJ), and in the peak level of CDS. (2) The market regarded the Tokyo Mitsubishi as strongest among the six in the first period and among the four in the second period. In all of the three indicators in both periods (except in stock price decline in the first period), the Tokyo Mitsubishi Bank is the best. (3) Timing of the peaks of LIBOR and CDS, and also the trough in stock prices tend to coincide for all banks. This indicates that a shock was common to the banking sector, but vulnerability or sensitivity to the shock was different among different banks.

Insert Figures 6-1 to 6-4 about here

In the second period, CDS has increased markedly in December 2001 for all four financial institutions, Mizuho (spread of up to 204.5), Mitsubishi Tokyo (120), UFJ (192), and Mitsui Sumitomo (145.5). Stock prices had declined steadily from the spring of 2001 to February 2002. The degree of decline was the largerst for the Mizuho (72.8%) and UFJ (70.1%), and the least for Mitsubishi-Tokyo (43.5%).

Insert Table 2 about here

The soundness evaluated by the markets did not change even after most major banks consolidated and formed four financial groups. The Tokyo Mitsubishi Bank has been the best and Fuji, current Mizuho, has been the riskiest, according to the market.[13] Bank consolidation did not seem to

[13] The capital ratios of banks disclosed publicly were all above a critical mark of 8% and differences among banks were not significant. However, market participants might not have trusted these numbers.

change fundamentally the financial health of merging banks.

Table 3 presents statistical summary of the levels of STOCK, LIBOR, and CDS. The table reveals the following characteristics of these market indicator movements. Those banks that had high CDS values (average and max) in either first or second period tended to have higher LIBOR (average and max) levels and a sharpest drop in stock prices ((max – min)/average). The averages of LIBOR and CDS were smaller in the second period except CDS of DKB and IBJ. The averages of CDS for DKB and IBJ were smaller before their merger, but those of two banks become larger in the second period. The ranges for LIBOR and CDS were much smaller in the second period than those in the first period. The standard deviations ("s,d." in Table 3) of LIBOR became smaller in the second period, but standard deviations of CDS did not change over time.

The worst bank in terms of CDS average was Fuji Bank in the first period, and Mizuho Bank in the second period. The Mizuho is a product of a three way merger of Fuji, IBJ and DKB. The three banks were the weaker three of the six in the first period. A merger of three weaker banks turned out to be one large weak bank, at least in the eyes of the market.

Insert Table 3 about here

5.2. Correlation among Indicators

Next, correlation coefficients among the three indicators are presented and interpreted. The correlation between stock prices and credit derivative spread are expected to be negative. This is confirmed during the period of bank turmoil. However, during the period of IT bubble, from 1999 to spring of 2000, stock prices of banks rose more than the market average, because banks hold a wide-range of stocks including IT-related stocks. The CDS, representing credit risk, behaved differently from stock price movements. The market participants of the credit derivatives were not impressed by the stock price increases.

Insert Table 4 about here

The correlation of the LIBOR and CDS are shown in Table 5. The correlation is expected to be

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The capital ratios in 2000-2003 included differed tax assets and capital injected by the government earlier. The capital ratios adjusted for these elements were widely circulated by research publications of investment banks and securities firms as well as academic work. Appendix 3 and appendix 4 of this paper show that Tier1 capital adjusted for the deferred tax assets (the equity equivalent in excess of differed tax assets) and preferred shares. Excluding deferred tax assets in Tier 1 capital reduces the banks' regulatory capital ratios substantially, especially in 2002.

positive, as both represent the vulnerability of bank financial health. This prediction is confirmed in the data.

The correlation coefficient in the first period is uniformly higher than those in the second and third periods, suggesting that LIBOR3 represented credit risk more in the first period. As suggested earlier in the paper, LIBOR lost direct relationship to credit risk after April 1999, because either collaterals are used or counter-parties believe interbank liabilities would be honored even in the case of a bank failure. [14]

Insert Table 5 about here

Banks that are rated by credit rating agencies to be weak tended to have higher correlation in the second half period, especially in the relations of stock prices and credit derivative spread (-0.807 for Mizuho, -0.903 for UFJ, -0.821 for Sumitomo Mitsui and -0.283 for BTM. Long-term credit ratings for Mizuho, UFJ and Sumitomo Mitsui were single "A" that of BTM was "A+" at the end of March 2001.).

5.3 Panel Analysis

A panel regression is conducted in the following form. Dependent variable is either one of the following:

$$JP_{it} = LIBOR3M_{it} - LIBOR3M_t$$
$$STOCK_{it} = \log(stock)_{it} - \log(TOPIX)_t$$

As an independent variables, we use the following variables; CDS, Call rate and a dummy variable, where they are defined as follows: $CDS_{it} = BANK_{it} - JAPANsovereign_t$, Call = Call rate, uncollateralized overnight.[15] For the interest rate, we use daily observations of the overnight

[14] This information is obtained from the hearings we had with market participants. "Collaterals " do not mean those under CSA (Collateral Support Annex, which is official transaction based on the regulation of ISDA), but collaterals here are part of the swap arrangement where the Japanese yen is used in the swap transactions in order for Japanese banks to obtain the U.S. dollar for a certain period. The "Japanese premium" is hidden in the interest rates used in this swap arrangement.

[15] We have examined panel regressions with a dummy variable that takes 1 before the second capital injection, March 1999, and 0 after April 1999. The regression results were almost the same as the results presented in this paper. The dummy variable was included to control for a possible regime change in bank financial soundness however the regression results are not shown because of the following econometric reason.

As long as a dummy variable is used in the panel regression, fixed effect model has a bias. For the level data we use in our regression, fixed effect model is preferable since it brings us the same effect as

uncollateral call rate, data being taken from the Toyo Keizai Monthly Statistics. Both CDS and Call are expected to correlate positively with the Japan Premium and negatively with the STOCK. Call rate is proxy for monetary policy so that an increase in call rate implies the tighter monetary policy and liquidity in the market, and it may lead to a higher possibility of bank failures.

Tables 6-1, 6-2 and 6-3 report results of a panel analysis. The regression results of OLS, with the fixed effect estimators, are reported in Table 6-1. Stock prices are affected negatively by CDS, and the coefficient is statistically significant. The Japan premium tends to be higher when the CDS is higher, and the coefficient is also statistically significant for both of the periods. In equations (1) and (2), that examine whether CDS, as the fundamental default indicator, influences stock prices and the Japan premium. The impact of CDS on the Japan premium in the second period is about one eighth of that in the first period (0.101 for the first half and 0.013 for the second half). This evidence is consistent with our conjecture that the Japan premium became very small in the second period, because collateral is used or because market participants believe that a failure does not imply default in the interbank market. The impact of CDS on STOCK has increased (larger coefficient in magnitude) in the second period (-0.0003 for the first half and -0.001 for the second half). In fact, the size effect of coefficients of CDS in the second period is about four times larger than that of the first period. Stock prices, representing profitability, is more sensitive to the default risk in the second period. Therefore, unlike the Japan Premium, the default factor in stock prices has increased in the second period compared to the first period. The signs of call rate sometimes are not consistent with our priors.

Insert Table 6-1 about here

Table 6-2 and Table 6-3 present the results of the OLS, pooled and the random effect estimators respectively. Most of the results of Table 6-1 carry over to Tables 6-2 and 6-3. The sensitivity of stock prices to CDS is similar for the first sample period, and they are negative and significant, and smaller in the first period. That of the Japan premium to CDS is also the same. It is positive and significant for the first and second period, and much smaller in the second half.

An important finding of the Japan premium becoming insensitive to CDS is robust against different methods of panel regression. A conventional wisdom in the market, that is, the Japan premium lost a value as an indicator of default probability of Japanese banks, is basically confirmed. However, it is important to stress that the Japan premium and stock prices do react to changes in CDS that is a direct measure of default probability of Japanese banks. Although the magnitude of CDS as well as

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the panel regressions in differenced form.

that of the Japan premium has been lower in 2001-2002, compared to in 1998, this does not necessarily mean that reputations of Japanese banks have been recovered. The stock and the interbank markets do react to the changes in the pricing of default risk of Japanese banks, although with lower sensitivity.

Insert Tables 6-2 and 6-3 about here

6. Concluding Remarks

The banking sector has been a weak spot of the Japanese economy. It is not at all clear whether the weak economy produced weak banking, or the other way around, but any solution to a question of how to get out of stagnation should include decisive actions to address problems in the banking sector: a low capital ratio, a high nonperforming loans ratio, a low loan-deposit spread, capital losses from stock holdings, and a high deferred tax asset.

The market participants attempt to assess a true degree of fragility, and to price them in the interbank market and the stock market. The credit derivative spread is the direct measure of the market participants' perception of the bank insolvency and default. The Japan premium also is an indicator of default probability in the interbank market. However, in this case a default may occur due to the liquidity problem, in addition to the insolvency problem. The stock prices of banks reflect not only default but also future profitability. Insolvency is only an extreme case of cumulative losses.

Credit derivative spreads became a better measure of bank fragility in recent years. Higher credit derivative spreads tend to be associated with lower stock prices and higher Japan premium. Various specifications of panel regressions produced similar results. The negative correlation between credit derivative spread and stock prices, and the positive correlation between credit derivative spread and Japan premium, tend to hold both in time-series and in cross-section. It is argued in this paper that the level of Japan premium ceased to be a good indicator of bank fragility after 2000, since the market requires Japanese banks to put up cash collateral, an unusual step for interbank transactions. When credit derivative spread is used as the fundamental default indicator, the impact of it on the Japan premium became one eighth of that in the earlier period where the Japan premium was believed as an indicator of default probability. Although the change in the Japan premium still reflects market perception of the Japanese banks' vulnerability in obtaining liquidity, the sensitivity has declined substantially. Most of the results given by different methods of panel regression are pointing to the same direction so that our conjecture as well as market participants' belief was confirmed.

It has been argued by many that banking is an important element for the stagnation of the Japanese economy. It has been difficult to quantify the fragility of banks. This paper compared three indicators. Two of the three are well known and have been used in the literature. This paper shows a promising research direction using credit derivative spreads, newly available and better measure, in the literature on soundness of Japanese banking.

Reference

Cargill, T., M.M. Hutchison, and T. Ito (2000). Financial Policy and Central Banking in Japan, The MIT Press, Cambridge.

Hanajiri, T. (1999).”Three Japan Premiums in Autumn 1997 and Autumn 1998----Why did premiums differ between markets?-----,” Financial Markets Department Working Paper Series 99-E-1, Bank of Japan.

Horiuchi, A. (1999). “Financial Fragility and Recent Developments in the Japanese Safety Net,” in Bos, T. and Fetherston, A.T. (eds.), Advances in Pacific Basin Financial Markets, Vol.3, 45-72, JAI Press.

Hull, J. and A. White (2000). “Valuing Credit Default Swaps 1: No Counterparty Default Risk,” mimeograph.

Ito, T. and K. Harada (2000). “Japan Premium and Stock Prices: Two Mirrors of Japanese Banking Crises,” NBER Working Papers Series, No.7997, November.

Kashyap, A. K. (2002). “Sorting out Japan’s Financial Crisis,” NBER Working Papers Series, No.9384, December.

Neal, S.R. (1996). “Credit Derivatives: New Financial Institutions for Instruments for Controlling Credit Risk,” FRB Kansas City.

Peek, J. and Rosengren, E.S. (2001). “Determinants of the Japan Premium: Actions speak louder than words,” Journal of International Economics 53, 283-305.

Ueda, K. (2000). “Causes of Japan’s Banking Problems in the 1990s,” in Hoshi, T. and Patrick, H. (eds), Crisis and Change in the Japanese Financial System, 59-81, Kluwer Academic Publishers, Massachusetts.

Saito, M. and Shiratsuka, S. (2001). “Financial crises as the failure of arbitrage: Implications for monetary policy,” Monetary and Economic Studies Special Issue, S239-270.

Figure1：TOPIX (left scale) and Bank Index (right scale))

Figure 2 1995/8/30 Hyogo Bank Failure

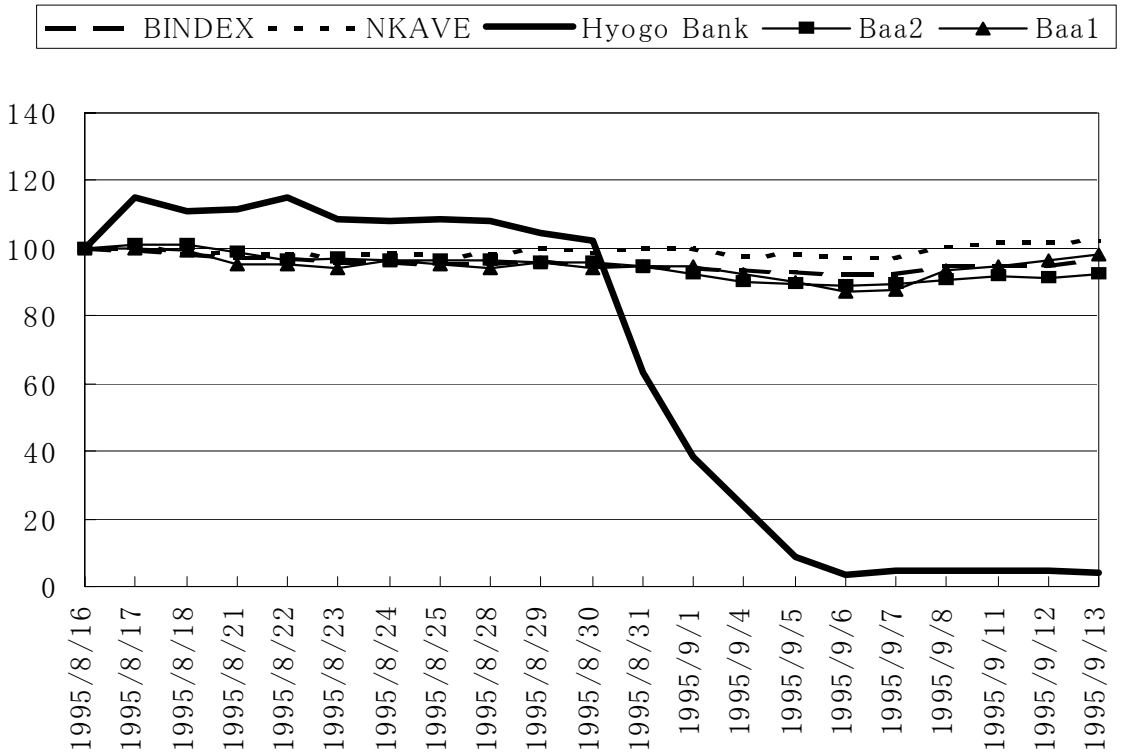

Figure 3 1997/11/17 Hokkaido Takushoku Bank Failure

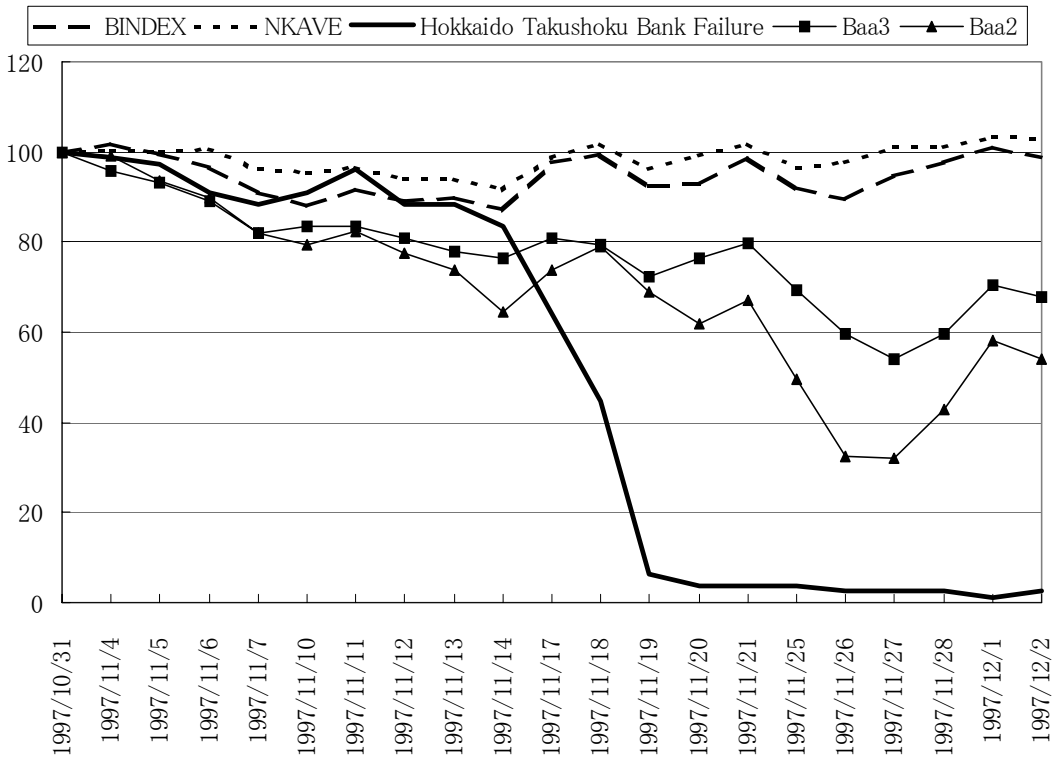

Figure 4 1998/10/23 Long-Term Credit Bank of Japan Nationalization

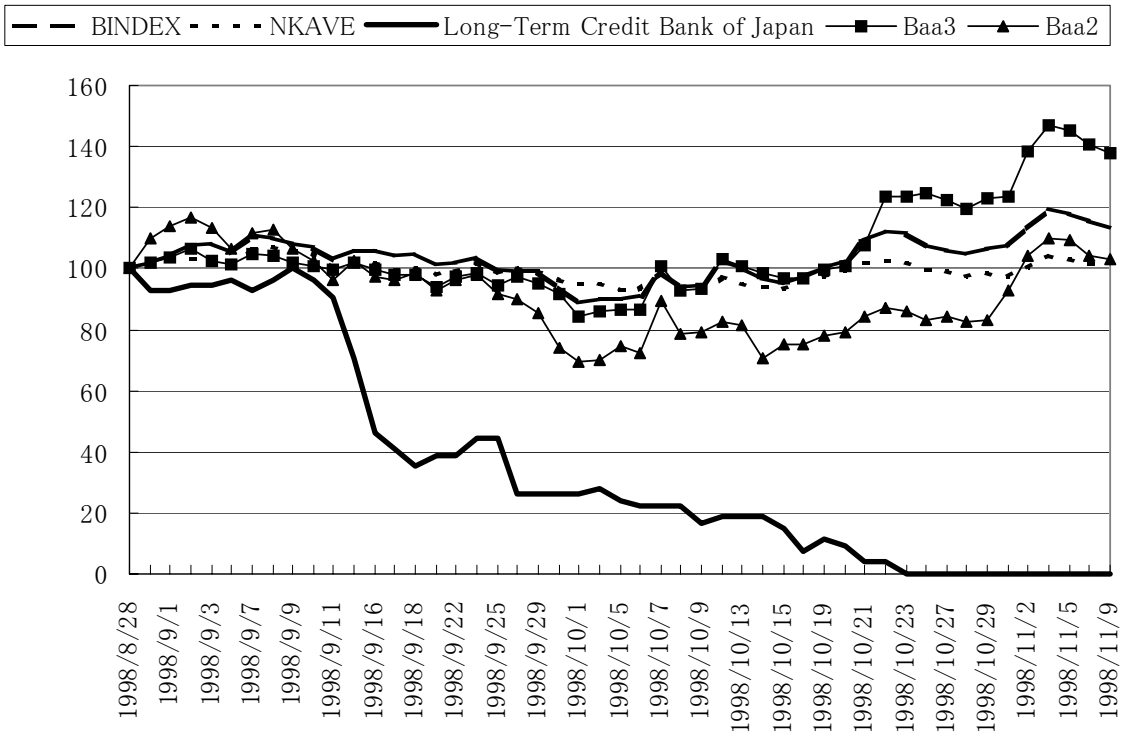

Table 1 Deposits and Nonperforming Loans

Deposit/Asset ratio	1998 Sep.	1999 Mar.	1999 Sep.	2000 Mar.	2000 Sep.	2001 Mar.
DKB	58.4%	54.6%	59.7%	56.0%	59.5%	57.1%
Sakura Bank	60.5%	62.5%	65.5%	62.3%	62.4%	61.7%
Fuji Bank	59.2%	50.5%	52.5%	51.5%	53.3%	49.8%
Bank of Tokyo Mitsubishi	55.5%	53.5%	56.0%	56.3%	52.6%	51.0%
Sanwa Bank	57.0%	56.5%	61.4%	61.6%	59.9%	58.8%
Sumitomo Bank	53.5%	51.1%	52.9%	52.7%	52.0%	46.1%
Capital/Asset ratio	1998 Sep.	1999 Mar.	1999 Sep.	2000 Mar.	2000 Sep.	2001 Mar.
DKB	2.8%	4.4%	4.6%	4.7%	4.9%	4.7%
Sakura Bank	2.6%	4.4%	4.5%	4.6%	4.3%	4.2%
Fuji Bank	2.3%	3.8%	3.8%	3.9%	3.8%	3.5%
Bank of Tokyo Mitsubishi	2.5%	3.5%	3.6%	3.8%	3.9%	3.2%
Sanwa Bank	2.9%	4.1%	4.4%	4.7%	4.1%	3.5%
Sumitomo Bank	2.1%	3.2%	3.3%	3.4%	3.2%	2.7%
NPL/Asset ratio	1998 Sep.	1999 Mar.	1999 Sep.	2000 Mar.	2000 Sep.	2001 Mar.
DKB	1.7%	4.4%	3.9%	3.5%	3.1%	3.3%
Sakura Bank	3.1%	3.6%	3.6%	3.4%	3.3%	2.8%
Fuji Bank	3.3%	3.1%	2.8%	2.7%	2.7%	2.5%
Bank of Tokyo Mitsubishi	2.5%	3.0%	2.7%	2.6%	2.6%	3.8%
Sanwa Bank	2.8%	2.9%	3.1%	2.9%	2.7%	2.7%
Sumitomo Bank	2.7%	4.3%	3.9%	4.1%	4.3%	2.7%

Figure5-1 DKB indicators

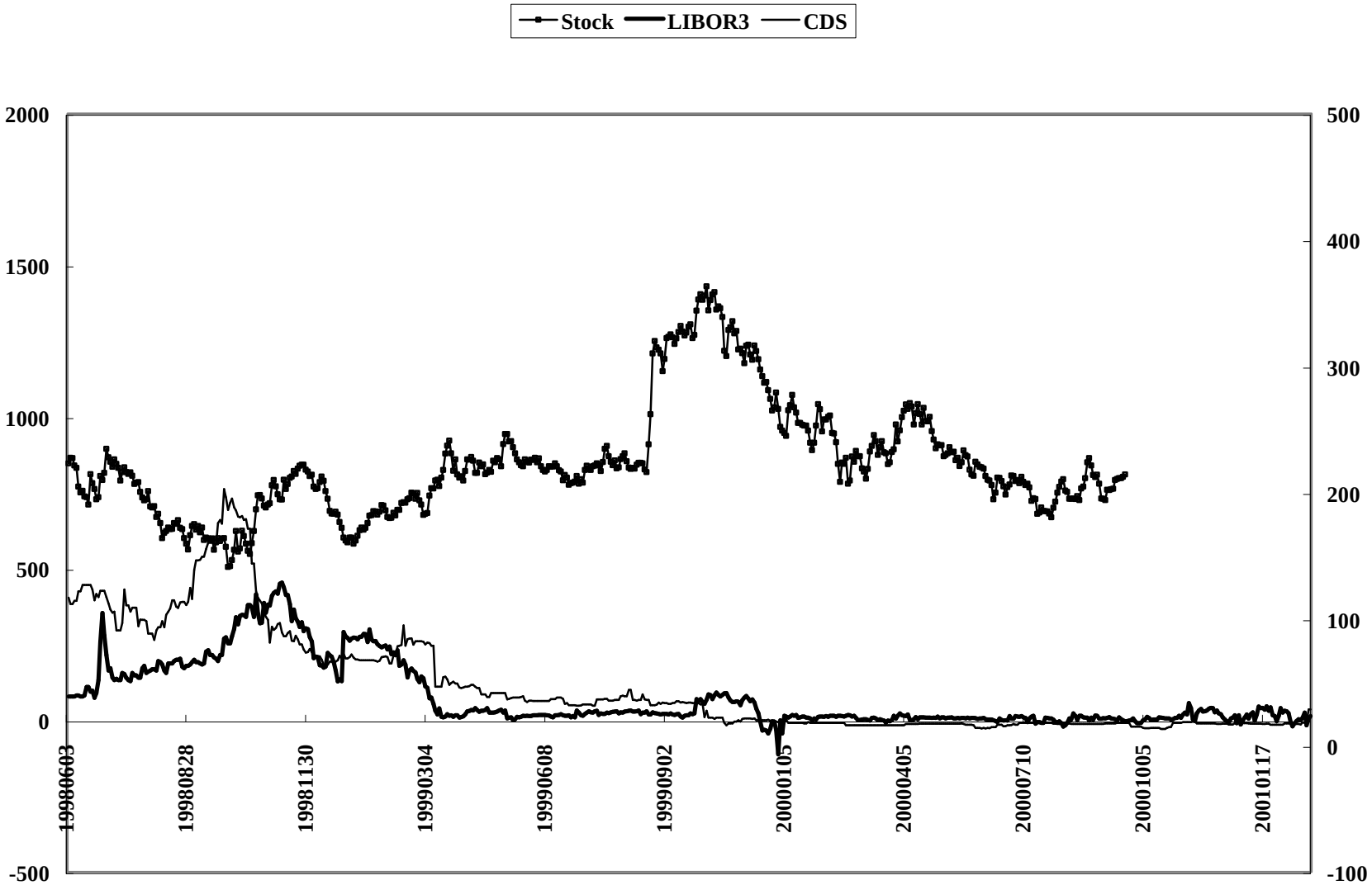

Figure5-2 IBJ indicators

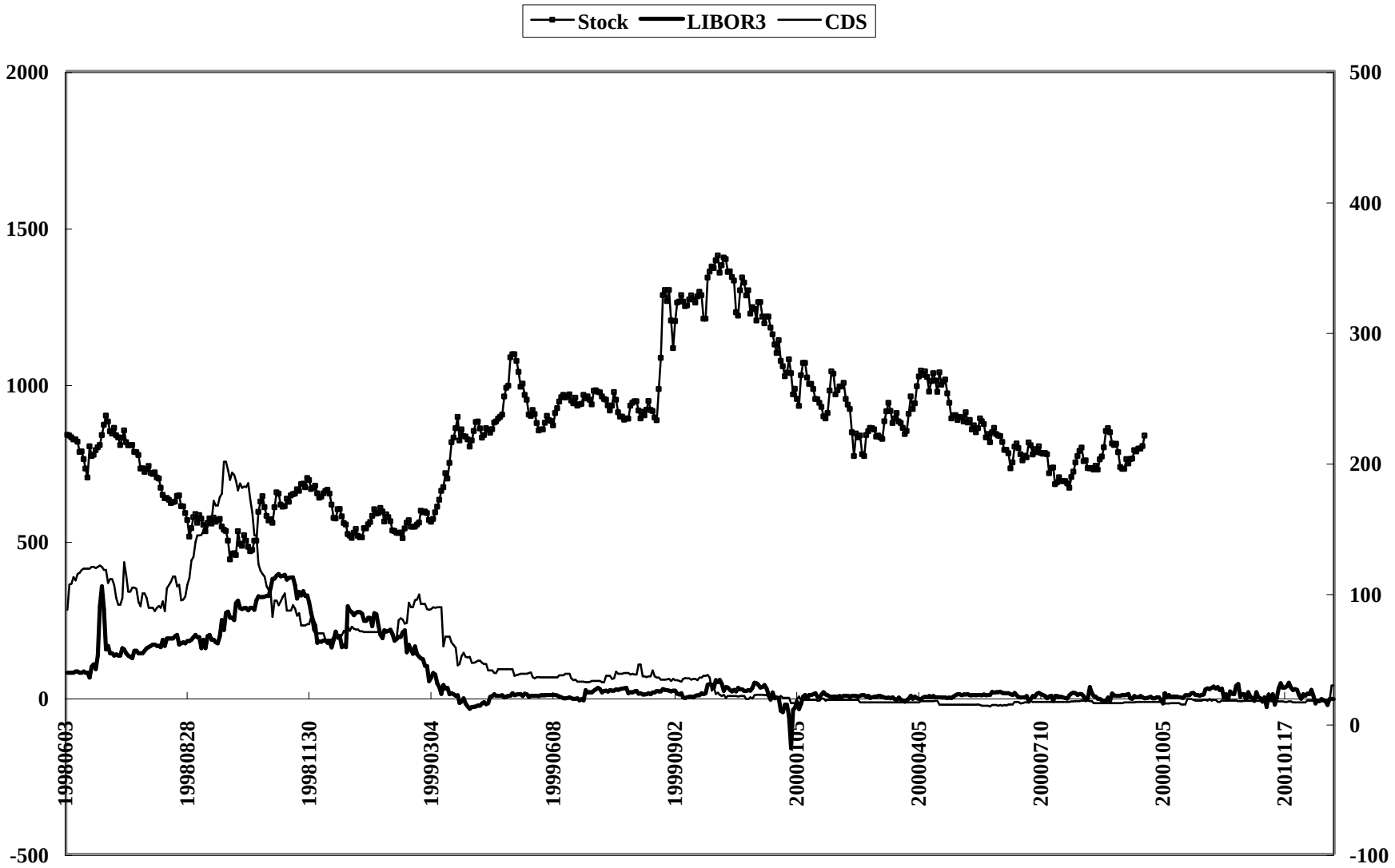

Figure5-3 FUJI Bank Indicators

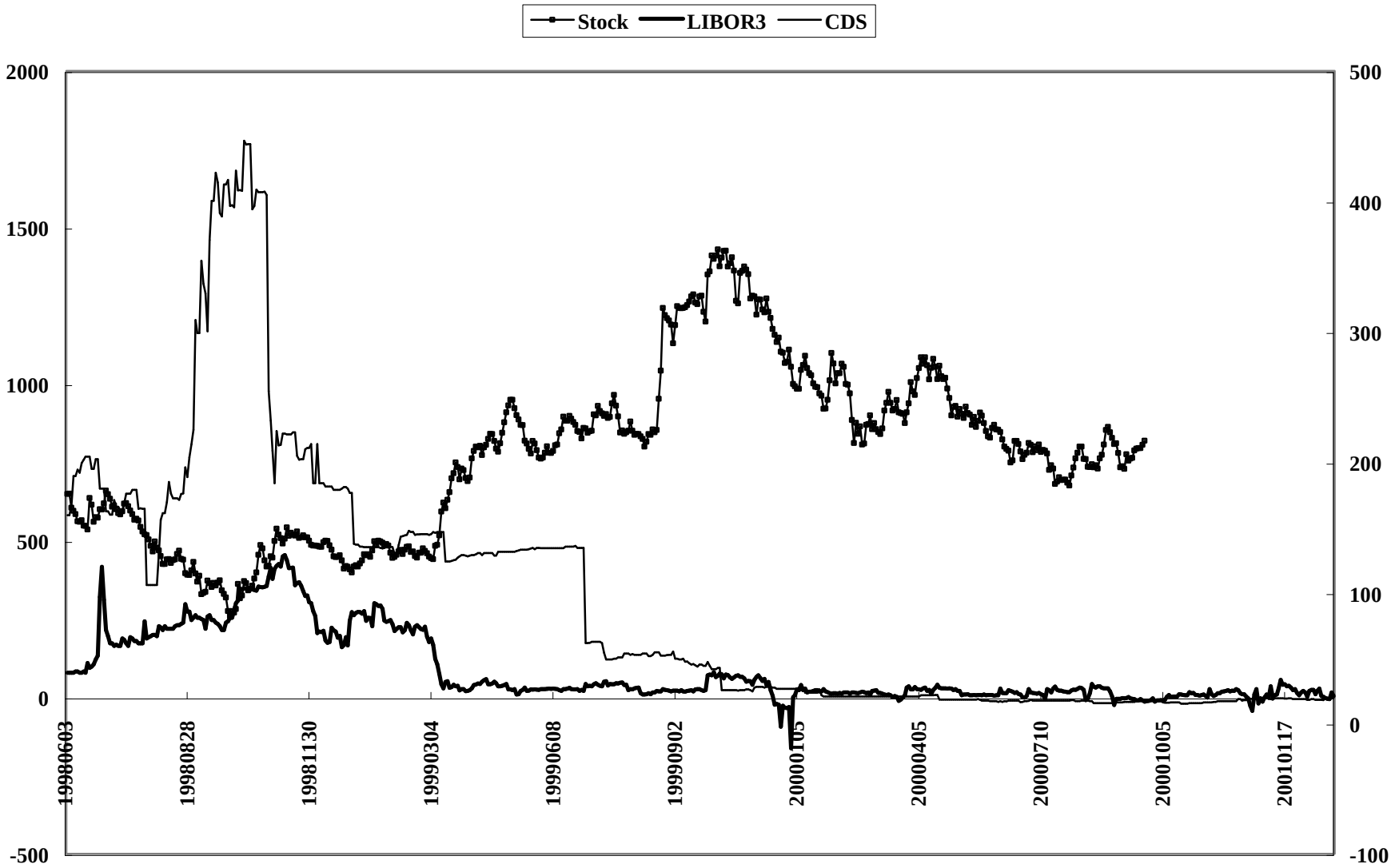

Figure5-4 BTM Indicators

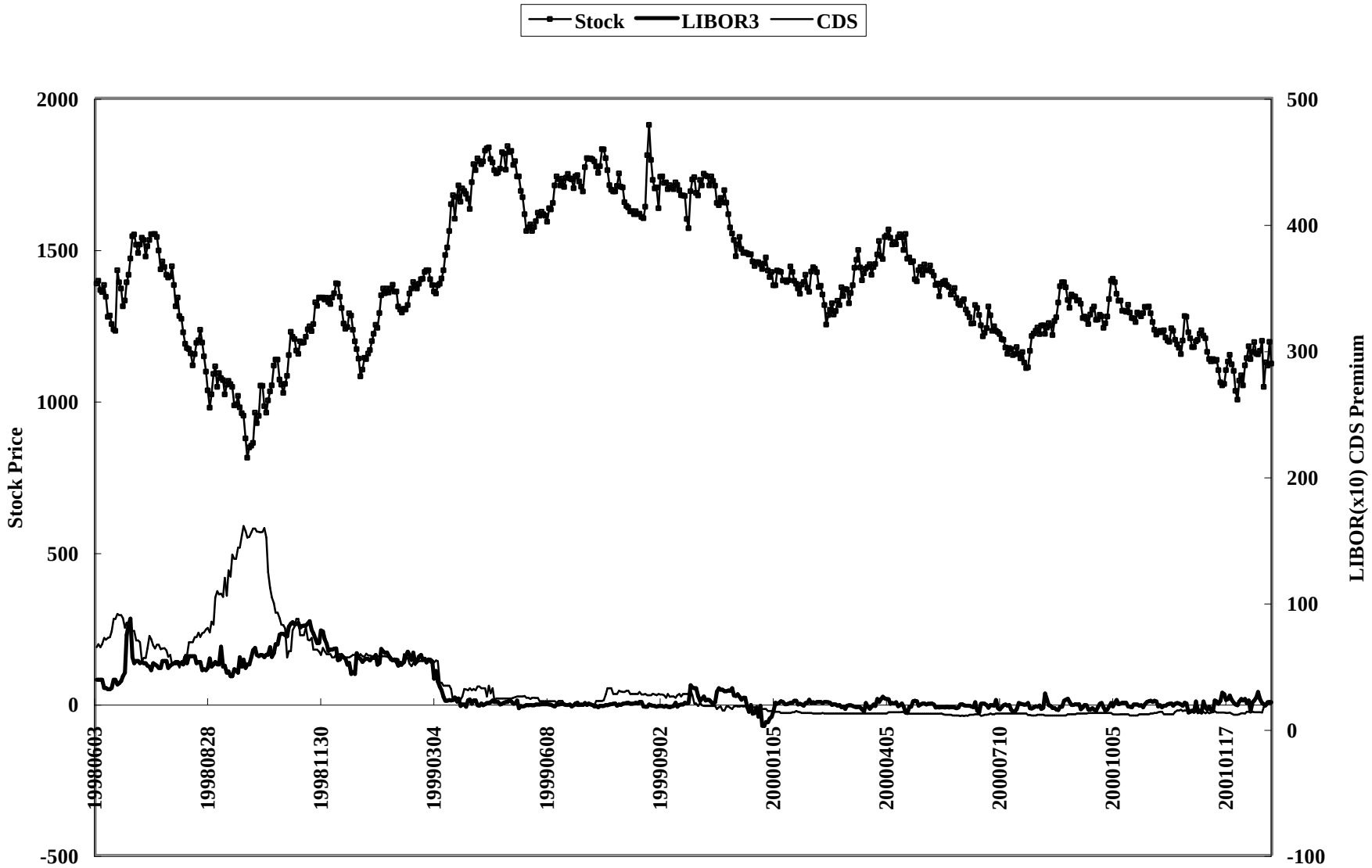

Figure5-5 Sanwa Bank Indicators

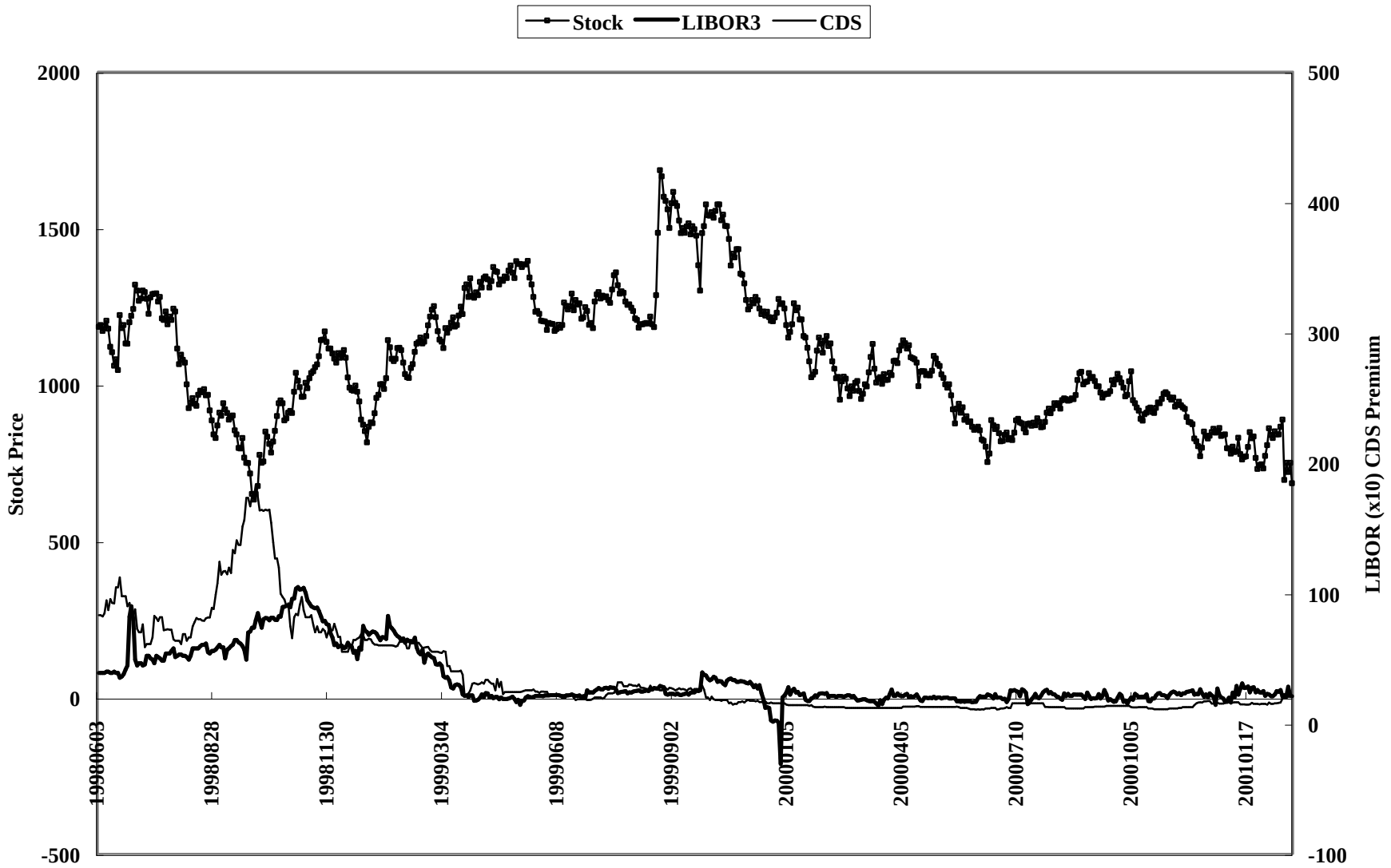

Figure5-6 Sumitomo Bank Indicators

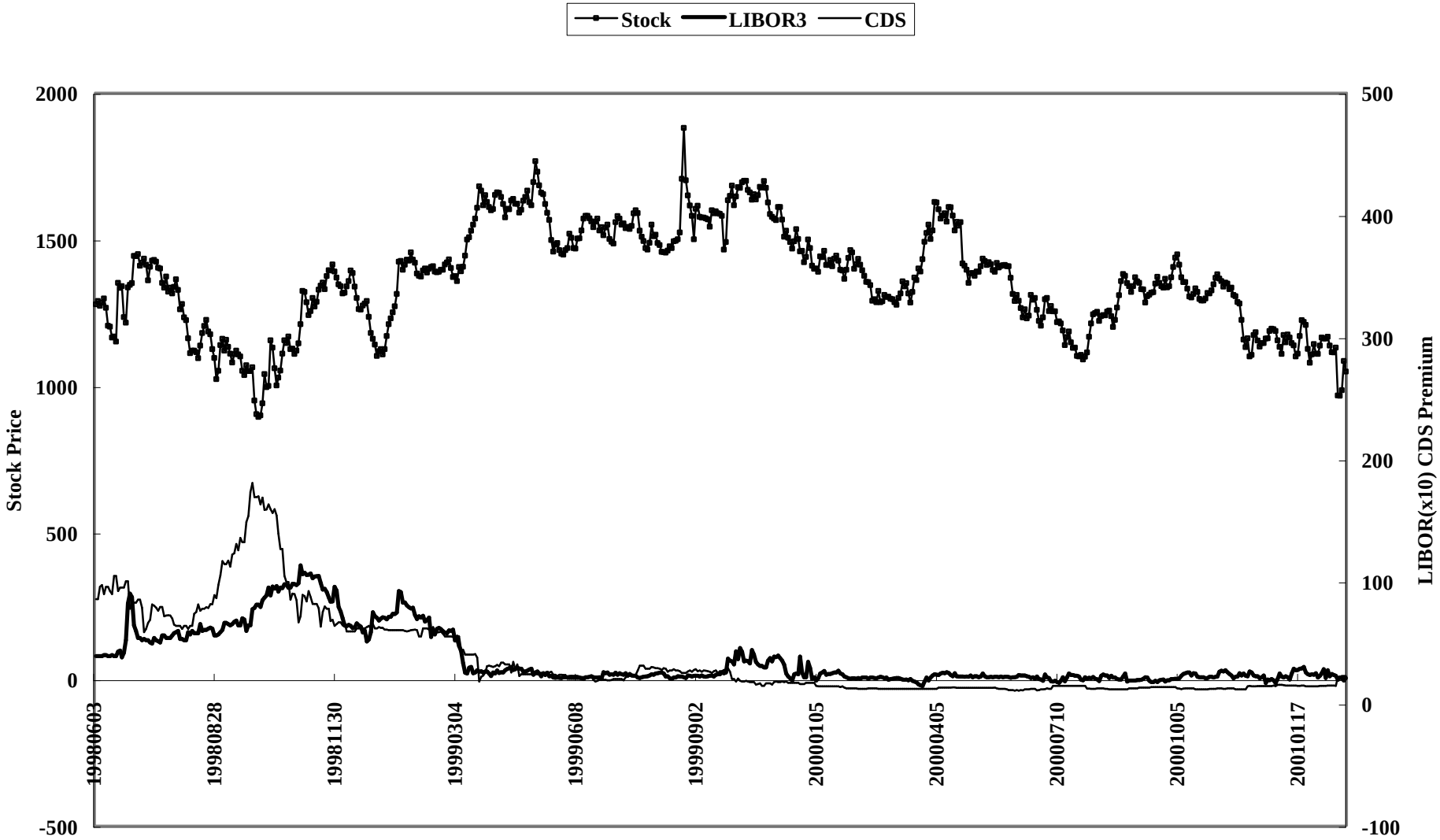

Figure6-1 MizuhoHD Indicators

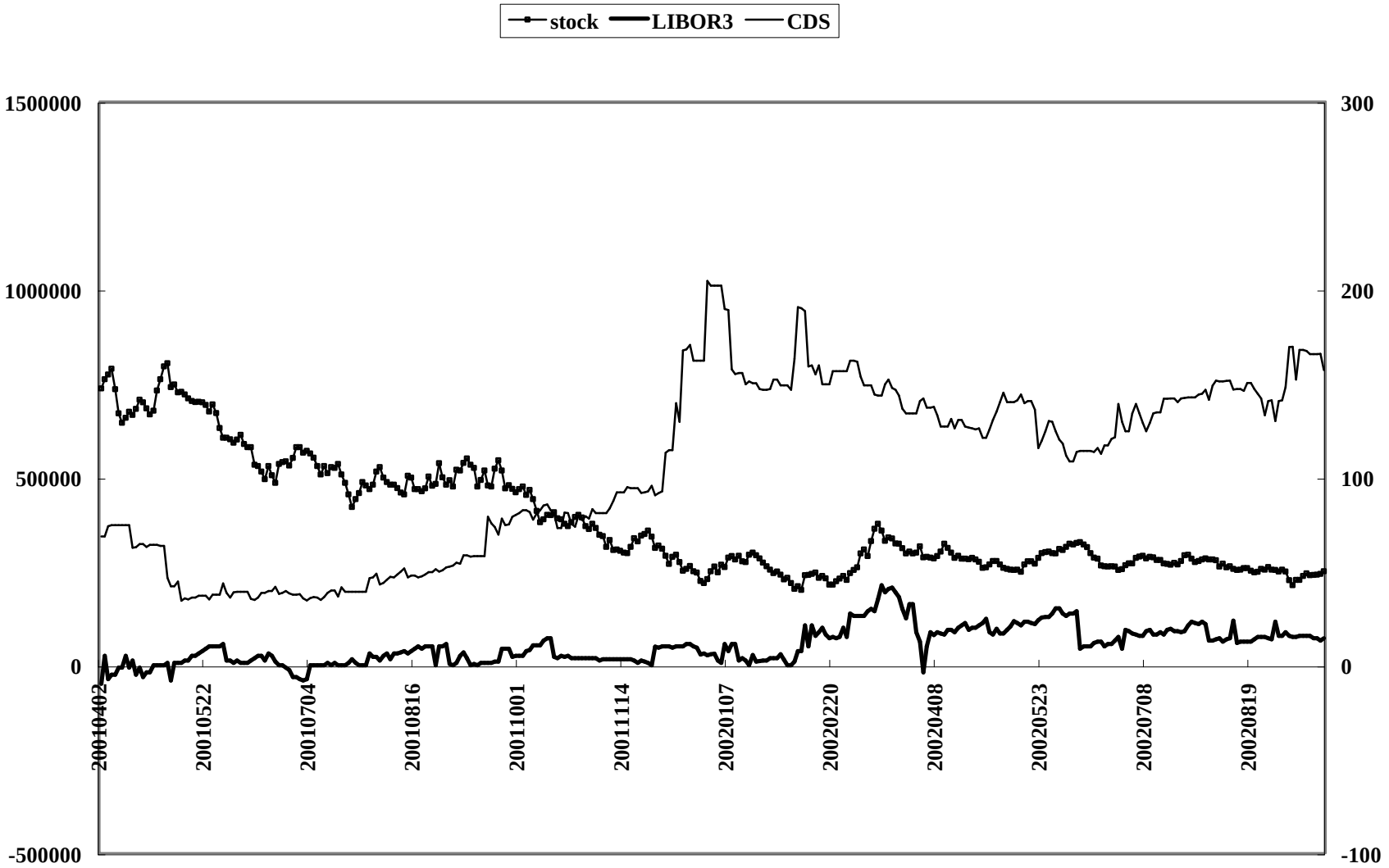

Figure6-2 Mitsubishi Tokyo FG Indicators

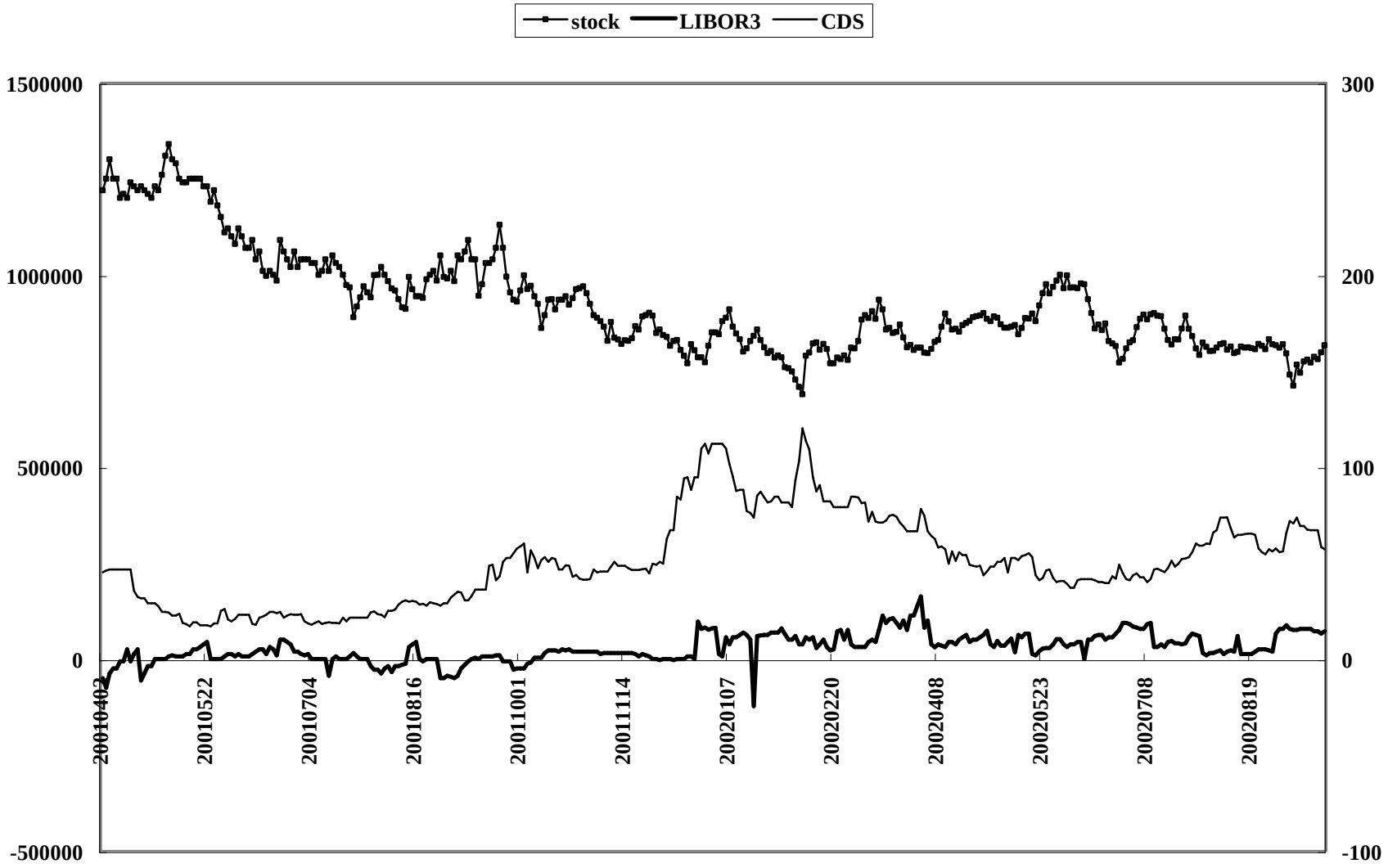

Figure6-3 UFJ Indicators

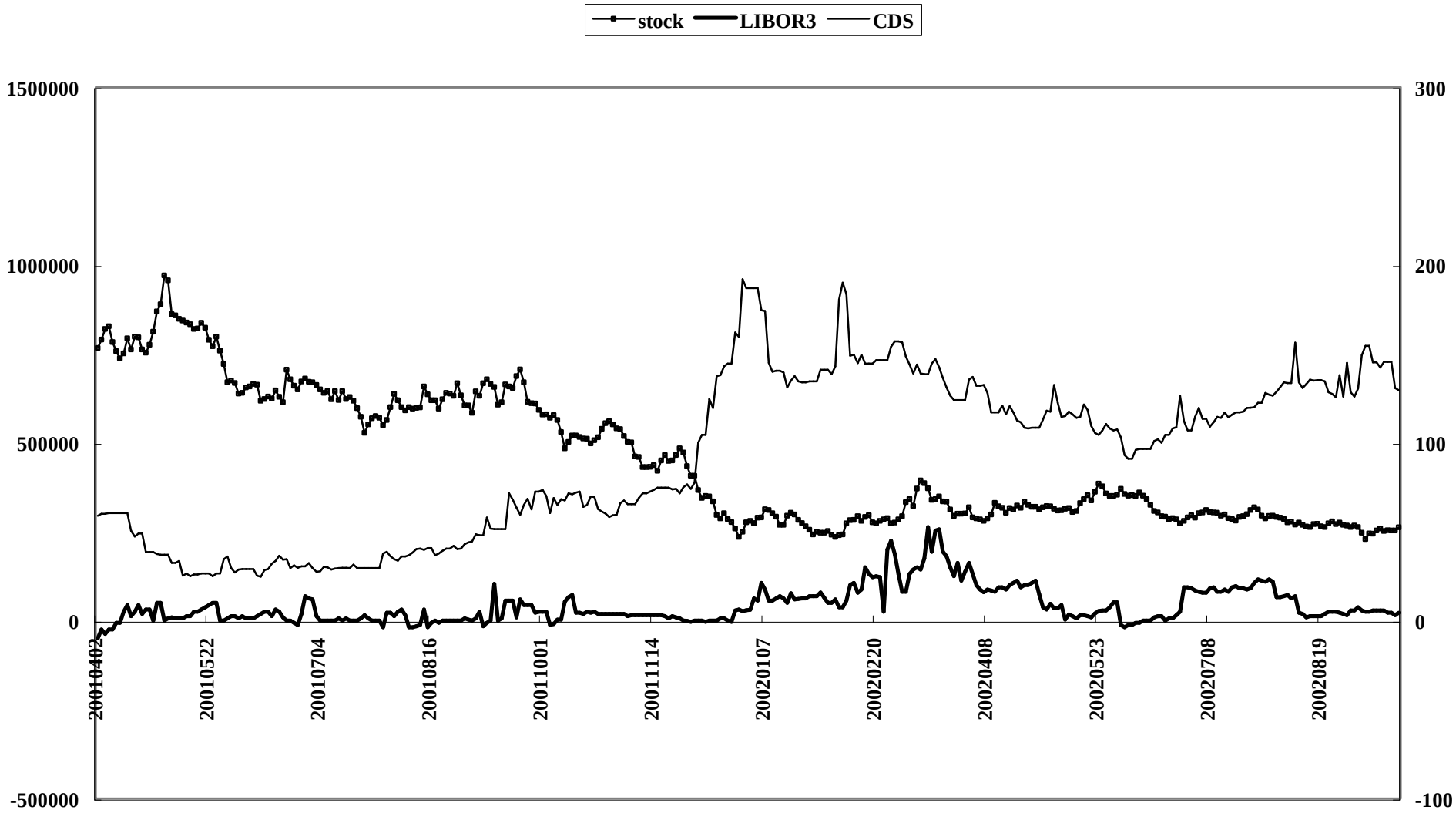

Figure6-4 Sumitomo Mitsui BC Indicators

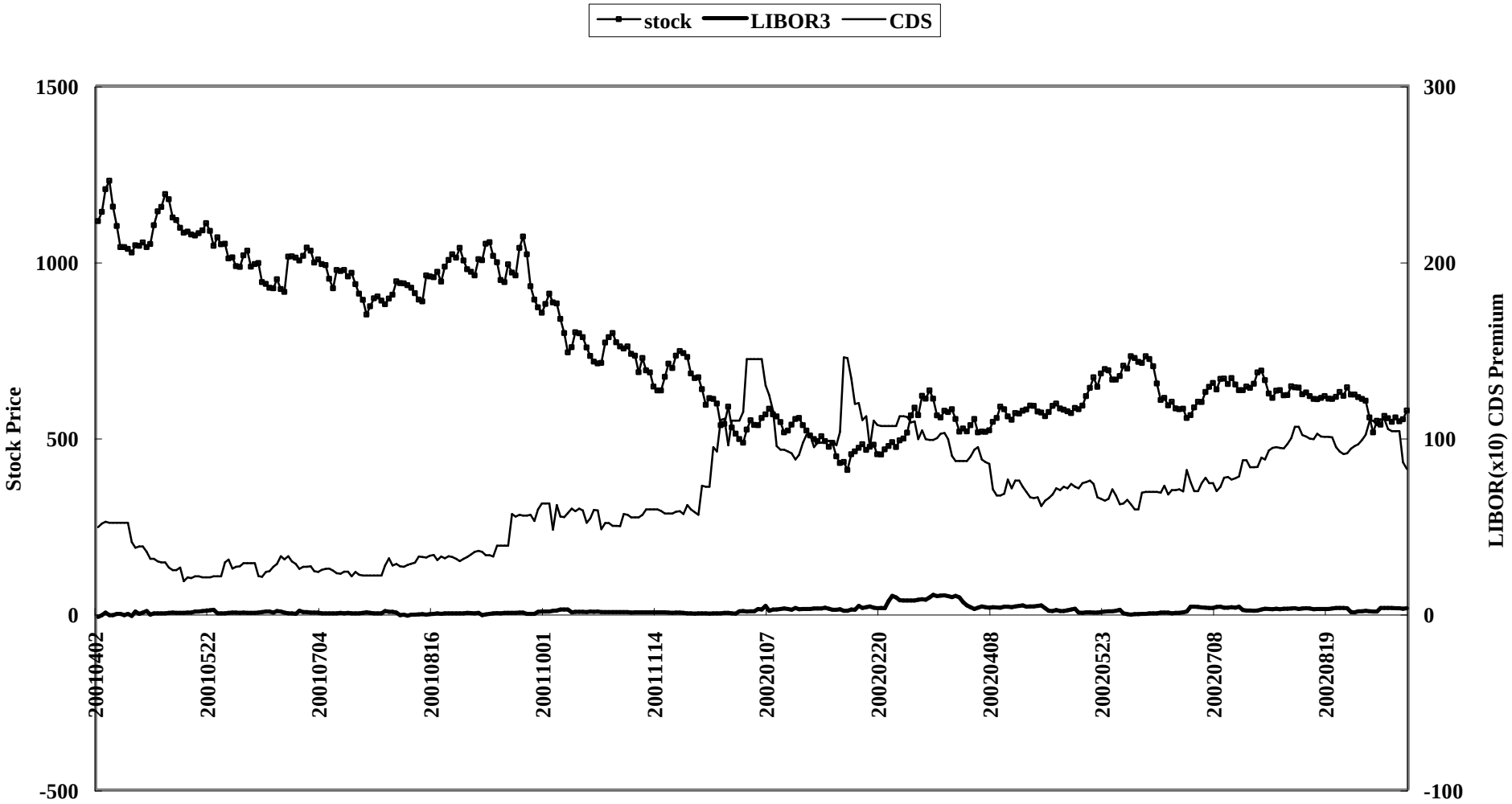

Table 2-A: First sample:

	Stock Prices Level (March 31, 1997), Lowest Level and (Date)				LIBOR Peak		CDS Peak		Credit Rating 1999/4/1 FITCH
	Level 31-Mar-97	Level Lowest	% decline	Lowest Date	Level	Date	Level	Date	
DKB	1310	505	-61.45%	1998/10/1	45.38	1998/11/10	203	1998/8/24	A
IBJ	1260	440	-65.08%	1998/10/1	39.38	1998/11/5	200.5	1998/9/28	A-
Fuji Bank	1430	259	-81.89%	1998/10/1	45.38	1998/11/10	446.5	1998/10/12	A
BTM	1930	811	-57.98%	1998/10/1	27.97	1998/6/30	160.5	1998/9/29	A
Sanwa Bank	1330	632	-52.48%	1998/10/2	35.25	1998/11/5	183	1998/10/5	A
Sumitomo Bank	1470	894	-39.18%	1998/10/2	38.75	1998/11/5	180.5	1998/9/29	A

Table 2-B: Second sample:

	Stock Prices Level (April 2, 2001), Lowest Level and (Date)				LIBOR Peak		CDS Peak		Credit rating 2001/4/1 FITCH
	Level 2-Apr-01	Level, Lowest in the spring of 2002	% decline	Lowest Date	Level	Date	Level	Date	
Mizuho HD	736000	200000	-72.83%	2002/2/6	5.25	2002/3/12	204.5	2001/12/19	A
Mitsubishi Tokyo FG	1220000	689000	-43.52%	2002/2/6	3.25	2002/3/28	120	2002/2/6	A+
UFJ HD	766000	229000	-70.10%	2001/4/5	5.25	2001/12/19	192	2001/12/19	A
SMBC	1114	407	-63.46%	2002/2/6	4.25	2002/3/12	145.5	2002/2/5	A

Table 3 Statistics Summary

First half	Stock price					LIBOR					CDS				
	Average	Range	s.d.	Min.	Max.	Average	Range	s.d.	Min.	Max.	Average	Range	s.d.	Min.	Max.
DKB	847	925	184	505	1430	8.77	56.62	11.35	-11.25	45.37	52.65	189.50	43.59	13.50	203.00
IBJ	836	970	214	440	1410	7.47	55.62	10.86	-16.25	39.37	52.61	187.50	43.61	13.00	200.50
Fuji Bank	772	1171	271	259	1430	9.83	61.62	11.69	-16.25	45.37	106.02	431.00	102.37	15.50	446.50
Bank of Tokyo Mitsubishi	1419	1099	224	811	1910	4.99	35.38	7.93	-7.42	27.96	38.07	150.50	33.70	10.00	160.50
Sanwa Bank	1116	1053	198	632	1685	6.67	56.50	9.24	-21.25	35.25	41.29	172.50	37.32	10.50	183.00
Sumitomo Bank	1387	986	174	894	1880	7.93	41.12	10.07	-2.37	38.75	40.96	170.00	36.72	10.50	180.50
Second half	Stock price					LIBOR					CDS				
	Average	Range	s.d.	Min.	Max.	Average	Range	s.d.	Min.	Max.	Average	Range	s.d.	Min.	Max.
Mizuho HD	385167	603000	151467	200000	803000	1.03	5.25	0.97	-1.00	4.25	104.56	170.25	46.84	34.25	204.50
Mitsubishi Tokyo FG	928292	651000	135726	689000	1340000	0.56	5.71	0.72	-2.46	3.25	50.71	103.00	23.26	17.00	120.00
UFJ HD	453136	741000	187461	229000	970000	0.83	6.25	1.00	-1.00	5.25	91.73	167.25	45.47	24.75	192.00
SMBC	742	822	205	407	1229	0.83	6.25	1.11	-1.00	5.25	66.32	127.25	31.28	18.25	145.50

Table 4 Correlation of (log(stock)-log(TOPIX)) and CDS

	days	DKB(Mizuho	IBJ(Mizuho)	Fuji(Mizuho)	BTM	Sanwa (UFJ)	SumitomoMits
June 1998-Sept 1999	315	-0.588	-0.686	-0.76	-0.88	-0.763	-0.793
Oct 1999 – Sept 2000	216	0.662	0.7	0.81	0.713	0.705	0.557
April 2001 – Sept 2002	352	-0.807			-0.283	-0.903	-0.821

Table 5 Correlation of LIBOR 3M and CDS

	days	DKB(Mizuho	IBJ(Mizuho)	Fuji(Mizuho)	BTM	Sanwa (UFJ)	SumitomoMits
June 1998-Sept 1999	315	0.656	0.655	0.661	0.651	0.719	0.724
Oct 1999 – Sept 2000	216	0.501	0.362	0.394	0.432	0.431	0.704
April 2001 – Sept 2002	352	0.556			0.451	0.529	0.583

Table 6-1 Panel Analysis; Fixed effect

First Half	JP		STOCK	
Variable	(1)		(2)	
CDS	0.101	***	-0.0003	***
	(0.00269)		(0.000032)	
CALL	21.858	***	0.043	***
	(1.02847)		(0.012244)	
R2	0.593498		0.678364	
F1	41.238	***	72.446	***
F2	30.491	***	1058.4	***

Asterisks ***, ** and * denote the significance at 1%, 5% and 10% level respectively.

Second Half	JP		STOCK	
Variable	(1)		(2)	
CDS	0.013	***	-0.001	***
	(0.00064)		(0.000034)	
CALL	-4.839	**	-0.113	
	2.24037		(0.119043)	
R2	0.304329		0.998799	
F1	4.9716	***	198.76	***
F2	10.803	***	38603	***

Asterisks ***, ** and * denote the significance at 1%, 5% and 10% level respectively.

Table 6-2 Pooled OLS

First Half	JP		STOCK	
Variable	(1)		(2)	
Intercept	-0.463	***	-0.103	***
	(0.1726)		(0.00328)	
CDS	0.089	***	-0.001	***
	(0.0024)		(0.000046)	
CALL	24.485	***	0.211	***
	(1.0083)		(0.0192)	
R2	0.574		0.142	
F statistics	38.945	***	480.57	***

Asterisks ***, ** and * denote the significance at 1%, 5% and 10% level respectively.

Second Half	JP		STOCK	
Variable	(1)		(2)	
Intercept	-0.248		2.398	***
	(0.0540)		(0.0816)	
CDS	0.011	***	0.002	***
	(0.00055)		(0.00083)	
CALL	-7.254	***	5.842	*
	(2.201)		(3.3251)	
R2	0.288		0.007	
F statistics	6.9767	***	23771	***

Asterisks ***, ** and * denote the significance at 1%, 5% and 10% level respectively.

Table 6-3 Panel Analysis; Random effect

First Half	JP		STOCK	
Variable	(1)		(2)	
Intercept	-0.738		-0.122	***
	(0.6076)		(0.0416)	
CDS	0.100	***	-0.0003	***
	(0.00267)		(0.000032)	
CALL	21.989	***	0.043	***
	(1.0264)		(0.012243)	
R2	0.572290		0.136677	
Hausman test	3.9776	**	3.3594	*

Asterisks ***, ** and * denote the significance at 1%, 5% and 10% level respectively.

Second Half	JP		STOCK	
Variable	(1)		(2)	
Intercept	-0.139	*	2.733	***
	(0.0841)		(0.6231)	
CDS	0.013	***	-0.001	***
	(0.00063)		(0.000034)	
CALL	-5.221	**	-0.113	
	(2.23067)		(0.11904)	
R2	0.287611		0.00457	
Hausman test	3.3645	*	0.21855	

Asterisks ***, ** and * denote the significance at 1%, 5% and 10% level respectively.

Appendix 1 Credit Derivative trading volume （principal amounts：million dollar）

	June-99	December-99	June-00	December-00	June-01	December-01
OTC total volume	11,159	16,538	14,691	13,281	14,309	17,432
6-month growth (%)		48.2%	-11.2%	-9.6%	7.7%	21.8%
one-year growth (%)			31.6%	-19.7%	-2.6%	31.3%
Credit Default Swaps Total	10,230	12,831	12,248	11,698	12,815	15,127
Credit Default Swaps (Selling)	5,173	3,388	3,259	3,599	4,275	4,357
Credit Default Swaps (Buying)	5,057	9,443	8,989	8,099	8,540	10,770
6-month growth (%)		25.4%	-4.5%	-4.5%	9.5%	18.0%
one-year growth (%)			19.7%	-8.8%	4.6%	29.3%
Total Return Swaps Total	338	2,707	1,630	956	888	1,269
Total Return Swaps (Selling)	65	1,289	459		19	175
Total Return Swaps (Buying)	273	1418	1171	956	869	1,094
Credit Spread Total	36	16				
Credit Spread (Selling)	36	16				
Credit Spread (Buying)						
Credit Link Note Total	502	921	731	561	550	1,024
Credit Link Note (Issurance)	270	629	591	561	144	
Credit Link Note (Purchase)	232	292	140		406	1,024
Others Total	55	55	82	67	55	12
Others Selling）	55	55	55	55		6
Others Buying）			27	12	55	6

Source; BIS Derivative Survey(http://www.boj.or.jp/en/siryo/siryo_f.htm)

Appendix 2 Credit ratings change

		DKB	IBJ	Fuji Bank	BTM	Sanwa Bank (UFJ)	Sumitomo Bank
1994/9/21	Long-term			Upgrade AA			
	Short-term			Affirmed F1+			
	Individual			Affirmed B/C			
	Support			Affirmed 1			
1995/10/19	Long-term		Downgrade AA-				
	Short-term		Affirmed F1+				
	Individual		Downgrade C				
	Support		Affirmed 1				
1995/11/27	Long-term			Downgrade AA-			
	Short-term			Affirmed F1+			
	Individual			Downgrade C			
	Support			Affirmed 1			
1996/3/22	Long-term				New Rating AA		
	Short-term				New Rating F1+		
	Individual				New Rating B/C		
	Support				New Rating 1		
1996/6/27	Long-term	Affirmed AA				Affirmed AA	Affirmed AA
	Short-term	Affirmed F1+				Affirmed F1+	Affirmed F1+
	Individual	Downgrade C				Downgrade C	Downgrade C
	Support	Affirmed 1				Affirmed 1	Affirmed 1
1997/10/27	Long-term	Downgrade AA-			Downgrade AA-	Downgrade AA-	Downgrade AA-
	Short-term	Affirmed F1+			Affirmed F1+	Affirmed F1+	Affirmed F1+
	Individual	Affirmed C			Affirmed B/C	Affirmed C	Affirmed C
	Support	Affirmed 1			Affirmed 1	Affirmed 1	Affirmed 1
1997/11/13	Long-term		Downgrade A+	Downgrade A+			
	Short-term		Downgrade F1	Downgrade F1			
	Individual		Downgrade C/D	Downgrade C/D			
	Support		Affirmed 1	Affirmd 1			
1997/12/2	Long-term	Downgrade A+				Downgrade A+	Downgrade A+
	Short-term	Downgrade F1				Downgrade F1	Downgrade F1
	Individual	Affirmed C				Affirmed C	Affirmed C
	Support	Affirmed 1				Affirmed 1	Affirmed 1
1998/5/20	Long-term	Downgrade A	Downgrade A	Downgrade A	Downgrade A+	Downgrade A	Downgrade A
	Short-term	Downgrade F1	Affirmed F1	Affirmed F1	Downgrade F1	Affirmed F1	Affirmed F1
	Individual	Downgrade C/D	Affirmed C/D	Downgrade D	Downgrade C	Downgrade C/D	Downgrade C/D
	Support	Affirmed 1	Affirmed 1	Affirmd 1	Affirmed 1	Affirmed 1	Affirmed 1
1999/2/10	Long-term	Affirmed A	Downgrade A-		Downgrade A	Affirmed A	
	Short-term	Affirmed F1	Affirmed F1		Affirmed F1	Affirmed F1	
	Individual	Downgrade D	Downgrade D		Downgrade C/D	Downgrade D	
	Support	Affirmed 1	Affirmed 1		Affirmed 1	Affirmed 1	
2000/4/20	Long-term		Upgrade A				
	Short-term		Affirmed F1				
	Individual		Affirmed D				
	Support		Affirmed 1				
2000/6/16	Long-term					Affirmed A	
	Short-term					Affirmed F1	
	Individual					Affirmed D	
	Support					Affirmed 1	

2000/7/5	Long-term									Affirmed	A	
	Short-term									Affirmed	F1	
	Individual									Affirmed	D	
	Support									Affirmed	1	
2000/9/27	Long-term	Affirmed	A	Affirmed	A	Affirmed	A	evision Outlo	A	evision Outlo	A	
	Short-term	Affirmed	F1	Affirmed	F1	Affirmed	F1	Affirmed	F1	Affirmed	F1	
	Individual	Affirmed	D	Affirmed	D	Affirmed	D	Affirmed	C/D	Affirmed	D	
	Support	Affirmed	1	Affirmed	1	Affirmed	1	Affirmed	1	Affirmed	1	
2000/11/10	Long-term									Affirmed	A	
	Short-term									Affirmed	F1	
	Individual											
	Support											
2000/11/14	Long-term							Affirmed	A			
	Short-term							Affirmed	F1			
	Individual							Affirmed	C/D			
	Support							Affirmed	1			
2000/12/1	Long-term							Revision Outlo	A+			
	Short-term											
	Individual											
	Support											
2001/3/14	Long-term											
	Short-term											
	Individual	ating Watch (	D	ating Watch (	D	ating Watch (	D	ating Watch (	C/D	ating Watch (	D	
	Support											
2001/3/30	Long-term							Affirmed	A+	Affirmed	A	
	Short-term							Affirmed	F1	Affirmed	F1	
	Individual							Affirmed	C/D	Affirmed	D	
	Support							Affirmed	1	Affirmed	1	
2001/8/6	Long-term	Affirmed	A	Affirmed	A	Affirmed	A	Affirmed	A+	Affirmed	A	
	Short-term											
	Individual	Downgrade	D/E	Downgrade	D/E	Downgrade	D/E	Downgrade	D	Downgrade	D/E	
	Support											
2001/9/18	Long-term	Affirmed	A	Affirmed	A	Affirmed	A					
	Short-term	Affirmed	F1	Affirmed	F1							
	Individual	Affirmed	D/E	Affirmed	D/E	Affirmed	D/E					
	Support	Affirmed	1	Affirmed	1	Affirmed	1					
2001/11/26	Long-term	Downgrade	A-	Downgrade	A-	Downgrade	A-	Downgrade	A	Downgrade	A-	
	Short-term	Downgrade	F2	Downgrade	F2	Downgrade	F2	Affirmed	F1	Downgrade	F2	
	Individual	Affirmed	D/E	Affirmed	D/E	Affirmed	D/E	Affirmed	D	Affirmed	D/E	
	Support	Affirmed	1	Affirmed	1	Affirmed	1	Affirmed	1	Affirmed	1	

Ratings history data are obtained from the FITCH Ratings, that contains International long- and short term ratings, individual and support ratings.
The below is based on the definition given by FITCH. Long- and short-term ratings assess its general creditworthiness on a senior basis.
The difference between long- and short- is the maturity of obligations. A short-term rating has a horizon of less than 12 months.
Therefore short-term ratings place emphasis on the liquidity necessary.
The individual ratings assess how a bank would be viered if it were entirely independent and could not rely on ecternal support.
Individual ratings therefore are for management of risk, and the likelihood that it would run into significant difficulties.
Support ratings are not about the quality of a bank, but they are the assessment of whether the bank would receive support.

Appendix 3 Genuine Capital Ratio (at September 30,2001)

As percentage of weighted assets

	Tier 1 capital	Publicfunds	Pref securities	Other pref.cap	Tax effect	Genuine Tier 1
DKB	5.52%	2.09%	0.00%	0.00%	2.26%	1.17%
IBJ	5.95%	1.32%	1.13%	0.00%	1.84%	1.67%
Fuji Bank	4.73%	1.94%	0.48%	0.38%	2.39%	-0.45%
Bank of Tokyo Mitsubishi	5.18%	0.00%	0.00%	0.51%	1.80%	2.87%
Sanwa Bank	5.45%	1.80%	0.54%	0.45%	1.94%	0.73%
Sumitomo Bank	6.04%	1.93%	1.24%	0.00%	2.51%	0.37%

*“Genuine”Tier 1 capital excludes preferred instruments and tax effect.
Source: Fitch Ratings.

Appendix 4 Genuine Capital Ratio (at September 30,2002)

As percentage of weighted assets

	Tier 1 capital	Excluding 90% of Tax Effec	Less Public Fund	GenuineTier1*
Mizuho HD	5.27%	3%	0.45%	-0.99%
Mitsubishi Tokyo FG	5.24%	4%	3.57%	2.86%
UFJ HD	5.77%	3%	0.26%	-1.83%
SMBC	5.37%	3%	0.45%	-1.21%

*"Genuine"Tier 1 capital excludes preferred instruments and tax effect.

Source: Fitch Ratings.

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