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Crisis Resolution and Credit Allocation: The Case of Japan

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Abstract

A traditional “capital crunch,” like that experienced in the United States in the early 1990s, did not occur in Japan following the bursting of the stock price and real estate price bubbles. Poorly capitalized banks did not disproportionately cut back on loans, and overall lending did not decline dramatically. Nonetheless, we find evidence that the banking problems have contributed to the extended malaise of the Japanese economy during the subsequent decade. Just as the banks were slow to restructure, bank support for troubled and noncompetitive firms prevented the needed restructuring of nonfinancial firms from occurring. Thus, the strong borrower-lender relationships in Japan insulated Japanese firms from market forces and prevented a credit crunch. Nonetheless, bank lending behavior stifled economic growth by allocating an increasing share of bank credit to those firms least likely to use it productively.

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Crisis Resolution and Credit Allocation: The Case of Japan

After the bursting of the bubbles in stock prices and real estate prices at the beginning of the 1990s, Japanese economic performance deteriorated markedly, and has yet to recover the vigor that it exhibited for most of the postwar era. Why the Japanese economy has continued to stagnate and been unable to escape its persistent malaise has been the subject of considerable controversy. While many have argued that resolving the banking crisis and repairing the damaged financial system are critical to the Japanese economic recovery (Greenspan 1999), others have argued that the essential problem is a liquidity trap rather than problems in the banking sector (Krugman 1999).

Determining the nature of the underlying problems is essential, since the appropriate policy prescriptions for these two alternatives are quite different. If the problems center on the banking crisis, then government needs to recapitalize banks, encourage new entry by well-capitalized foreign banks, and restore liquidity to the real estate market (Glauber, Rosengard, and Rosengren 1998). Presuming that the problem is primarily a liquidity trap, Krugman (1999) advocates that the Bank of Japan should credibly commit to pursue an inflationary policy for periods “of at least a decade.” With such different solutions being proposed, it is essential to understand whether Japanese banks are a key factor in the prolonged economic malaise experienced in Japan.

This paper uses a rich new panel data set to examine how Japanese banks reacted to the economic problems in the 1990s, focusing on how banks allocated credit to Japanese firms. By using Japanese firm-level data, we are able not only to link Japanese firms to their banks, but also to identify the magnitude of their borrowing from their main bank, as well as from alternative sources of financing. Linking individual banks to individual borrowers is critical for

understanding how lending disruptions created by problems at financial institutions can be transmitted to the real economy. Such a link cannot be made clearly in many other countries, such as the United States, where bank-borrower relationships are considered private information.

Understanding how banking crises can impact the real economy has been the focus of substantial research over the past two decades. Much of the research in the United States has focused on financial problems exacerbating the Great Depression (Bernanke 1983) and the problems created by the credit crunch period during the early 1990s (Bernanke and Lown 1991; Peek and Rosengren 1995a,b; Hancock and Wilcox 1998). While these studies have documented that bank lending was restricted during these periods and that the restricted bank lending was coincident with declines in real activity, the absence of a clear micro-level matching of borrower and bank has been a major handicap to isolating the impact of bank lending disruptions.

Establishing the impact of bank lending disruptions on real economic activity is also an important linkage for recent research focused on the “lending view” of monetary policy (Kashyap and Stein 1994, 1995, 1996; Kashyap, Stein, and Wilcox 1993; Stein 1995). If relatively small changes in bank loan supply induced by changes in Federal Reserve policy can affect the real economy, then there should be an even larger impact on loan supply of the much larger shock created by a banking crisis. This is particularly true in Japan, where the entire banking system was close to insolvency. The effect on the economy of banking problems are exacerbated when borrowers have few alternatives to domestic bank credit, such as nonbanks, foreign banks or direct access to national credit markets, especially when much of the industrial structure is centered on the main bank system (Hoshi, Kashyap and Scharfstein 1990, 1991; Hoshi, Scharfstein, and Singleton 1993).

Even though bank lending did not decrease dramatically as it did in the United States, Japanese bank behavior may still be critical to understanding the poor performance of the Japanese economy during the 1990s. For example, Peek and Rosengren (2003) have examined the probability of obtaining increased loans from Japanese banks and found that poor firm performance increases the likelihood of a firm getting additional bank loans. This study provides further support for the hypothesis that Japanese banks have misallocated credit, which in turn, has impeded the resolution of the crisis created by the end of the bubble economy in the early 1990s.

The first section of the paper documents the patterns of individual Japanese bank lending and shows that the main banking system remained intact and that troubled banks continued to lend. The second section discusses the data and methods used in our analysis of the patterns of bank lending. The third section provides the empirical results, indicating that bank lending tended to be directed to troubled firms, suggesting that the quality rather than the quantity of bank lending may have been an important impediment to achieving an economic recovery. The final section provides conclusions.

I. Did Japan Experience a Capital Crunch?

Following the sharp decline in the Japanese stock market beginning in 1990 and the peak in land prices a year later, Japan experienced slower growth in its economy for the subsequent decade, measured both relative to its trend and relative to the United States. A leading candidate for the underlying cause of the persistence of the stagnation of the world's second largest economy has been the impaired health of the banking system. One channel through which banking problems can be transmitted to the real economy is a reduction in credit to creditworthy

firms by financially troubled banks. As Bernanke and Lown (1991) and Peek and Rosengren (1995b) have shown for the United States in the early 1990's, banks faced with binding capital constraints tend to shrink their assets in order to improve their capital-to-asset ratios. If the capital constraint is sufficiently binding, banks can be forced to sharply reduce credit to healthy as well as troubled firms. A sharp reduction in credit supply could impede the ability of otherwise healthy firms to obtain needed credit, a characterization some have attributed to the period of slow growth experienced in the United States in the early 1990s.

This “traditional” capital crunch story is potentially more complicated in Japan. In the United States, capital ratio requirements were stringently enforced by bank supervisors through the use of formal regulatory actions that frequently required banks to restore capital ratios above the statutory minimum requirements (Peek and Rosengren 1995a). In contrast, capital standards in Japan were loosely enforced until quite recently, and bank examiners were far less aggressive in forcing shrinkage, mergers or recapitalization of troubled banks.

A further complication for the traditional capital crunch story is created by the far stronger lending relationships in Japan, compared to the United States. Banks and borrowers in Japan frequently have interlocking directorates, cross shareholdings, and main bank affiliations. Thus, the bank and the borrower have a much closer and far more complicated relationship than the typical bank-borrower relationship in the United States.

Should a Japanese bank choose to shrink, it has several options. First, it can choose to shrink its foreign operations, which will typically affect foreign borrowers with less of a banking relationship than is typical of domestic borrowers. This was the initial choice of Japanese banks (Peek and Rosengren 1997). However, if the bank's problems are too severe to be solved by shrinking only international operations, the bank must choose the least costly method for

shrinking its domestic loans. First, banks can choose to terminate its main bank commitment to some firms.¹ This would not only allow the bank to reduce lending, but would also enable the bank to unwind its portfolio of share crossholdings by selling the stock of the former borrower, possibly at a capital gain.² A second method of shrinking domestic loans would be to leave the main bank relationships intact, but to reduce lending to firms for which it is the main bank. This makes bank credit less available to firms, possibly at the time of their greatest need, likely reducing the value for firms of bank lending relationships. At least for the biggest and healthiest firms, this would likely encourage firms to make greater use of domestic and international debt markets.³ The third method of shrinking would be to leave the main banking relationships unchanged, but to reduce lending commitments to firms for which it is not the main bank. Thus, firms would find lending reduced from secondary banks, which might, for some firms, be offset by increased credit from their main bank.

Table 1 examines the changes in loans for all firms that were in the first section of the Japanese stock market as of 1992. To be included in the table, a firm's loan data must be available at the beginning and end of the year, although it does not necessarily need to have the same main bank at the beginning and end of each year. The loan data span the period from 1992 through 1998 and are based on the fiscal years of the individual firms. For dating purposes, a firm's observation is assigned to the year in which its fiscal year ends. For example, for a firm with a fiscal year that ends in March, the most common fiscal year in Japan, the March 1995 observation is considered to be the firm's 1995 observation. Because firms may fail, merge, change their fiscal year, have missing data, or be removed as a first section firm, the number of firms with useable observations changes somewhat from year to year.

For the period from 1992 through 1998, no dramatic decline in total loans occurs for the set of first section firms. While the biggest decline is 3.41 percent in 1996, the declines are only about one-third of 1 percent in 1994, and about 1 percent in both 1995 and 1997. Total loans actually increase in both 1993 and 1998. This is in sharp contrast to the experience in the United States, where loans in some regions of the country declined by as much as 20 percent in a single year during the early 1990s. In fact, given that real GDP growth in Japan was quite lethargic, growing less than 2 percent for each year except 1996, presumably stifling loan demand, it is striking that a sharper decline in loans did not occur in Japan during this period.

No evidence of a dramatic decline in main bank loans to first section firms is apparent. In fact, in both 1993 and 1994, main bank loans to first section firms grew more quickly than the real economy, with loan growth of 5.3 and 2.7 percent, respectively. Main bank loans declined in both 1995 and 1996, but actually increased substantially in 1997, before resuming the decline in 1998. Thus, main bank loans increased in three of the six years covered in the table, even though this period was characterized by deteriorating bank financial health, slow economic growth, reductions in Japanese bank lending abroad (Peek and Rosengren 2000), and Japanese banks paying large premiums on interbank borrowing (Peek and Rosengren 2001),.

Credit growth from sources other than the firm's main bank was weaker. These loans decreased in each year from 1994 through 1997, increasing only in 1993 and 1998. Because main bank loans account for less than 15 percent of the loans to first section firms, changes in loans from alternative sources have a disproportionate effect on total loan growth. The table also suggests a pattern whereby actions by main banks were followed in the subsequent year by the secondary lenders. Decreases in loans from main banks in 1995 and 1996 were followed by an acceleration in the decline in loans from secondary lenders in 1996 and 1997, while the increase

in loans by main banks in 1997 was followed by an increase in secondary source loans in 1998. Such a pattern is consistent with main banks serving as the delegated monitor for other potential sources of credit for the firm. Having the most extensive, and likely the most timely, information about the firm, the main bank would take the lead, which would then be followed by the firm's other lenders. Nonetheless, the pattern from 1992 through 1998 is consistent with lending from non-main-bank sources being flat, on average, over this seven year period. While total loans outstanding to first section firms were quite similar in 1992 and 1998, the distribution of loans across these firms could potentially show sharp declines in some sectors of the economy.

Table 2 examines which banks decreased their main bank commitments to first section firms during the 1992 to 1998 period. Of the 1,186 first section firms in 1992, 1,099 had the same main bank in 1998 (93%). Most banks had slightly fewer first section firms listing them as their main bank in 1998. The major exception is BOTM, which had a net increase of seven additional firms listing it as their main bank, with eight firms switching to BOTM and one firm lost due to a merger. The number of firms associated with Asahi, Bank of Yokohama, and Sumitomo Trust were unchanged. Only the weakest banks experienced large declines in the number of firms listing them as their main bank. The biggest declines occurred at Hokkaido Takushoku and LTCB, the two weakest banks on the list. While main bank switching occurred, other than for the weakest and strongest banks, the number of firms that switched from a bank tended to be roughly offset by firms switching to the bank. Thus, for most banks, little net effect occurred through firms switching their main bank allegiance.

Table 3 examines the extent to which banks reduced loans to firms that they served as main bank, and if so, whether any reduction was related to the financial condition of the bank.

Table 3 includes only firms that maintained the same main bank relationship over the entire 1992 through 1998 period. Banks that had at least 10 first section firms listing them as their main bank are shown separately. Banks with less than 10 first section firms listing them as their main bank are aggregated into an “Other Banks” category. The Other Banks category includes primarily regional banks.

Overall, lending by all banks to first section firms grew by 4.19 percent from 1992 through 1998. In half the years, loan growth from the main bank was positive and exceeded 2 percent. Main bank loans declined in three years (1995, 1996 and 1998), although the only decline in excess of 1 percent occurred in 1996.

The aggregate data provide no evidence that banks with weaker ratings by Moody’s substantially reduced their lending. In fact, the opposite appears to be the case. Among the city banks and long-term credit banks, the largest shrinkage occurred at Bank of Tokyo-Mitsubishi, with a decline of over 19 percent. While much of the decline occurred around the time of the merger of Bank of Tokyo with Mitsubishi Bank, even excluding the merger period, the change in loans would be negative. The other two banks with declining loans over this period were Sumitomo and Fuji, which have ratings lower than BOTM, but still much higher than those for the weakest banks. In contrast, Daiwa, Asahi and Tokai, banks with relatively weaker ratings, increased lending by more than 20 percent over this seven-year period.

Among the other individually listed banks, Mitsui Trust and Sumitomo Trust substantially reduced loans to firms listing them as their main bank, while Mitsubishi Trust substantially increased its lending. Bank of Yokohama, the only regional bank with at least 10 first section firms listing it as their main bank, exhibited loan growth of 13 percent to firms for which it served as the main bank over this period, despite its relatively weak condition. Loan

growth for the Other Banks category was positive in all but one year, increasing 56 percent from 1992 through 1998. Apparently, the regional banks were quite willing to provide financing for the few first section firms that relied on them as their main bank.

Table 4 shows changes in loans from main bank and secondary sources for two subsets of firms: those with increased main bank loans over the 1992 through 1998 period and those with decreased main bank loans. The purpose of this table is to investigate the extent to which either main bank loan increases offset withdrawn credit from secondary sources or secondary sources fill the void left when the main bank reduces loans to a firm. The table shows that firms that had increased loans from their main bank during this period generally also had increased loans from their secondary sources. The firms experiencing the largest increases, on average, had Fuji and Asahi as their main banks, and firms with these main banks also experienced large increases in loans from their secondary sources. Similarly, firms using trust banks or banks in the Other Banks category as their main banks also experienced large increases in secondary loans. Only firms associated with Sanwa, DKB, and LTCB had increases in main bank loans and declines in loans from secondary sources, with the largest decline occurring at one of the more troubled banks, LTCB.

Firms that had decreases in main bank loans generally experienced declines in loans from their secondary sources as well. Only firms that had decreased main bank loans from Tokai and banks in the Other Banks category had an increase in secondary source financing. In general, Table 4 does not indicate that secondary source financing and main bank financing served as substitutes. Firms with a reduced volume of loans from their main bank also tended to have a reduction in loans from their secondary lenders, while firms with increased loans from their main bank also had increased loans from their secondary sources.

The number of firms with increased main bank loans during this period is somewhat larger than the number with decreased main bank loans. Among the major banks, only BOTM and LTCB, the strongest and weakest of the main banks, had more firms with decreased main bank loans than increased main bank loans. Among those banks with more associated firms with increased main bank loans, the numbers were relatively evenly split between firms increasing and decreasing main bank loans. Only Sumitomo, Fuji, DKB, and Sakura had substantially more firms with increased main bank loans than with decreased main bank loans. Given the difficulties experienced in the Japanese economy between 1992 and 1998, it is somewhat surprising that so many firms experienced increases in their main bank loans. This is in sharp contrast to the U.S. experience, where troubled banks tended to sharply decrease lending in order to raise their capital-to-asset ratios.

The first four tables indicate that a traditional capital crunch did not occur in Japan during the period from 1992 through 1998. Poorly capitalized banks did not disproportionately cut back on loans, and overall lending did not decline dramatically. Nonetheless, the tables do suggest that strong rather than weak banks were more inclined to reduce lending, and that many of the weaker banks and regional banks were the most likely to increase lending. The tables also suggest a surprisingly even split at many banks between the number of firms that had increased loans from their main bank compared to those obtaining less credit from their main bank. Furthermore, in aggregate, firms with decreased lending from their main bank also tended to borrow less from their secondary lenders. Similarly, firms with increased borrowing from their main bank tended to increase their borrowing from their secondary source lenders. However, to better understand the forces determining the allocation of loans across firms with differing

characteristics, it is necessary to examine micro firm-level data. These are discussed in the next section.

II. Data and Methods

While the traditional capital crunch story does not appear to apply to Japan, it is possible that banking problems nonetheless impaired economic growth. This can occur if weakened bank health causes a misallocation of credit, whereby too little credit is provided to healthy firms, while a substantial volume of loans is provided to firms with few prospects for being economically viable. By examining the firm-level data, we can better understand how bank loans were allocated to firms. The empirical tests examine several motivations that may affect how Japanese banks allocated credit to firms.

The first is the forbearance hypothesis. Banks seeking to avoid writing off loans, which would reduce their capital, have an incentive to provide sufficient financing to keep otherwise bankrupt firms afloat. For example, banks might provide funds to firms to make the interest payments on their outstanding loans from the bank so that the loans are not classified as nonperforming loans. While this “evergreening” of loans benefits the firm, it also improves the bank’s reported balance sheet data. The firm avoids (or delays) declaring bankruptcy and the bank avoids a further increase in its reported nonperforming loans (that includes loans to bankrupt firms and loans that are not current on interest payments) and any associated increase in its loan loss reserves that would reduce its income and capital. The incentive for a bank to engage in forbearance is likely to be greatest for firms with strong main bank attachments that include equity holdings by the bank. If the firm declares bankruptcy, the bank loses both its equity and some portion of its debt stake. If these firms take more risks, the bank benefits as an

equity holder, to the extent the strategy is successful. However, in the long run, such a strategy could result in far greater losses to the bank and scarce credit being allocated to firms with the least productive investment opportunities.

Forbearance was particularly easy for Japanese banks because financial statements were not transparent and there was no tradition of disclosing emerging problems. The most obvious example of the lack of transparency is that problem loans were not disclosed prior to March 1993. Without such disclosure, depositors and stockholders did not have sufficient information to evaluate the condition of the bank. This inhibited the ability of market discipline to provide an incentive for management to quickly resolve emerging problems. Even after 1993, the definition of problem loans evolved only gradually toward definitions similar to those used in the United States and many other countries, with a major breakthrough occurring when the Financial Supervisory Agency (FSA) released its estimates of problem loans, which were substantially larger than those that had been released by the banks, although still far below private sector estimates. While the FSA appears to be forcing greater disclosure, from 1992 until 1998, government policy did not clearly discourage banks from limiting disclosure and pursuing a policy of forbearance on problem loans, especially since much of the focus prior to 1998 was to avoid a capital crunch, whereby problems at the banks would seriously reduce credit available to firms.

Empirically, forbearance would appear as continued lending to firms that were unprofitable and/or had bleak prospects, as viewed by market participants through declines in the firm's stock price, and to industries such as real estate that were disproportionately affected by the problems in the Japanese economy. It is also more likely to occur for a firm for which the bank holds a major equity stake.

The second hypothesis is the market hypothesis. This hypothesis assumes that banks have superior information because of their access to confidential firm information. Banks are often equity holders, may have representation on the board of the firm, and can monitor the cash flow of the firm. Having this superior information, the bank is able to make credit decisions based on the expected profitability of the firm. Thus, the bank efficiently allocates credit to those firms with the highest expected returns, based on information that is superior to that publicly disclosed in Japan. In this case, no misallocation of scarce credit occurs, as banks ration loans according to the prospects of the firm. If so, a misallocation of credit by banks would not be responsible for the continuing poor performance of the Japanese economy, with aggregate credit not being sharply reduced and, more importantly, being allocated to those firms with the best prospects.

To test these hypotheses, this study utilizes a new data set that combines individual firm balance sheet, income statement, and stock price data with data on the firm's loans from its main bank, as well as its total borrowing. In addition, the database includes measures of the health of the firm's main bank. This provides a database that can much more clearly detail the effects of loan supply shocks than in the United States, where data linking specific firms to their primary banks is considered private information.

We collected information on all first-section listed firms with a fiscal year that ends in March.⁴ The main bank is identified as the first bank listed in the reference section of the Japan Company Handbook (Shikiho). We then obtained total borrowing and main bank loans from the Directory of Corporate Affiliations (Kigyo Keiretsu Soran). These data are then linked to the PACAP database that includes the financial statements and stock returns for each firm. The data set spans the period from 1993 through 1998.

We test the two hypotheses using the following basic specification:

$$\Delta\text{LOAN}_{i,t} = \alpha_0 + \alpha_1\text{FIRM}_{i,t-1} + \alpha_2\text{BANK}_{i,t-1} + \alpha_4\text{TIME} + \varepsilon_{i,t} \quad (1)$$

The dependent variable, ΔLOAN , represents three alternative dependent variables: the change in total loans to the firm, the change in main bank loans to the firm, and the change in secondary financing to the firm, with each change calculated between period t and $t-1$ and then scaled by the value of firm assets at $t-1$. For each firm, the dating of the variables is based on the year in which their fiscal year ends. For example, a fiscal year ending in March 1995 would be taken as the 1995 observation.

The first vector of variables is a set of firm-specific variables at time $t-1$. These variables are intended to capture the financial condition of the firm and the degree of bank dependence. FIRM includes the firm's capital-to-asset ratio, return on assets, and percent change in market value, as well as the logarithm of the real value of firm assets. We have also included the ownership concentration of the firm's shares by financial institutions, other nonfinancial corporations, and foreigners, whether the firm enters the bond market (the first time it has a positive value for bonds outstanding), is in the bond market (has a positive value for bonds outstanding, other than the year in which it first enters the bond market), or exits the bond market (no longer has bonds outstanding) to capture the ability of the firm to access credit from sources outside of domestic banks. We have also included a set of dummy variables that indicate the firm's industry (disaggregated into nine industries). We have omitted the dummy variable for real estate, so all industry dummies are relative to the industry one might have expected to be most severely affected by Japan's economic problems.

The second vector of variables is a set of bank-specific variables, measured at time $t-1$, that measure the health of the main bank. This set includes the return on assets (ROA), risk-

based capital ratio, and ratio of nonperforming loans to assets for the firm's main bank. Were this a "capital crunch" as was reported in the early 1990s in the United States (Peek and Rosengren 1995b), we would expect that lending would decline as the ROA and risk-based capital ratio of the main bank declined, and as the bank's nonperforming loan ratio increased. The third vector of variables is a set of annual time dummy variables intended to control for the general macroeconomic conditions in Japan.

III. Empirical Results

We provide the results for estimating equation (1) using both ordinary least squares (Table 5) and fixed-effects (Table 6) estimation methods. The estimation uses annual observations for 1994-98. The beginning of the sample period is restricted to 1994 because bank nonperforming loan data has been reported only since 1993 and we use its lagged value as an explanatory variable. The Hausman test statistic strongly rejects ordinary least squares in favor of the fixed-effects specification, the the PLS regressions allow us to examine industry patterns. The t-statistics reported in the tables are based on robust standard errors calculated by relaxing the assumption of independence of the observations for a given year.

Table 5 contains the ordinary least squares estimates. Columns 1, 2 and 3 present the results for the change in total loans to the firm, the change in main bank loans to the firm, and the change in loans to the firm from secondary lenders, each scaled by the firm's total assets. Only three of the FIRM variables have statistically significant effects, using standard levels of significance: the firm's size and the dummy variables that indicate when the firm entered and exited the bond market. The bond market variables suggest that bank loans serve as a substitute for bond debt. In particular, the negative coefficient on the dummy variable for exiting the bond

market is consistent with firms exiting the arms-length credit market where they are charged appropriate risk premiums and returning to relationship financing with their main bank which may be under charging the firm for loans. In fact, Smith (2003) finds that Japanese banks charge Japanese firms lower interest rates than do foreign banks.

Among the other FIRM variables, the firm's ROA consistently has a negative estimated coefficient, significant at the 10 percent level in the main bank equation, indicating that loans tended to increase the worse was firm performance. While only suggestive, the negative estimated coefficient is consistent with banks evergreening loans, increasing credit to the weakest firms. Similarly, while never significant, the negative estimated coefficients on the percent change in the firm's market value are also consistent with the evergreening hypothesis. Similarly, none of the bank health variables have significant coefficients, although the negative coefficients on bank risk-based capital ratios and the positive coefficient on the bank nonperforming loan ratio are consistent with banks tending to increase loans the weaker is bank health, a result that contrasts sharply with the U.S. experience, but is consistent with the evergreening hypothesis. The industry dummy variables are not significant but all of the industry dummies in the main bank equation are negative. Given the significant decline in real estate prices before, during, and after the regression sample, one would have expected positive and significant coefficients.

Table 6 reports the same set of regressions using a fixed-firm-effect specification. Based on the Hausman test statistics, this specification is preferred over the ordinary least squares specification in Table 5. Now that we have controlled for the fixed firm effect, we obtain more statistically significant estimated coefficients. Among the FIRM variables, larger firms tend to have smaller increases in loans and firms with higher capital-to-asset ratios tend to obtain larger

increases in loans. Now the negative coefficient on the firm's ROA is significant in each of the three columns. Again, this indicates that the weaker is the firm's performance, the larger is the increase in loans. All three bond market dummy variables tend to be significant. Finally, a larger percentage of ownership of the firm by nonfinancial corporations is associated with a smaller increase in loans.

With respect to the bank health variables, the risk-based capital variable always has a positive estimated coefficient and is significant at the 10 percent level for the change in total loans and for the change in loans from secondary lenders. Again, this is consistent with banks evergreening loans, insofar as the lower is the bank's capital ratio, the stronger is the bank's incentive to keep firms in a position to continue to make interest payments to keep their loans current and/or delay or avoid declaring bankruptcy.

The evidence indicates that weak banks had a tendency to expand lending more aggressively than stronger banks, and that the largest increases in loans were to firms most severely impacted by the collapse of the bubble economy. This is in sharp contrast to the experience in the United States in the 1990s, where lending declined dramatically at troubled banks and to troubled firms. While Japan has ameliorated the potential impact of a bank-induced credit crunch, it has done so at the expense of continuing to allocate credit to troubled firms that are least likely to have productive uses for the credit.

IV. Conclusions

Japan, from 1992 through 1998, did not experience a "capital crunch" similar to the one experienced in the United States in the early 1990s, despite having more widespread and more severe problems in its banking sector. Unlike the United States, where troubled banks

aggressively shed assets to improve their capital ratios, many of the most troubled Japanese banks did not aggressively restructure. We find little evidence that main bank relationships were breaking down, with more than one-half of the first-section firms having increases in loans from their main banks over this six year period, despite the very weak performance of the overall Japanese economy. However, for those firms that did experience a reduction in main bank loans, loans from secondary lenders also declined.

The evidence is consistent with the Japanese borrower-lender relationships continuing to be quite different than in the United States. Main banks generally continued to support affiliated firms, despite problems at the bank and in the overall economy. Peek and Rosengren (1997,2000) have shown that Japanese banks aggressively shed international assets during the 1990s as they continued to insulate their domestic borrowers from a reduction in credit availability. Such a strategy should have insulated many healthy Japanese firms from the problems occurring at their bank.

While many Japanese firms have been insulated by their strong bank-borrower relationships, this is not necessarily good news for the Japanese economy. If scarce credit is allocated to uncompetitive and troubled firms, the natural cleansing that would result from an economic downturn will not occur. If a disproportionate flow of funds is directed to the zombie firms, then longer-run economic growth may be reduced. Thus, economic growth is not stifled from too little overall credit, but rather from too much credit going to unproductive sectors of the economy, while too little is allocated to the most productive firms. In fact, this is what we do find. This misallocation of credit to deeply troubled firms, rather than the decline in aggregate lending, is why Japanese bank problems have stifled economic growth.

Bibliography

- Bernanke, Ben S. "Nonmonetary effects of the Financial Crisis in the Propagation of the Great Depression." American Economic Review, June 1983 73(3) 257-76.
- Bernanke, Ben S. and Lown, Cara. 1991. "The Credit Crunch." Brookings Papers on Economic Activity 2, 205-248.
- Hancock, Diana and Jim Wilcox. 1998. "The Credit Crunch and the Availability of Credit to Small Business." Journal of Banking and Finance. 22, 983-1014.
- Hoshi, Takeo; Kashyap, Anil and Scharfstein, David. "The Role of Banks in Reducing the Costs of Financial Distress in Japan." Journal of Financial Economics, September 1990, 27(1), pp. 67-88.
- _____. "Corporate Structure, Liquidity, and Investment: Evidence from Japanese Industrial Groups." Quarterly Journal of Economics, February 1991, 106(1), pp. 33-60.
- Hoshi, Takeo; Scharfstein, David and Singleton, Kenneth J. "Japanese Corporate Investment and Bank of Japan Guidance of Commercial Bank Lending," in Kenneth J. Singleton, ed., Japanese Monetary Policy. Chicago, IL: University of Chicago Press, 1993.
- Kashyap, Anil K, and Jeremy C. Stein. "Monetary Policy and Bank Lending," in Monetary Policy, edited by N. Gregory Mankiw, University of Chicago Press, Chicago, 1994.
- _____. "The Impact of Monetary Policy on Bank Balance Sheets." Carnegie-Rochester Conference Series on Public Policy, 1995.
- _____. "What Do A Million Observations on Banks Say About the Transmission of Monetary Policy?" The American Economic Review, June 2000, pp. 407-28.

- Kashyap, Anil K; Jeremy C. Stein and David W. Wilcox. "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance." American Economic Review, March 1993, 83: 78-98.
- Krugman, Paul R. "It's Baaack: Japan's Slump and the Return of the Liquidity Trap." Brookings Papers on Economic Activity, 1998(2) 137-205.
- Peek, Joe and Rosengren, Eric S. "Bank Regulation and the Credit Crunch." Journal of Banking and Finance, June 1995a 679-92.
- _____. "The Capital Crunch: Neither a Borrower nor a Lender Be." Journal of Money, Credit, and Banking, 27(3) August 1995b, pp. 625-38.
- _____. "The International Transmission of Financial Shocks: The Case of Japan." The American Economic Review, 87(4), September 1997, pp. 495-505.
- _____. "Collateral Damage: Effects of the Japanese Bank Crisis on Real Activity in the United States." The American Economic Review, 90(1), March 2000, pp. 30-45.
- _____. "Determinants of the Japan Premium: Actions Speak Louder than Words." Journal of International Economics, 53(2), April 2001, pp. 283-305.
- _____. "Unnatural Selection: Perverse Incentives and the Misallocation of Credit in Japan." NBER Working Paper 9643, April 2003.
- Smith, David C. "Loans to Japanese Borrowers." Manuscript. May 2003.
- Stein, Jeremy C. "An adverse Selection Model of Bank Asset and Liability Management with Implications for the Transmission of Monetary Policy." RAND Journal of Economics 29 Autumn 1998. 466-486.

Table 1
Percent Change of Total, Primary, and Alternate Sources of Loans

Year	Observations	Total Loans	Main Bank Loans	Loans from Secondary Sources
1993	1146	1.72	5.32	1.25
1994	1144	-0.34	2.68	-0.76
1995	1134	-1.01	-2.09	-0.85
1996	1139	-3.41	-2.22	-3.58
1997	1140	-1.04	3.67	-1.72
1998	1030	1.69	-0.95	2.10

Table 2
Did Banks Reduce the Number of Firms Which had Main Bank Commitment?

Bank	Total 1992	Same Bank	Switched		Merged		Delisted	Total 1998
			From	To	Same	Different		
City Banks and Long-Term Credit Banks								
BOTM	133	132	0	8	1	0	0	140
Sanwa	114	108	4	5	0	0	2	113
Sumitomo	129	122	3	4	2	1	1	126
Fuji	142	136	4	5	0	0	2	141
DKB	146	138	6	4	1	1	0	142
IBJ	95	85	5	8	3	2	0	93
Asahi	42	42	0	0	0	0	0	42
Tokai	60	58	0	1	0	1	1	59
Sakura	139	127	7	9	1	0	4	136
LTCB	21	15	5	0	0	0	1	15
Daiwa	31	28	2	1	0	0	1	29
Hokkaido Takushoku	9	0	8	0	0	0	1	0
Regional Bank								
Bank of Yokahama	14	13	0	1	0	1	0	14
Trust Banks								
Mitsui Trust	18	16	2	1	0	0	0	17
Mitsubishi Trust	14	10	3	1	0	1	0	11
Sumitomo Trust	17	14	2	3	0	1	0	17
Other Banks								
	62	55	6	6	0	0	1	61
Totals	1,186	1,099	57	57	8	8	14	1,156

Table 3

Percent Change of Loans from Previous Year by Main Bank to First Section Firms

Bank	1994 Rating	April 1999 Rating	1993	1994	1995	1996	1997	1998	Percent Change 1992-1998
City Banks and Long-Term Credit Banks									
BOTM	Aa3	A2	-2.41	1.73	-2.69	-12.30	1.40	-6.35	-19.55
Sanwa	Aa3	A2	9.12	1.42	-0.39	2.38	-4.63	0.67	8.36
Sumitomo	A1	A3	1.61	0.85	-3.46	-0.42	-1.66	2.12	-1.08
Fuji	A1	Baa1	-1.65	-1.34	-0.96	-5.63	4.26	1.36	-4.17
DKB	A1	Baa1	4.67	5.15	1.32	0.78	1.33	-1.75	11.90
IBJ	A1	Baa1	1.42	0.92	-2.27	2.62	13.26	-1.54	14.48
Asahi	A2	Baa1	27.89	6.22	8.37	-24.24	16.46	14.83	49.15
Tokai	A2	Baa1	-2.88	21.05	3.32	-0.77	3.10	5.67	31.32
Sakura	A2	Baa1	-1.28	-0.88	0.77	-4.77	14.11	-5.27	1.52
LTCB	A3	Baa2	5.42	-0.32	0.52	-5.16	2.51	-0.54	2.14
Daiwa	A3	Baa3	-0.93	7.96	-2.63	12.94	-1.43	4.79	21.49
Regional Bank									
Bank of Yokohama		Baa2	0.05	16.79	0.95	-4.78	-4.16	5.10	13.14
Trust Banks									
Mitsui Trust		Baa2	7.19	-0.82	-4.19	-5.85	-7.69	-11.08	-21.28
Mitsubishi Trust		Baa1	15.96	-2.23	-4.33	31.26	6.39	22.03	84.83
Sumitomo Trust		Baa2	-2.05	-7.89	4.26	0.24	-10.37	5.18	-11.11
Other Banks			12.09	-1.65	0.98	11.12	9.16	15.63	56.12
Total All Banks			2.41	2.12	-0.65	-2.29	3.31	-0.66	4.19

Table 4
Changes in Loans from Main Banks and Secondary Sources, 1992-1998

Bank	Firms with Increased Main Bank Lending				Firms with Decreased Main Bank Lending			
	Number	Total	Percent Change		Number	Total	Percent Change	
			Main Bank	Secondary			Main Bank	Secondary
City Banks and Long-Term Credit Banks								
BOTM	49	38.67	48.45	36.59	50	-12.53	-39.37	-7.86
Sanwa	41	-2.96	48.44	-8.99	36	-10.09	-34.55	-7.03
Sumitomo	47	15.91	55.00	10.61	32	-41.67	-45.46	-41.09
Fuji	60	63.41	107.98	56.12	30	-27.12	-42.19	-25.41
DKB	59	4.29	62.04	-2.97	45	-19.10	-31.02	-17.67
IBJ	38	20.29	36.70	18.03	33	-21.32	-29.28	-19.95
Asahi	15	83.91	165.80	67.66	14	-35.96	-21.21	-43.59
Tokai	22	14.55	80.98	7.74	15	-10.28	-51.26	1.33
Sakura	59	50.58	87.44	46.26	38	-23.10	-46.14	-21.46
LTCB	6	-11.35	29.05	-17.30	7	-17.32	-22.06	-11.60
Daiwa	14	17.72	47.37	12.44	7	-24.26	-46.28	-20.23
Regional Bank								
Bank of Yokohama	5	42.55	31.16	46.36	5	-16.58	-24.46	-13.94
Trust Banks								
Mitsui Trust	8	40.37	43.83	39.85	7	-8.61	-49.94	-2.77
Mitsubishi Trust	8	78.72	95.63	73.45	2	-31.98	-26.11	-32.76
Sumitomo Trust	8	46.52	66.38	43.18	4	-40.67	-27.59	-42.71
Other Banks								
	22	57.02	75.83	50.95	10	4.31	-25.92	13.52
Total All Banks	461	19.17	58.05	13.87	335	-20.93	-38.19	-18.63

Table 5
 Factors Affecting the Change in Bank Lending to First-Section Firms
 Estimation Method: Ordinary Least Squares; 1994-98

	Total Loans	Main Bank	Secondary Lenders
Firm Variables			
Log (Assets)	-.289** (3.57)	-.048 (1.74)	-.242** (3.61)
Capital/Assets	.005 (0.92)	.001 (0.43)	.004 (0.96)
Return on Assets	-.046 (1.21)	-.032 (1.91)	-.014 (0.49)
Percent Change in Market Value	-.406 (1.36)	-.055 (0.55)	-.351 (1.52)
In Bond Market	.385 (1.68)	.044 (0.61)	.341 (1.81)
Enter Bond Market	-.594* (2.21)	-.102 (1.13)	-.492* (2.23)
Left Bond Market	1.488** (6.22)	.437** (5.96)	1.051** (5.45)
Financial Ownership	.001 (0.10)	-.004 (1.36)	.005 (0.78)
Business Ownership	-.005 (0.75)	-.004 (1.43)	-.001 (0.25)
Foreign Ownership	-.009 (0.77)	-.007 (1.84)	-.002 (0.17)
Bank Variables			
Return on Assets	.234 (0.78)	.126 (1.03)	.360 (1.54)
Risk-Based Capital Ratio	-.473 (1.63)	-.156 (1.59)	-.317 (1.36)
Nonperforming Loan Ratio	.105 (0.88)	.043 (1.03)	.062 (0.66)
Agriculture/Mining	0.041 (0.04)	-.441 (1.17)	.482 (0.50)
Construction	.514 (0.66)	-.082 (0.26)	.596 (0.92)
Manufacturing	-.160 (0.21)	-.286 (0.97)	.126 (0.20)
Wholesale/Retail	-.407 (0.50)	-.263 (0.85)	-.143 (0.21)
Finance/Insurance	-0.906 (0.92)	-.457 (1.07)	-.449 (0.48)
Transportation/Communication	-0.628 (0.72)	-.437 (1.31)	-0.191 (0.27)
Electric Power and Gas	.564 (0.65)	-.339 (1.07)	0.903 (1.22)
Services	.192 (0.17)	-.239 (0.67)	.431 (0.46)
Observations	3777	3777	3777
R ²	.029	.022	.027
SER	4.346	1.538	3.430

Table 6
 Factors Affecting the Change in Bank Lending
 Estimation Method: Fixed-Effects Specification; 1994-98

	Total Loans	Main Bank	Secondary Lenders
Firm Variables			
Log (Assets)	-2.337* (2.35)	-.234 (0.65)	-2.104** (2.70)
Capital/Assets	.211** (8.79)	.070** (7.97)	.141** (7.50)
Return on Assets	-.093** (2.71)	-.037** (2.96)	-.056* (2.07)
Percent Change in Market Value	.010 (0.03)	.133 (1.13)	-.124 (0.49)
In Bond Market	1.097** (2.98)	.198 (1.48)	.899** (3.11)
Enter Bond Market	-.945* (2.56)	-.165 (1.23)	-.780** (2.69)
Left Bond Market	1.970** (6.85)	.550** (5.25)	1.419** (6.28)
Financial Ownership	.020 (0.48)	.000 (0.03)	.020 (0.60)
Business Ownership	-.100* (2.03)	.007 (0.38)	-.107** (2.76)
Foreign Ownership	-.007 (0.18)	-.017 (1.22)	.010 (0.34)
Bank Variables			
Return on Assets	.137 (0.40)	-.067 (0.54)	.205 (0.77)
Risk-Based Capital Ratio	-.597 (1.74)	-.116 (0.92)	-.481 (1.79)
Nonperforming Loan Ratio	.063 (0.25)	0.130 (1.43)	-.068 (0.35)
Observations	3777	3777	3777
R ²	.297	.249	.302
SER	4.149	1.512	3.258

Footnotes

¹ Gibson (1995) examines three ways to identify a firm's main bank: whether a bank employee is on the Board of Directors of the firm, whether the bank is the largest bank shareholder of the firm, or whether the bank is listed first as the reference bank in the Japan Company Handbook. He finds a 95 percent correlation between these three methods of identifying the main bank and chooses the Japan Company Handbook method, since it has the best coverage of firms. Following Gibson, we use the Japan Company Handbook to identify main banks.

² Selling cross-shareholdings for a capital gain would increase tier 1 capital. If the firm also sells shares of the bank, it can pay down loans or replace credit it is no longer able to obtain from the bank.

³ Until the 1970s, firms had to receive approval for issuing debt from the Bond Issuance Committee. This and other impediments to the bond market have prevented debt issuance from being a viable option for most firms until fairly recently. See Hoshi and Kashyap (1999) for more details.

⁴ We restrict the sample to firms with a March fiscal year end for two reasons. First, it avoids serious timing problems across firms. Second, this dating lines up with the bank data, since banks report fiscal year results in March.