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ABSTRACT

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

Japan 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.

JEL Classification: G10, G21 and G30

Keywords: bank-firm relations, event study and Japan's banking crisis

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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. To the extent that some of the credit-constrained companies are virtually bankrupt "zombies," the Japanese banking crisis may involve some "creative destruction" of weak companies in low-tech sectors, a process which is not necessarily detrimental to the Japanese economy. The welfare implications are very different if bank dependent companies are mostly positive-NPV firms. We return to this issue below.

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 eleven-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" (market to book or 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.¹ 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 (2003, Norwegian data).² 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. (2003),

¹ For example, see Boot (2000), Boot and Thakor (2000), Greenbaum, Kanatas, and Venezia (1989), Petersen and Rajan (1994 and 1995), Rajan (1992), Weinstein and Yafeh (1998).

² Dahiya, Saunders, and Srinivasan (2003) adopt a different approach and examine the impact of borrowers' distress on bank share prices (rather than the other way around).

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.³ For the most part, these studies do not focus on the distinction between the stock price responses of different types of firms. The present paper therefore contributes to this literature in two ways. First, following Brewer et al. (2003) and, to some extent, Bae 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.⁴

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, 2003).

³ Spiegel and Yamori (2003) also examine the sensitivity of firm stock returns in Japan to the stock returns of their main banks not in response to particular events, but over a long period of time. They argue that Japanese firms became more sensitive to the stock performance of their main banks after 1997.

⁴ Recent related studies of stock price responses of client firms to bank mergers include Karcesky et al. (2004) and Shin et al. (2003).

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 types of firms that 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) find 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 section 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, 1995-2000⁵

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. 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 and 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

⁵ 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.

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.⁶ 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

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. As a result, the Japan Premium increased and there was 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 in March 1998. The newly created Financial Crisis Management Committee (*Kinyu Kiki Kanri Iinkai*) handled this capital injection, which had a calming effect on financial markets until May. However, markets were apparently not convinced that the banking

⁶ These include loans to failed firms, loans on which payments have been suspended, and loans with “relaxed conditions,” see Hoshi and Kashyap (2001).

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 Reconstruction Act (*Kinyu Saisei-Ho*), 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 (*Kinyu Soki Kaizenka-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 (FRC) 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 Supervisory 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 the ratio of market to book (Tobin’s q)

from the Waseda-Nissei Corporate Governance Database. For each event we collect information from financial statements for the corresponding period.

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, and in the empirical analysis that follows we denote them as “high R&D” firms. We will later examine other measures of R&D intensity such as 1994 company R&D (incomplete data) or industry R&D intensity.

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). This coding scheme implies that a credit rating change from one to two on our scale is equivalent to a change from two to three. This need not be the case, yet more general alternative specifications discussed below do not affect the results.

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. The variable definitions and basic statistics are summarized in Table 2.⁷

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 in which news might have affected the market, and because some events evolved over several trading days, the

⁷ Note that despite our focus on the First Section of the Tokyo Stock Exchange, there are some small firms in the sample.

analysis that follows will focus on cumulative abnormal returns between dates -5 and $+5$ for each event. Shorter event windows and alternative calculations of stock returns, including a longer period of estimation of the market model and an analysis of raw (not excess) returns are discussed in the robustness sub-section below.

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, 2003 and in Karcesky et al., 2004). 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.

Our choice of events is based on our reading the financial press and inevitably involves some subjective judgment. To verify that the selected events were indeed important, we examine movements in the bank stock index around these dates. Around many of the events described below, we find a substantial difference between changes in bank stock returns and changes in the general stock index (which itself must have been influenced from these events as well). We conclude that the events we study constitute a reasonable list of events that had an impact on the banking industry.⁸

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 December 19, 1995.
- (ii) The Diet (parliament) passes bills on *Jusen* liquidation on June 18, 1996.

⁸ For example, the bank stock index increased by about 15 percent around the Mizuho merger discussed below, relative to an increase of 3 percent in the TOPIX index. Similarly, we observe events that “mattered” within each of the event categories discussed below.

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 a bill to establish the independent Financial Supervisory Agency on March 11, 1997.
- (viii) The Financial Supervisory 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, and, on average, constituted good news for the banking system. 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.⁹ 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.¹⁰

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.¹¹ 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.

⁹ Firms with leverage two standard deviations above the mean experienced a CAR three times higher than the mean (about 3 percent). The impact of a shift from the lowest to the highest credit rating is similar. The CAR of firms in R&D intensive industries was about two percentage points lower than that of similar firms in low R&D sectors.

¹⁰ See Appendix C. Other coefficients remain qualitatively unchanged, although the statistical significance on leverage falls probably because of collinearity. 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).

¹¹ It is interesting to note that the two most important events in this category (in terms of their impact on bank stock returns and on the average CAR of client firms) were the establishment of the Financial Supervisory Agency (1998) and the publication of the Financial Examination Manual (1999). The first event in this category (in May 1997) seems to have generated the least positive response, perhaps because it was hard to evaluate the government’s approach to banking supervision at that relatively early stage. The last two events (in 2001) generated only moderate positive returns on bank and client firms’ stock prices.

IV.2. Downgrading of Banks' Credit Rating

We now turn to several events, in which major Japanese banks were downgraded by international rating agencies, focusing on 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.
- (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 a CAR of minus 7 percent. Also sensitive to downgrading are firms in low R&D industries and with low credit rating, although the magnitude of the coefficients 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 early 1998, during the peak of financial crisis period, far exceeded that of the early too downgrading events.¹²

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 variable remains insignificant, even when measures of the strength of a firm's ties to its main bank are added to the regression.¹³ 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.

¹²Average CAR around the 1997 downgrading was minus 6 percent. The corresponding figure for the March 1998 downgrading was even more negative, minus 9 percent, much higher than for all the other events in this category. The effect of these downgrades on bank stock prices was also particularly pronounced. It is interesting to note that the results in Table 4 correspond to the results reported by Brewer et al. (2003) 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. Bae et al. (2002), Table 7, also report qualitatively similar results for bank distress in Korea.

¹³ See Appendix C. 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, confirming the importance of bank debt and leverage, while the other coefficients remain unchanged. Furthermore, the coefficients are mostly very similar when the regressions are run separately for firms whose bank is downgraded and for other firms.

(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)¹⁴ on March 14, 2000.

The results are presented in Table 5. Although the average effect of the three bank mergers was zero, bank mergers constituted good news for some firms. Firms with the 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.¹⁵ Stock prices of firms in low R&D industries also responded positively (in relatively R&D intensive sectors the average CAR was 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, 2003). 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 lower the eleven-day returns by about one percent.

Consistent with our results on downgrading announcements, and in line with the findings of Brewer et al. (2003) on three bank failures, there is not much difference

¹⁴ Despite the initial announcement, Asahi Bank ended up not joining this group.

¹⁵ According to the coefficient estimates in the pooled regressions, highly leveraged companies (with leverage two standard deviations above the mean) experienced positive returns of about 2 percent. The results of this regression remain qualitatively unchanged when a measure of bank debt to total assets is included, see Appendix C.

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 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.¹⁶

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.¹⁷ 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.

IV.4 Robustness Tests

Our results remain generally unchanged when the following modifications are made to the basic regression specification:

- CAR is measured using a shorter event window, between days -1 and $+1$ (rather than between days -5 and $+5$).

¹⁶ 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). However, a recent study of the Mizuho merger finds somewhat different results in certain specifications (Shin et al., 2003). See also Karcesky et al. (2004) for an investigation of the impact of different types of bank mergers in Norway.

¹⁷ The average CAR for this event was about 4 percent, compared with minus 2 percent for the other two merger events. Note, however, that the increase in the bank stock index was even higher around the Mizuho merger (15 percent) than in this case (about 8 percent).

- The market model in the CAR calculation is estimated using days –140 to –20 instead of using a shorter 40-day period.¹⁸
- Raw stock returns between days –5 and +5 are used instead of abnormal returns (i.e. a one-stage regression is estimated instead of the market model followed by the excess return regression).¹⁹
- ROA (return on assets) is used as a measure of firm profitability (or “quality”) instead of Tobin’s q .
- Four dummy variables corresponding to different positions on the rating “scale” are used instead of a continuous rating variable ranging between one and four.
- Incomplete 1994 firm-level R&D intensity (R&D to sales; data not available for many firms) are used instead of a dummy variable for firms belonging to R&D intensive sectors.
- Industry-level R&D is used (with or without industry dummies) instead of a dummy variable for firms belonging to R&D intensive sectors.
- The ratio of foreign sales (exports and production abroad) to total sales is included in the downgrading regressions. This variable tends to be positive, suggesting that exporting firms are “better” and therefore less sensitive to events in the banking system, or that these firms are more oriented towards foreign markets and less sensitive to domestic market conditions for which the banking troubles proxy.

¹⁸ In the benchmark results we use a shorter period to estimate the market model because of the large number of events within much of the period.

¹⁹ An analysis of raw returns is not subject to some concerns associated with event studies. For example, if some government actions raise all stock returns by a given percent, this may generate different excess returns for firms with different betas. However, the results of the analysis of government actions remain unchanged when raw returns are used.

IV.5 Welfare Implications: Some Preliminary Tests

It has recently become fashionable to argue that Japanese banks tend to “prop” virtually bankrupt companies, perhaps by “ever-greening” old loans (e.g. Peek and Rosengren, 2003). If poor performers (“zombies” in the terminology of Caballero et al., 2003) are artificially kept alive by banks, then events that reduce the banks’ ability to lend may actually be “cleansing” and possibly even welfare improving. By contrast, if most of the firms that are identified as sensitive to events in the banking sector are essentially healthy, then reduced bank lending is detrimental to Japan’s economic recovery. Our regression results so far have not been able to directly address this issue. The coefficient on “market to book” (Tobin’s q) suggests that, in some cases, low- q companies were particularly sensitive to events in the banking sector (in the downgrading of 1997 and March 1998, for example). This may be partly due to a “zombie effect,” but may also reflect the fact that some low- q companies have low profits and cash flows (q is correlated with ROA). In this section we attempt to examine the welfare implications of the banking crisis more directly.

In order to shed some light on this issue, we examine the impact of events in the banking sector on “zombie firms,” defined according to various criteria, and test whether or not these firms are particularly sensitive to these events. Caballero et al. (2003) propose a definition according to which firms whose actual interest payments are lower than the existing risk-free interest rate on debt of similar maturity are classified as “zombies.” When this “zombie dummy variable” is added to the regressions measuring the impact of government capital injection or bank downgrading, its coefficient tends to be negative (suggesting a stronger effect on “zombies”) but it is very far from being

statistically significant (other coefficients remain unchanged). Non-parametric tests of the sensitivity of these firms to the banking crisis also do not produce very conclusive results.

One interpretation of this is that this “zombie” definition is too rough - indeed, not all of the firms characterized by this definition as “zombies” appear to be particularly weak, and some accounting irregularities may partially account for the difficulty in measuring their true cost of debt (see also Weinstein and Yafeh, 1998). We therefore attempt to identify “zombies” using various combinations of the following criteria: relatively large firms, whose performance (q or ROA) is relatively low, and/or whose leverage increased consistently during their 1990s, instead of, or in combination with, the Caballero et al. (2003) interest rate criterion. None of these exercises identifies a group of firms that clearly consists of losers that are artificially kept alive. It is possible that not all “zombies” have these characteristics; for example, their loans may have decreased if some of them were forgiven, or increased due to “ever-greening;” their accounting performance need not always be extremely low, etc. Alternatively, their “zombie-ness” may have been hidden through some accounting tricks. Nevertheless, if the Caballero et al. (2003) “zombie” definition is refined to include only firms in the top size quartile, then a group of five or six construction and real estate companies is consistently identified as having unusually high values of CAR for both positive and negative events in the banking system (these firms do not necessarily exhibit very low profit rates or increasing leverage ratios). One possible conclusion is that the number of “zombies” is not as high as is sometimes fashionable to argue, and that these firms tend to be primarily concentrated in the construction and real estate sectors (which are especially sensitive to events in the banking sector).

It is also not easy to identify a group of cash-constrained good and “promising” firms (for example, in the lowest size quartile and in the highest q quartile) that are especially sensitive to the events in the banking sector. Our impression is therefore that the most bank-dependent firms belong to “middle Japan” – relatively small firms in relatively low tech sectors with mediocre performance, perhaps in combination with a heterogeneous group consisting of some “zombies” and some promising small firms. There is little in our analysis to suggest that the “zombie effect” is prevalent and therefore that the banking crisis leads to beneficial “creative destruction.”

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 that we identify as 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. To the extent that the credit-constrained companies are mostly positive-NPV firms that cannot raise external finance, our findings imply that the banking crisis is costly. If however, many of the credit-constrained firms are “zombies,” the Japanese banking crisis may

include a (slow) “cleansing effect,” leading to the survival of better performing companies in high-R&D industries; nevertheless, the empirical analysis in this study has not been able to clearly identify a group of bank-dependent firms of this type.

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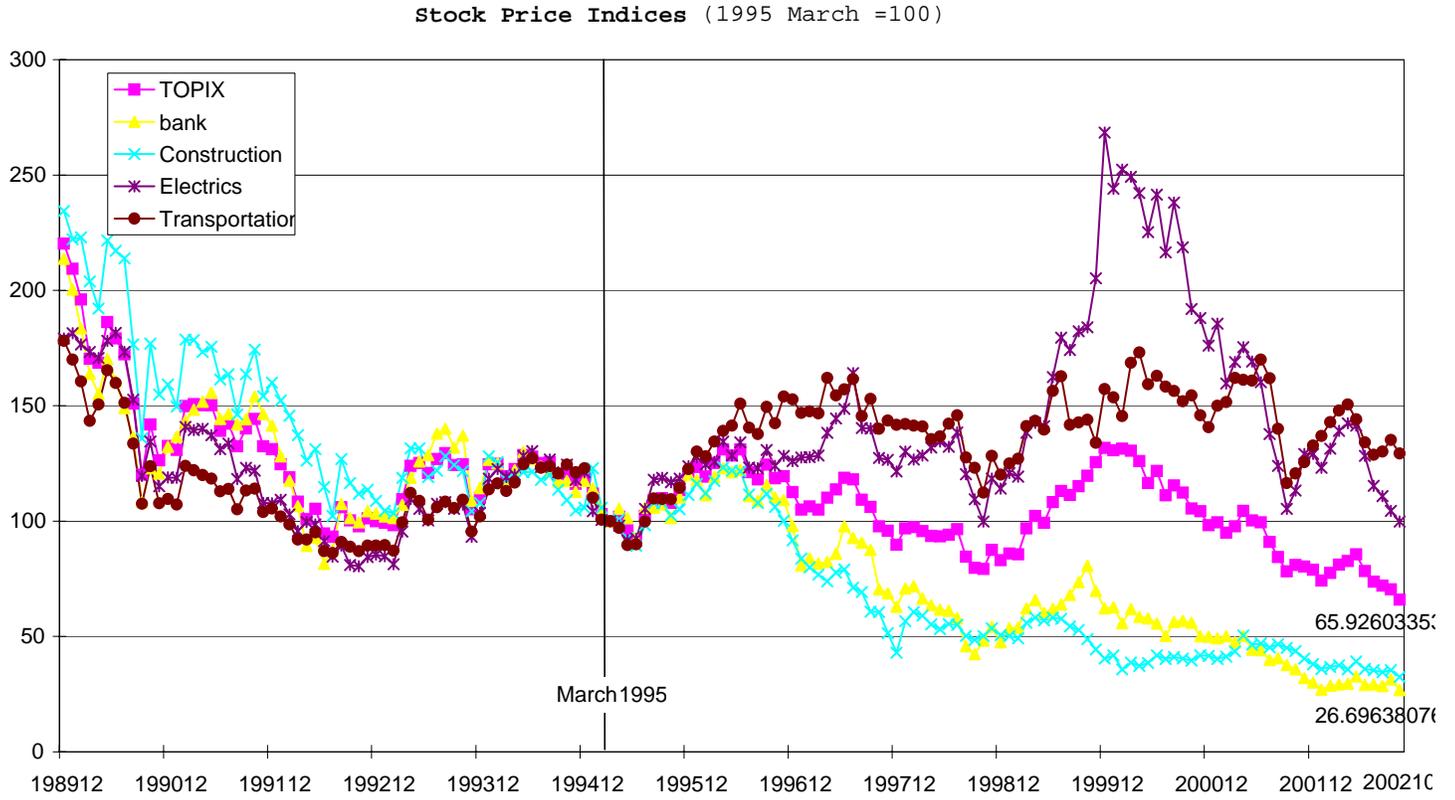
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Figure 1: Co-movement of Industry-specific Stock Price Indexes and Bank Stock Prices, 1995-2002



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 of non-financial firms ^a	4.1 (3.0)	3.3 (3.0)	3.6 (3.2)	3.7 (3.1)	4.3 (3.2)	4.2 (3.5)	3.4 (3.9)	4.4 (4.2)	5.8 (4.9)	4.6 (5.1)
ROA of major banks ^b	0.20	0.12	0.03	- 0.54	- 0.16	- 2.01	- 3.71	-0.09	0.05	-0.78
“Risky” loans ^c	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	363.0	357.3	353.4	366.1	373.3	353.8	324.5	308.5	303.7	285.2

(a) Average for all non-financial companies listed on the First Section of the Tokyo Stock Exchange on the basis of consolidated statements. Standard deviations are in parentheses.

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

(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 (million 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.

	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 ²	0.01	0.05	0.04
Average CAR	-0.01	0.01	0.02
Change in Bank Stock Price Index (average for each category)	0.05	0.11	0.02

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	Event-specific	0.008	0.013	-0.007	-0.060	0.025
		(0.010)	(0.008)	(0.019)	(0.019)	(0.008)
Assets	0.009***	-0.002	-0.001	0.012*	0.020***	0.002
	(0.002)	(0.002)	(0.003)	(0.007)	(0.006)	(0.003)
Tobin's q	0.021***	-0.007	-0.004	0.033**	0.063***	0.003
	(0.003)	(0.007)	(0.005)	(0.011)	(0.012)	(0.004)
Leverage	-0.104***	0.000	0.013	-0.249***	-0.156***	-0.097***
	(0.009)	(0.015)	(0.013)	(0.028)	(0.025)	(0.014)
High-R&D sector dummy	0.012***	-0.009**	0.008*	0.009	0.033***	0.013***
	(0.003)	(0.004)	(0.004)	(0.008)	(0.007)	(0.005)
Bond rating	-0.009***	0.003	-0.002	-0.011***	-0.024***	-0.009***
	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.002)
MB involved dummy	0.000	-0.010**	-0.011*	0.011	0.006	0.003
	(0.003)	(0.004)	(0.007)	(0.012)	(0.009)	(0.005)
N	4016	790	801	820	829	776
R ²	0.22	0.02	0.01	0.17	0.28	0.12
Average CAR	-0.03	0.00	0.01	-0.06	-0.09	-0.02
Change in Bank Stock Price Index ^a	-0.06	0.02	-0.02	-0.10	-0.10	-0.08

(a) The figure in the left column is an average.

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.

	All Mergers	Mizuho	SMBC	UFJ
Constant	Event-specific	-0.036	-0.058	0.018
		(0.011)	(0.012)	(0.013)
Assets	-0.000	0.004	0.002	-0.008
	(0.003)	(0.005)	(0.006)	(0.007)
Tobin's q	0.003	0.014**	0.001	0.001
	(0.003)	(0.006)	(0.006)	(0.003)
Leverage	0.052***	0.037**	0.068***	0.057***
	(0.011)	(0.015)	(0.017)	(0.024)
High-R&D sector dummy	-0.012***	-0.024***	0.012***	-0.025***
	(0.004)	(0.006)	(0.006)	(0.007)
Bond rating	0.004**	0.000	0.005*	0.006*
	(0.002)	(0.003)	(0.003)	(0.003)
MB involved dummy	0.000	0.006	0.002	-0.006
	(0.004)	(0.006)	(0.007)	(0.012)
N	2606	862	862	882
R ²	0.10	0.04	0.03	0.04
Average CAR	0.00	-0.02	-0.02	0.04
Change in Bank Stock Price Index ^a	0.10	0.15	0.08	0.08

(a) The figure in the left column is an average.

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	SMBC	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

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

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.

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