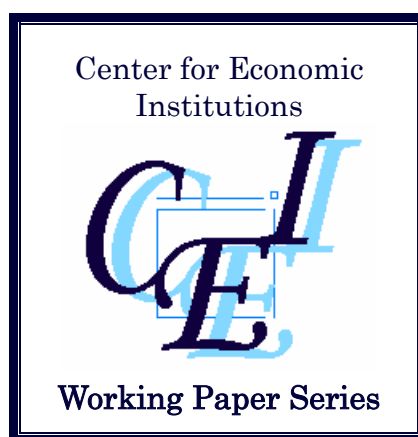


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***Japan's Banking Crisis:  
Who has the Most to Lose?***

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# **Japan's Banking Crisis: Who has the Most to Lose?**

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## **Abstract**

Japan has experienced a deep and prolonged banking crisis in the 1990s. In this paper we attempt to identify the characteristics of companies which have the most to lose from the banks' malaise. Using stock price data, we calculate abnormal returns of non-financial companies around significant dates in the history of the banking crisis, starting in 1995. The events we study include various government actions to address the crisis, downgrading of banks by international rating agencies, and bank mergers. We find that not all companies are equally sensitive to events in the banking sector. The most affected are small companies, with low profits, in low-tech sectors, with high leverage and limited access to bond markets. These findings are consistent with macroeconomic "credit crunch" theories according to which small companies with limited reputation are the most affected when banks reduce lending. Our results are also in line with theories suggesting that bank debt is not very important for financing innovation.

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## **Introduction**

Japan has experienced a deep and prolonged banking crisis. Estimates of the magnitude of the crisis vary (Hoshi and Kashyap, 2001), but it is evident that the problem of non-performing loans is severe, and that the ability of banks to provide capital to corporate clients is substantially impaired. In this paper we argue that the macroeconomic crisis in Japan, and the banks' restricted lending ability, have not affected everybody equally. Some sectors, and some companies, continue to do quite well. At the same time, relatively small companies, with limited access to bond markets and a heavy debt burden, suffer more. We also observe that companies in industries where R&D intensity is relatively high are not very sensitive to the troubles of the banking sector. Our results are therefore consistent with a large macroeconomic literature that identified small companies as being especially sensitive to restrictive monetary policy. Our results are also consistent with the financial economics literature according to which R&D intensive industries are not very dependent on bank finance. An optimistic conclusion that can be drawn from this analysis is therefore that the Japanese banking crisis may lead to some "creative destruction" of weak companies in low-tech sectors, a process which is not necessarily detrimental to the Japanese economy.

Casual observation of stock price indexes for different industries in Japan suggests that not all sectors have suffered equally (Figure 1). Some industries, such as transportation equipment, electronics, or precision instruments, have fared much better than others (e.g. real estate, construction and textiles). This indicates that industries, and perhaps firms, of different characteristics, exhibit different degrees of sensitivity to a crisis-driven credit crunch. To investigate these issues, we assemble data on stock price

responses of non-financial firms to events related to the banking sector. The events we study include various government actions in relation to the banking sector, downgrading of banks by the two major international rating agencies (Moody's and S&P), and bank mergers (Japan has experienced a consolidation wave in recent years). All these events may affect the ability of banks to offer credit. Around each event, we estimate cumulative ten-day abnormal returns for a sample of roughly 800 listed non-financial companies. We then relate the abnormal returns to firm characteristics such as size, "quality" (Tobin's  $q$ ), leverage, R&D intensity, bond rating, and measures of the strength of bank-firm ties. This enables us to characterize companies that are most sensitive to the malaise of the banking sector.

The present paper is naturally related to the large literature on bank-firm relationships. More specifically, it is closely tied to the financial economics literature that investigates the stock price response of companies to the distress of banks with which they maintain a relationship, using event study methodology. Notable among these studies are Slovin, Sushka, and Polonchek (1993, US data), Bae, Kang and Lim (2002, Korean data), Djankov, Jindra, and Klapper (2001, data from several Asian countries), and Ongena, Smith, and Michalsen (2002, Norwegian data). Two studies apply this methodology to bank failures in Japan. Yamori and Murakami (1999) study the stock price response of clients of the failed Hokkaido Takushoku Bank. Brewer et al. (2002), which is closest to the present study, examine, in addition to the failure of Hokkaido Takushoku, the responses of client firms to the failures of the LTCM and NCB. The main result that emerges from the literature on bank distress and client firms' stock returns is that (with the exception of Norway), there is usually a negative stock price response of

client firms to bank troubles, which is interpreted as evidence of the importance of bank-firm relationships. With the exception of Brewer et al. (2002), none of these studies attempts to distinguish between the stock price responses of different types of firms. The present paper therefore contributes to this literature in two ways. First, like Brewer et al. (2002), we focus on the differential response of firms with different characteristics. Among the firm characteristics that we examine, R&D intensity and bond rating have not been studied before. Second, the present paper differs from the existing studies of this type in the scope of the events we study. Unlike previous studies, we do not focus on bank failures, but rather include a large number and variety of positive and negative events related to the banking crisis and to the ability of banks to offer new loans.

The paper is also related to another line of research in financial economics, according to which different types of finance are appropriate for different types of economic activities. One conclusion that emerges from this literature, which is supported by our findings that firms in R&D intensive sectors are not very sensitive to bank-related events, is that R&D activity rarely relies on bank finance (Allen and Gale, 2000, Carlin and Mayer, 2002).

The macroeconomic literature on (monetary policy and) “credit crunch” is also related to our work. For our purposes, the main relevant conclusion from this literature is that small firms, as well as firms with limited access to financial markets, are more sensitive to changes in available bank credit (because of shifts in monetary policy) than are bigger and more reputable firms. (See, for example, Gertler and Gilchrist, 1994, or Kashyap, Stein, and Wilcox, 1993). The present paper can therefore be viewed as an

attempt to connect the financial economics and macro schools of thought, and offer some conclusions on the type of firms, which are most sensitive to banking crises.

Finally, the paper is, of course, also related to studies of the Japanese banking crisis and its impact on firm behavior. Gibson (1995 and 1997) estimates the sensitivity of corporate investment in Japan to banking troubles, reaching ambiguous conclusions. Kang and Stulz (2000) argue that firms with strong bank ties were hardest hit by the crisis of the (early) 1990s. Klein, Peek, and Rosengren (2002) show that FDI activity of Japanese firms in the US was affected by the health of the firms' banks.

The rest of the paper is organized as follows. The next offers a brief chronology of the Japanese banking crisis since the mid-1990s. Section III describes our data set, which consists of stock price data, financial reports, measures of bank-firm relationships, and newspaper clips. The event study technique we use is also discussed in this section. The results are presented in Section IV, and Section V concludes.

## **II. A Brief Chronology of the Japanese Banking Crisis, 1995-2000<sup>1</sup>**

In this section we briefly outline some of the major developments in the Japanese banking sector in the second half of the 1990s. The period can be divided into three sub-periods:

### *Phase I (Mid 1995 - Fall 1997): The Emergence of Banking Troubles*

The problems of the banking sector first became apparent in mid-1995, when two large credit unions and a regional bank failed as a result of bad loans. These failures were

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<sup>1</sup> This section is based, in part, on Peek and Rosengren (2001), Ito and Harada (2000), Nakaso (2001), as well as on unpublished data collected by Jenny Corbett, the on-line archives of the New York Times and several other journals.

followed by the Daiwa scandal in the fall of that year. This period witnessed also the *Jusen* crisis, when housing loan companies ran into severe difficulties as a result of the decline in land prices. The resolution of the crisis was costly and involved the use of both public private funds. Out of losses of 6410 billion yen, 55 percent (3500 billion yen) were born by the *Jusen* founding banks, 27 percent (1700 billion yen) by lending banks, 8 percent (530 billion yen) by agricultural financial institutions, and only the remaining 10 percent (680 billion yen) were covered by the government.

As a result of these developments, the “Japan Premium” on the cost of debt of Japanese banks first appeared in Euro markets. Bank stock prices declined relative to other stocks starting around the end of 1995 (see Figure 1), and rating agencies began to downgrade Japanese banks. The credit ratings of major banks were AA or higher in the early 1990s; following the *Jusen* crisis and some bank bailouts, many banks were downgraded. For example, the Long Term Credit Bank of Japan (LTCB), Nippon Credit Bank (NCB), Hokkaido Takushoku Bank (HTB) and Daiwa were downgraded from A all the way to BBB (see Appendix A).

At the end of fiscal year 1995, “loans under risk management,” published by each bank, amounted to 21.9 trillion yen, almost twice the amount a year earlier.<sup>2</sup> This triggered some government attempts to strengthen the supervision of the banking sector, which, at the time, was the responsibility of the Ministry of Finance.

### *Phase II (End of 1997 – March 1999): Financial Crisis*

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<sup>2</sup> These include loans to failed firms, loans on which payments have been suspended, and loans with “relaxed conditions,” see Hoshi and Kashyap (2001).

Macroeconomic conditions started to deteriorate in April 1997, when consumption taxes were raised. The first bank failure and the onset of the financial crisis occurred in November 1997. On November 3, Sanyo Securities defaulted in the inter-bank loan market, delivering a serious shock to the market. This was followed by the collapse of Hokkaido Takushoku Bank in mid-November, and Yamaichi Securities, one of the four large securities houses, at the end of that month. This resulted in an increase in the Japan Premium and a further decline in bank stock prices. International rating agencies continued to downgrade the Japanese banks, and the credit rating of some major banks became as low as BBB, or even BB.

In view of the impending financial crisis, the Japanese government sought to ameliorate the under-capitalization of the banks by injecting capital to the banking sector took in March 1998. The newly created Financial Crisis Management Committee handled this capital injection, which had a calming effect on financial markets until May. However, financial markets were apparently not convinced that the banking problems had been definitely dealt with. The LTCB crisis, the largest bank failure in Japan's postwar history further threatened financial stability.

In order to cope with the crisis, the government attempted, starting in mid-1998, to pass several reform bills. One of these bills was the Financial Revitalization Act, which was designed to deal with failed financial institutions. Under this law, a failed bank could either be placed under Financial Reorganization Administration (FRA), or could be temporarily nationalized. This law formed the basis for the government's decision in late 1998 to nationalize LTCB and NCB, both on the verge of bankruptcy.



Another bill passed during this period was the Financial Function Early Strengthening Law (*Soki Koznka-Ho*, English term from Nakaso, 2001). This bill replaced an earlier legislation of February 1998, under which capital injection into viable banks using public money could take place. The Financial Reconstruction Commission was established in order to operate the entire safety net under the new laws, ranging from dealing with bank failures to capital injections. Within this new framework, available funding was doubled and, using a larger volume of public funds, the government hoped to convey a clear commitment to cope with the non-performing loan problem.

In addition, government supervision of the banking sector seems to have improved during this period. The establishment of the Financial Supervision Agency (FSA, *Kinyu Kantoku-cho*) in June 1998 shifted the responsibility of financial supervision from the Ministry of Finance to an independent entity.

### *Phase III (April 1999 - End of 2001): The Merger Wave*

No outright financial collapse occurred in Japan during this period, despite the prolonged crisis. The Japan Premium declined starting in spring 1999, in part because of the government's capital injections and other measures designed to improve bank health, and in part because of a certain improvement in the performance of the Japanese economy in the fourth quarter of 1999.

The most striking characteristic of this phase was the big consolidation wave among major banks, with merger announcements starting in the summer 1999. The first large merger plan was the announcement of the formation of the Mizuho group, which was followed by other large major banks. This merger movement included not only city

banks, but also trust banks and securities companies within newly established financial groups (see Appendix B).

An important catalyst for the rapid transformation of the Japanese banking industry was the “Big Bang” plan, aiming to thoroughly deregulate Japan’s financial system. This plan, which was announced in November 1996, constituted the last step in the deregulation process, which originated in the late 1970s. An important feature of the Big Bang was the removal of restrictions that separated banking, securities business, and insurance operations. As a result, Japanese banks began to seek partners in order to survive in a fiercely competitive domestic and international financial environment.

Another driving force behind the merger wave was the public funds injected to large banks and the restructuring plan submitted to the government in Phase II. Injected public funds often took the form of preferred stocks, so that the government could exercise stronger control of bank management if a bank failed to fulfill the restructuring plan, or could not pay dividends on these preferred stocks. Consequently, banks attempted to increase profitability by merging with other banks and by restructuring their operations and organization. For example, Mizuho Holdings planned to reduce costs by closing 170 domestic and 60 overseas branches. By April 2001, as a result of this merger wave, the 13 “city banks” which existed in early 1993 had been reduced to five.

Nevertheless, by the end of 2000, economic conditions deteriorated again, the volume of non-performing loans remained high, and the allowance for loan losses seemed insufficient (Table 1). The government apparently lost some of the zeal to deal with non-performing loans, and the continuous asset price deflation made things even worse. Investors’ concerns about the problems of the banking sector caused a continuous

increase in the performance difference between bank stocks and the rest of the Nikkei Index in early 2001. In response, the government resumed its efforts to strengthen banking supervision.

### **III. Data and Empirical Approach**

#### *Sample and Data Sources*

Our sample includes about 800 listed firms on the First Section of the Tokyo Stock Exchange. These firms are mostly in manufacturing industries and, in addition, in construction, real estate, and retail (which are sectors that are likely to be sensitive to the availability of bank finance). The information we gather on each firm consists of several parts. First, we use daily stock price data drawn from the *Kabuka Soran (Toyo Keizai)*. We use financial statements and information on Tobin's  $q$  from the Waseda-Nissei Corporate Governance Database. For each event we collect information from financial statements for the corresponding period.

We identify each firm's main bank (if there is one) according to several different definitions. The first defines a company's main bank as the top lending bank in the Japan Company Handbook (as in Gibson, 1995). This definition identifies about three-quarters of all firms as having a main bank. The second definition is slightly more stringent, stipulating that only if the top lending bank is the largest lender over a five-year period will it be defined as a main bank (slightly less than two-thirds of all firms have a main bank according to these criteria). The third definition requires, in addition to the first two definitions, that the ratio of main bank loans to firm assets exceed the median (or mean) value of this variable in the sample (3.6 percent or 5.1 percent, respectively). Using mean

bank loans, about one third of the companies in the sample are classified as main bank clients according to this definition. Other main bank definitions we examine require instead of, or in addition to the above requirements, that shareholding by the main bank exceed the median value of this variable in the sample. In practice, the results of the empirical analysis are not sensitive to the definition of the main bank. The coefficients in the tables below refer to the first, and broadest, definition.

R&D intensive industries are identified according to ratio of R&D expenditures to sales, and include chemicals, pharmaceuticals, machinery, electronics, transportation equipment, and precision instruments. Roughly half of the sample firms are in R&D-intensive industries.

Our measure of credit rating is based on the most conservative credit rating by any of the major rating agencies (i.e. the lowest available credit rating is used). In our data, a company's bond rating is coded on a scale from one to four, where one corresponds to a rating of A or higher, two to a rating between BBB and A-, three to a rating of BBB-, and four to complete absence of rating (not investment grade). (Thus, a low credit rating corresponds to a high code in the data). The variable definitions and basic statistics are summarized in Table 2.

### *Empirical Approach*

Our empirical analysis is based on measurement of abnormal stock returns for our sample of firms around the date of an event related to the banking crisis. As in all event studies, we begin by estimating the "market model." For each firm, stock returns are regressed on (a constant and) the market returns (Tokyo Stock Exchange Price Index, the

TOPIX index), using 40 daily observations between dates –60 and –20 (where date zero is the date of the event in question). The estimated parameters of the regression are then used to generate the predicted return for each firm around the event date. Finally, abnormal returns are defined as the actual stock returns in excess of the model's prediction. Because it is sometimes hard to verify the date on which news might have affected the market, and because some events evolved over several trading days, the analysis that follows will focus on cumulative abnormal returns between dates –5 and +5 for each event.

#### **IV. Hypotheses, Results and Discussion**

We report our findings for three classes of events. The first class of events we examine consists of various government actions designed to address the banking crisis. It is interesting to examine which government actions were interpreted as likely to improve the ability of banks to offer new loans, and therefore associated with a positive response in the stock prices of client firms.

The second class consists of cases of downgrading of banks by one of the two major international rating agencies, Moody's and S&P. This class of events is unambiguously bad for banks (resulting in an increased cost of raising funds), and consequently, we assume, for bank clients as well.

Finally, the third class of events consists of three major bank mergers. These events are of particular interest, both because of the large wave of consolidation in the Japanese financial system, and because the effect of bank mergers on client firms is *a priori* ambiguous. On the one hand, a merger may contribute to bank health and may

therefore improve a bank's ability to offer new loans. If this effect is important, the stock price response of client firms will tend to be positive. On the other hand, a merger may endanger the relationship between a firm and its main bank, for example because of a merger could take place between a firm's main bank and the main bank of one of its rival (see some discussion of this point in Yafeh, 2002). Bank mergers could also lead to a negative effect on the stock prices of client companies simply because the combined bank may be forced to sell some of its equity stakes in order not to exceed the legal maximum of 5 percent.

#### *IV.1 Government Actions*

We divide the eleven events in this category into three groups. The first, and chronologically the earliest, consists of measures to resolve the *Jusen* problem. In the second category we investigate government injections of capital to the banking sector. Several government steps to improve banking supervision are discussed in the third group.

##### The *Jusen* Problem

(i) The government announces steps to resolve the *Jusen* problem on March 19, 1995.

(ii) The Diet (parliament) passes bills on *Jusen* liquidation on June 18, 1996.

##### Injection of Funds

(iii) Banks request a government injection of funds on March 5, 1998.

(iv) The Upper House passes bills to inject funds to the banking industry on October 12, 1998.

(v) Banks apply for government funds again on March 5, 1999.

(vi) The government approves the banks' request for funds on March 12 1999.

#### Measures to Improve Banking Supervision and Reform the Banking Sector

(vii) The government adopts bill to establish the independent Financial Supervisory Agency on March 11, 1997.

(viii) The Financial Advisory Agency is established on June 22, 1998.

(ix) The Financial Examination Manual is made public on April 8, 1999.

(x) Emergency package for the banking sector is unveiled on April 6, 2001.

(xi) Plan and timetable for the reform of the banking sector are published on September 21, 2001.

As noted above, it is not always easy to identify precisely the time at which information on government actions reaches the market. Therefore, rather than focus on abnormal returns on the announcement date, date 0, we present in Table 3 regression results where the dependent variable is CAR, cumulative abnormal returns, between dates -5 and 5. The results appear to vary considerably across the three event groups. Government actions related to the resolution of the *Jusen* problem seem to have produced little impact on stock returns, although we do find some evidence that these actions had a more positive effect on the stock prices of companies in low-R&D sectors.

By contrast, government injections of capital to the banking sector seem to have been far more important. In particular, these measures constituted "good news" for the typical bank dependent company: operating in a low-tech sector, with limited access to bond markets and a high degree of leverage, the coefficient on which is large and highly

statistically significant. The importance of this category of events probably stems also from their timing in Phases II and III, in which leveraged firms faced an acute liquidity shortage. It is also interesting to note that when measures of main bank ties are added to the regression (main bank loans and shareholding) we find that firms with high ratios of main bank debt to total assets benefited from capital injection measures more than other firms.<sup>3</sup>

Similarly, the main beneficiaries of improving banking supervision, presumably interpreted as steps to remedy the system, were also small firms, with low  $q$ , in low-tech sectors, with limited access to bond finance (low bond rating) and a high degree of leverage.<sup>4</sup> We conclude that (a) (at least some) government actions matter; and (b) that firms which can be characterized as bank-dependent respond more to such government actions.

#### *IV.2. Downgrading of Banks' Credit Rating*

We now turn to several events in which major Japanese banks were downgraded by international rating agencies. This section of the paper examines some of the most dramatic downgrading announcements:

- (i) The announcement of downgrading of Mitsubishi, Sakura, Sumitomo and DKB banks by S&P on December 22, 1995.

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<sup>3</sup> The other coefficients remain qualitatively unchanged, although the statistical significance on leverage falls probably because of collinearity. The results are shown in Appendix C. The capital injection regression results are also unchanged when the last event in this category (dated March 12, 1999) is excluded from the regression because of its proximity to the previous event (dated March 5, 1999).

<sup>4</sup> It is interesting to note that the first event in this category (in May 1997) seems to have been the least important, perhaps because it was hard to evaluate the government's approach to banking supervision at that relatively early stage.



- (ii) The announcement of downgrading of Sakura, LTCB and Daiwa banks by Moody's on January 22, 1996.
- (iii) The announcement of downgrading of Sakura and Sanwa banks by S&P on December 29, 1997.
- (iv) The announcement of downgrading of LTCB, Tokyo-Mitsubishi, Asahi and Daiwa banks by S&P on March 30, 1998.
- (v) The announcement of downgrading of Daiwa, Sumitomo, DKB, IBJ, Sakura, Sanwa, and Tokai banks by S&P on December 24, 1998.

The results are presented in Table 4. On average, across all firms, bank downgrading constituted bad news, with an average CAR of  $-3.1$  percent. More importantly, and in line with our findings on the stock price response to government actions, downgrading announcements appear to have been particularly harmful to highly leveraged companies, the coefficient on which is both statistically significant and of substantial magnitude. For example, in the pooled sample, firms with leverage two standard deviations above the mean experienced 7 percent lower CAR than the average! Also sensitive to downgrading are firms in low R&D industries and with low credit rating, although the magnitude of the coefficient implies a smaller effect than that of leverage. In addition, there is evidence that large and profitable firms (with a high Tobin's  $q$ ) seem to suffer less from downgrading of their banks. The results in Table 4 suggest also that the impact of later downgrading announcements, in 1997 and 1998, during the peak of financial crisis period, far exceeded that of the early too downgrading events.<sup>5</sup>

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<sup>5</sup>It is also interesting to note that the results in Table 5 seem to correspond to the results reported by Brewer et al. (2002) for bank failures. They report that small, young, highly leveraged firms with low values of Tobin's  $q$  were particularly adversely affected by the bank failure events they examine.

Surprisingly, the dummy variable “main bank involved” (which takes the value one if a firm’s main bank was downgraded) suggests no special impact of downgrading on firms that use the downgraded bank as their main bank. This is because main bank ties do not matter, as the results of a regression specification with added measures of the strength of a firm’s ties to its main bank indicate. The coefficients on the ratio of bank loans to total assets or on the ratio of main bank loans to total assets are negative and statistically significant while the other coefficients remain unchanged (results shown in Appendix C). We conclude that bank-dependent firms suffer more from bank downgrading, even if their own main bank is not directly affected, because these events are interpreted as evidence of the weakness of the financial system as a whole.

#### *IV.3. Bank Mergers*

The Japanese financial system experienced a wave of mergers and consolidation between 1999 and 2000 (see Appendix B). We focus here on the three largest and presumably most important mergers:

- (i) The announcement of the formation of the *Mizuho* Group (consisting of the former DKB, Fuji and IBJ banks) on August 20, 1999.
- (ii) The announcement of the formation of the SMBC group (consisting of the former Sumitomo and Sakura banks) on October 14, 1999.
- (iii) The (first) announcement of the formation of the UFJ group (consisting of the former Sanwa, Tokai and Asahi banks)<sup>6</sup> on March 14, 2000.

The results are presented in Table 5. Although the average effect of bank mergers was roughly zero bank mergers constituted good news for some firms. Firms with the

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<sup>6</sup> Despite the initial announcement, Asahi Bank ended up not joining this group.

most positive abnormal returns were not necessarily clients of the merging banks. Instead, there is a strong positive correlation between leverage and abnormal returns in the pooled sample, as well as in each of the mergers separately. According to the coefficient estimates in the pooled sample, highly leveraged companies (with leverage two standard deviations above the mean) experienced positive returns of about 2 percent.<sup>7</sup>

Stock prices of firms in low R&D industries also responded positively (in relatively R&D intensive sectors the average CAR is about one percent lower than in low-tech industries), probably because banks tend to finance more traditional activities, and not so much research and development (Carlin and Mayer, 2002). This finding holds in two of the three mergers as well as in the pooled sample.

Finally, mergers appear to have been viewed as good news for firms with a low credit rating, i.e. with restricted access to bond markets, and high dependence on bank finance, in line with the macroeconomic literature on “credit crunch” (see Kashyap et al., 1993). The maximal possible change in credit rating (from no rating to a rating of A, or better) would raise the ten-day returns by about one percent.

Consistent with our results on downgrading announcements, and in line with the findings of Brewer et al. (2002) on three bank failures, there is not much difference between clients of the involved banks and other companies. One interpretation of this result is that mergers, much like bank downgrading or failure, are viewed as having an impact on the banking industry as a whole. Alternatively, mergers involving a firm’s main bank may have offsetting positive and negative effects: on the one hand they may

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<sup>7</sup> Similar results are obtained when a measure of bank debt to total assets is included in the regression, see Appendix C.

improve the ability of banks to offer new loans. On the other hand, bank mergers may destroy relationships, or force an equity sale by the merged bank that can drive down the share prices of client firms.<sup>8</sup>

Finally, it is interesting to note that the UFJ merger (with Sanwa bank at its core) seemed to have generated the most positive abnormal returns of the three mergers. This is perhaps because some of the participating banks were perceived as particularly weak prior to the consolidation, and so the news about their survival through the proposed merger constituted more of a positive surprise.

## **V. Concluding Remarks**

Two main conclusions emerge from this study. First, the impact of Japan's banking crisis has been far from homogenous: not all companies are equally affected by events in the banking sector. Second, companies, which we find to be especially sensitive to the malaise of the banking sector, are the ones that the macroeconomic literature has described as sensitive to "credit crunches." Companies with limited access to bond finance (low rating), high levels of leverage (and bank debt) and, to a lesser extent, small and low profit companies, tend to be more susceptible than other companies to events in the banking sector. We also find that companies in R&D intensive industries are less affected by the banking crisis than companies in more traditional sectors. This is consistent with the view that bank debt is not a main source of finance to R&D. Our

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<sup>8</sup> There is little evidence that the strength of bank-firm ties has any effect on the returns in this case. Measures of main bank debt to assets or of main bank shareholding are statistically insignificant when included in the regression (results shown in Appendix C).

findings imply, then, that the Japanese banking crisis may include a (slow) “cleansing effect,” leading to the survival of better performing companies in high-R&D industries.

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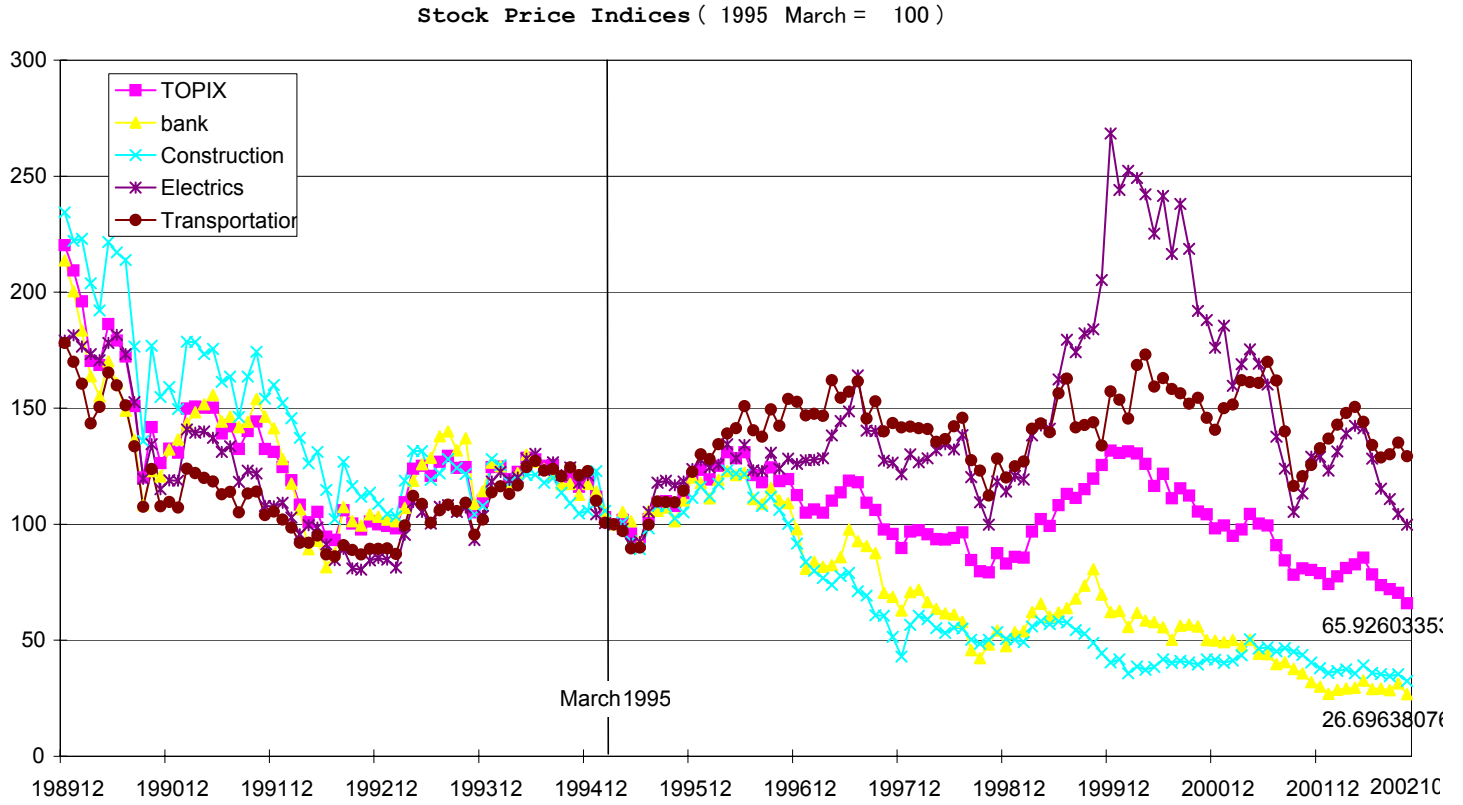
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**Figure 1: Co-movement of Industry-specific Stock Price Indexes and Bank Stock**  
**Prices, 1995-2002**



Note: Based on the Tokyo Stock Exchange industry-specific in



**Table 1: The Japanese Economy and Banking System, 1995-2001: Basic Indicators**

Fiscal Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Inflation rate	1.4	0.5	-0.1	-0.5	-0.8	0.7	-0.5	-1.6	-1.9	-1.2
Nominal GDP growth rate	1.8	0.9	1.0	2.0	2.6	0.9	-1.3	0.3	-0.2	-2.5
NIKKEI Index (end of March)	18,591	19,111	16,139	21,406	18,003	16,527	15,836	20,337	12,999	11,024
ROA in manufacturing <sup>a</sup>	3.3	2.5	2.8	3.0	3.5	3.2	2.5	3.1	4.2	N/A
ROA of major banks <sup>b</sup>	0.20	0.12	0.03	- 0.54	- 0.16	- 2.01	- 3.71	0.16	N/A	N/A
“Risky” loans <sup>c</sup>	12.8	13.6	12.5	21.9	16.4	22.0	20.3	19.8	19.3	27.6
Losses due to non-performing loans	1.6	3.9	5.2	11.1	6.2	10.8	10.4	5.4	4.3	7.7
Allowance for loan losses	3.7	4.5	5.5	10.3	9.4	13.6	9.3	7.7	6.9	8.7
Cumulative direct write-off since 1992	0.4	2.5	5.3	10.8	14.5	18.0	22.3	25.9	28.5	31.9
Total loans	0.0	0.0	0.0	0.0	0.0	365.9	320.2	316.5	313.6	293.2

(a) Average for all non-financial companies listed on the First Section of the Tokyo Stock Exchange.

(b) All of the rows below refer to average values for all city banks and the LTCB.

(c) Measures of problem loans are all in trillion yen.

**Table 2: Data Sources and Variable Definitions**

Variable	Source	Definition	Mean UFJ Merger Sample	Std. Deviation UFJ Merger Sample
Assets	Waseda-Nissei Corporate Governance Database	Total assets in (trillion yen)	269,778	550,926
Tobin's $q$	Waseda-Nissei Corporate Governance Database	Ratio of market value to book value	1.09	1.27
Leverage	Waseda-Nissei Corporate Governance Database	Total liabilities (borrowing and bonds) to assets	0.26	0.20
R&D-intensive Industries	Waseda-Nissei Corporate Governance Database	Chemicals, pharmaceuticals, machinery, electronics, transportation equipment, and precision instruments.	0.49	N/A
Bond rating	See text	On a range from 4 (lowest, no rating) to 1 (rated A or higher)	2.95	1.12
Main bank loans, shareholding, etc.	Waseda-Nissei Corporate Governance Database	Several definitions used to identify the main bank, see text	Depending on the definition used	N/A

**Table 3: The Effects of Government Actions to Address the Banking Crisis on Cumulative Abnormal Returns of Non-Financial Firms on Days (-5, +5)**

OLS regressions with event-specific intercepts. \*\*\*, \*\* and \* denote coefficients significant at the 1, 5, and 10 percent levels, respectively. The coefficient on assets is multiplied by 1,000,000.

0	Actions related to the Jusen Problem	Injections of Capital	Improved Banking Supervision
Constant	Event-specific	Event-specific	Event-specific
Assets	0.001 (0.002)	0.002 (0.003)	-0.014*** (0.003)
Tobin's q	-0.000 (0.004)	0.001 (0.005)	-0.013*** (0.004)
Leverage	-0.001 (0.009)	0.079*** (0.013)	0.036** (0.017)
High-R&D sector dummy	-0.009*** (0.003)	-0.023*** (0.004)	-0.007** (0.003)
Bond rating	-0.001 (0.001)	0.009*** (0.002)	0.006*** (0.001)
N	1603	3340	4307
R <sup>2</sup>	0.01	0.05	0.04

**Table 4: The Effects of Bank Downgrading on Cumulative Abnormal Returns of Non-Financial Firms on Days (-5, +5)**

OLS regressions with event-specific intercepts in the pooled regression. \*\*\*, \*\* and \* denote coefficients significant at the 1, 5, and 10 percent levels, respectively. The coefficient on assets is multiplied by 1,000,000.

	All	DG -1995	DG-1996	DG-1997	DG-3/98	DG-12/98
Constant	<b>Event-specific</b>	<b>0.008</b>	<b>0.013</b>	<b>-0.007</b>	<b>-0.060</b>	<b>0.025</b>
		<b>(0.010)</b>	<b>(0.008)</b>	<b>(0.019)</b>	<b>(0.019)</b>	<b>(0.008)</b>
Assets	<b>0.009***</b>	<b>-0.002</b>	<b>-0.001</b>	<b>0.012*</b>	<b>0.020***</b>	<b>0.002</b>
	<b>(0.002)</b>	<b>(0.002)</b>	<b>(0.003)</b>	<b>(0.007)</b>	<b>(0.006)</b>	<b>(0.003)</b>
Tobin's q	<b>0.021***</b>	<b>-0.007</b>	<b>-0.004</b>	<b>0.033**</b>	<b>0.063***</b>	<b>0.003</b>
	<b>(0.003)</b>	<b>(0.007)</b>	<b>(0.005)</b>	<b>(0.011)</b>	<b>(0.012)</b>	<b>(0.004)</b>
Leverage	<b>-0.104***</b>	<b>0.000</b>	<b>0.013</b>	<b>-0.249***</b>	<b>-0.156***</b>	<b>-0.097***</b>
	<b>(0.009)</b>	<b>(0.015)</b>	<b>(0.013)</b>	<b>(0.028)</b>	<b>(0.025)</b>	<b>(0.014)</b>
High-R&D sector dummy	<b>0.012***</b>	<b>-0.009**</b>	<b>0.008*</b>	<b>0.009</b>	<b>0.033***</b>	<b>0.013***</b>
	<b>(0.003)</b>	<b>(0.004)</b>	<b>(0.004)</b>	<b>(0.008)</b>	<b>(0.007)</b>	<b>(0.005)</b>
Bond rating	<b>-0.009***</b>	<b>0.003</b>	<b>-0.002</b>	<b>-0.011***</b>	<b>-0.024***</b>	<b>-0.009***</b>
	<b>(0.001)</b>	<b>(0.002)</b>	<b>(0.002)</b>	<b>(0.004)</b>	<b>(0.003)</b>	<b>(0.002)</b>
MB involved dummy	<b>0.000</b>	<b>-0.010**</b>	<b>-0.011*</b>	<b>0.011</b>	<b>0.006</b>	<b>0.003</b>
	<b>(0.003)</b>	<b>(0.004)</b>	<b>(0.007)</b>	<b>(0.012)</b>	<b>(0.009)</b>	<b>(0.005)</b>
N	<b>4016</b>	<b>790</b>	<b>801</b>	<b>820</b>	<b>829</b>	<b>776</b>
R <sup>2</sup>	<b>0.22</b>	<b>0.02</b>	<b>0.01</b>	<b>0.17</b>	<b>0.28</b>	<b>0.12</b>

**Table 5: The Effects of Bank Mergers on Cumulative Abnormal Returns of Non-Financial Firms on Days (-5, +5)**

OLS regressions with event-specific intercepts in the pooled regression. \*\*\*, \*\* and \* denote coefficients significant at the 1, 5, and 10 percent levels, respectively. The coefficient on assets is multiplied by 1,000,000.

	<b>All Mergers</b>	<b>Mizuho</b>	<b>SMBC</b>	<b>UFJ</b>
Constant	<b>Event-specific</b>	<b>-0.036</b>	<b>-0.058</b>	<b>0.018</b>
		<b>(0.011)</b>	<b>(0.012)</b>	<b>(0.013)</b>
Assets	<b>-0.000</b>	<b>0.004</b>	<b>0.002</b>	<b>-0.008</b>
	<b>(0.003)</b>	<b>(0.005)</b>	<b>(0.006)</b>	<b>(0.007)</b>
Tobin's $q$	<b>0.003</b>	<b>0.014**</b>	<b>0.001</b>	<b>0.001</b>
	<b>(0.003)</b>	<b>(0.006)</b>	<b>(0.006)</b>	<b>(0.003)</b>
Leverage	<b>0.052***</b>	<b>0.037**</b>	<b>0.068***</b>	<b>0.057***</b>
	<b>(0.011)</b>	<b>(0.015)</b>	<b>(0.017)</b>	<b>(0.024)</b>
High-R&D sector dummy	<b>-0.012***</b>	<b>-0.024***</b>	<b>0.012***</b>	<b>-0.025***</b>
	<b>(0.004)</b>	<b>(0.006)</b>	<b>(0.006)</b>	<b>(0.007)</b>
Bond rating	<b>0.004**</b>	<b>0.000</b>	<b>0.005*</b>	<b>0.006*</b>
	<b>(0.002)</b>	<b>(0.003)</b>	<b>(0.003)</b>	<b>(0.003)</b>
MB involved dummy	<b>0.000</b>	<b>0.006</b>	<b>0.002</b>	<b>-0.006</b>
	<b>(0.004)</b>	<b>(0.006)</b>	<b>(0.007)</b>	<b>(0.012)</b>
N	<b>2606</b>	<b>862</b>	<b>862</b>	<b>882</b>
R <sup>2</sup>	<b>0.10</b>	<b>0.04</b>	<b>0.03</b>	<b>0.04</b>

## Appendix A: Bond Rating of Major Banks:

### The most conservative rating of S&P, Moody's, JCRI and IBCA

							Phase I		Phase II		Phase III		
Old Name	New Name	3/91	3/92	3/93	3/94	3/95	3/96	3/97	3/98	3/99	3/00	3/01	3/02
IBJ	IBJ	AAA	AA	AA-	A+	A+	A	A	A-	BBB	BBB+	BBB+	A
LTCB	Shinsei	AA	AA-	A	A-	A-	BBB+	BBB+	BBB-	BB-	BBB-	BBB-	BBB-
NCB	Aozora	AA+	AA	A	A	A	BBB-	BB+	BB+	BB-	BB-	BB	BBB-
DKB	Mizuho	AA	AA-	AA-	A+	A+	A	A	BBB+	A	A	A	BBB
Sakura	Sakura	AA+	AA+	AA-	AA-	AA-	A-	A-	A-	BBB	BBB	A-	A-
Fuji	Mizuho	AA	AA-	A+	A+	A+	A-	A-	BBB+	A	A+	A+	BBB
Mitsubishi	Tokyo-Mitsubishi	AA+	AA	AA-	AA-	AA-	A+	A+	A	A-	A-	A-	BBB+
Asahi	Asahi	AA+	AA	A+	A	A	A	A	A	BBB	BBB	BB+	BB+
Sanwa	UFJ	AA	AA	AA-	AA-	AA-	A	A	A	BBB+	BBB+	BBB+	BBB
Sumitomo	SMBC	AA+	AA	AA-	A+	A+	A	A	A-	BBB	BBB	BBB+	BBB
Daiwa	Daiwa	AA+	A+	A+	A-	A-	BBB+	BBB+	BBB-	BB+	BB+	BB+	BB+
Tokai	Tokai	AAA	AA+	AA-	A	A	A	A	A	BBB-	BBB-	BBB	A
Hokkaido-Takushoku	-	AA	AA	A	A	.	BBB-	BBB-	BBB-	.	.	.	.
Tokyo	-	AA+	AA+	AA+	AA+	.	AA+	AA+	.	.	.	.	.

**Appendix B: The Consolidation of the Japanese Financial Industry:  
Press Announcements of Mergers and other Cooperation Agreements**

Source: Financial Supervision Agency

<b>Merging Parties</b>	<b>Date of First Announcement</b>	<b>Post-merger Name</b>	<b>Effective as of</b>
IBJ, Nomura Securities (Alliance)	<b>May 13, 1998</b>		<b>December 1998 / January 1999</b>
Dai-Ichi Securities, J.P. Morgan (Alliance)	<b>October 1, 1998</b>		<b>March 1999</b>
IBJ, Dai-Ichi Life Insurance (Alliance)	<b>October 2, 1998</b>		
DKB Trust, Fuji Trust, Yasuda Trust	<b>November 6, 1998</b>	<b>DK - Fuji Trust</b>	<b>April 1, 1999</b>
Chuo Trust, Mitsui Trust	<b>January 19, 1999</b>	<b>Cho-Mitsui Trust</b>	<b>April 2000</b>
Fuji Bank, Yasuda Trust	<b>January 28, 1999</b>		
IBJ, IBJ Securities, Shin- nihon Securities, Wako	<b>March, 24, 1999</b>	<b>Shinko Securities</b>	<b>April 2000</b>
Universal, Taiheiyo, Towa, Dai-ichi Securities	<b>July 29, 1999</b>	<b>Tsubasa Securities</b>	<b>April 2000</b>
DKB, Fuji, IBJ	<b>August, 1999</b>	<b>Mizuho Holding</b>	<b>September 2000 /April 2002</b>
Sakura, Sumitomo Sanwa, Tokai, Toyo Trust	<b>October, 1999 July 4, 2000</b>	<b>SMBC UFJ holding</b>	<b>April 2001 April 2001 / January 2002</b>
TMB, Mitsubishi Trust with holding companies	<b>April 19, 2000</b>	<b>Mitsubishi Trust</b>	<b>April 2001</b>
IBJ Securities, DK Securites, Fuji Securities	<b>May,25, 2000</b>	<b>Mizuho Securities</b>	<b>October 2000</b>
Daiwa Sec. H.C, Sakura, Sumitomo, Sakura Sec.	<b>November 28,2000</b>	<b>Daiwa SMBC</b>	<b>April 2001</b>
DKB Trust and IBJ Trust Asahi, Daiwa	<b>June 30, 2000</b>	<b>Mizuho Trust Resona</b>	<b>October 2000 March ,2001</b>

**Appendix C: Additional Regression Specifications:**

**The Effect of Bank Debt to Total Assets and Measures of Bank-Firm Ties.**

**Dependent Variable: Cumulative Abnormal Returns of Non-Financial Firms on  
Days (-5, +5)**

OLS regressions with event-specific intercepts. \*\*\*, \*\* and \* denote coefficients significant at the 1, 5, and 10 percent levels, respectively. The coefficient on assets is multiplied by 1,000,000.

	<b>Injections of Capital</b>	<b>All Downgrading Events</b>	<b>All Downgrading Events</b>	<b>All Mergers</b>	<b>All Mergers</b>
Constant	<b>Event- Specific</b>	<b>Event- Specific</b>	<b>Event- specific</b>	<b>Event- specific</b>	<b>Event- Specific</b>
Assets	<b>0.004</b> (0.003)	<b>0.008***</b> (0.002)	<b>0.009***</b> (0.002)	<b>-0.000</b> (0.003)	<b>-0.000</b> (0.003)
Tobin's q	<b>-0.001</b> (0.005)	<b>0.022***</b> (0.003)	<b>0.021***</b> (0.003)	<b>0.003</b> (0.003)	<b>0.003</b> (0.003)
Leverage	<b>0.026</b> (0.016)	<b>-0.084***</b> (0.014)	<b>-0.087***</b> (0.014)	<b>0.057***</b> (0.016)	<b>0.046***</b> (0.012)
High-R&D sector dummy	<b>-0.023***</b> (0.004)	<b>0.012***</b> (0.003)	<b>0.011***</b> (0.003)	<b>-0.012***</b> (0.004)	<b>-0.011***</b> (0.004)
Bond rating	<b>0.005**</b> (0.002)	<b>-0.008***</b> (0.001)	<b>-0.006***</b> (0.001)	<b>0.004**</b> (0.002)	<b>0.002</b> (0.002)
MB involved dummy	N/A	<b>0.000</b> (0.003)	<b>0.001</b> (0.003)	<b>-0.001</b> (0.004)	<b>0.000</b> (0.004)
MB loans to total assets	<b>0.282***</b> (0.068)	<b>-0.108**</b> (0.048)		<b>-0.001</b> (0.001)	
MB shareholding	<b>-0.001</b> (0.001)	<b>0.000</b> (0.001)		<b>0.001</b> (0.001)	
Bank loans to total assets			<b>-0.014**</b> (0.005)		<b>0.010*</b> (0.006)
N	<b>3340</b>	<b>4016</b>	<b>4016</b>	<b>2606</b>	<b>2606</b>
R <sup>2</sup>	<b>0.06</b>	<b>0.22</b>	<b>0.22</b>	<b>0.10</b>	<b>0.10</b>