Federal Reserve Bank of Chicago

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*Elijah Brewer III, Hesna Genay, William Curt Hunter and George G. Kaufman*

WP 2002-20

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Elijah Brewer III
Federal Reserve Bank of Chicago

Hesna Genay
Federal Reserve Bank of Chicago

William Curt Hunter
Federal Reserve Bank of Chicago

George G. Kaufman
Loyola University Chicago
and Federal Reserve Bank of Chicago

March 1, 2002
This version December 31, 2002

Corresponding author: Hesna Genay, Federal Reserve Bank of Chicago, Economic Research, 230 S. LaSalle Street, Chicago, IL 60604. Phone: (312) 322-5796; fax: (312) 322-2357 hgenay@frbchi.org.

The authors would like to thank the seminar participants at the Federal Reserve Bank of Chicago and the "Financial Issues in the Pacific Basin Region" Conference for their comments. The views expressed in the paper are those of the authors and do not necessarily represent the views of the Federal Reserve System.

## The Value of Banking Relationships During a Financial Crisis: Evidence from Failures of Japanese Banks

Previous literature suggests that banking relationships can enhance the value of client firms in the presence of asymmetric information problems. Hence, severance of banking ties due to a bank failure can have adverse consequences for the clients of the failed bank. In this paper, we provide evidence on the value of banking relationships by examining the impact of three large bank failures in Japan on their clients and the clients of surviving banks. We find that, as in previous studies, the market value of customers of the failed banks is adversely affected at the date of the failure announcements. In addition, the effects are related to the financial characteristics of the client firms and their primary banks. Firms that have greater access to alternative sources of funding experience a less severe adverse impact from bank failure announcements. Similarly, clients of banks that are more profitable, better capitalized, and have lower loan loss reserves suffer less from the failure announcements. However, we also find that these effects are not significantly different from the effects experienced by all firms in the economy. That is, the bank failures represent "bad news" for all firms in the economy, not just for the customers of the failed banks.

## I. Introduction

Bank failures are theorized to have adverse consequences for other firms in general, and for customers of the failed institutions in particular. Firms that are customers of the failed institution may be adversely affected because, among other things, they may lose an ongoing source of funding and need to incur the expense of search and providing financial and other information about themselves to new lenders. Firms that are not customers of the failed bank may be adversely affected because the failure may signal existing but yet unrecognized problems at other banks, ignite problems at other banks through spillover or contagion, or foretell adverse economic conditions for the economy in the region or nationwide. But all firms and bank customers may not be equally affected by bank problems and failures. The effects may be related to characteristics of the individual firm and its bank. A number of recent studies have provided empirical evidence that bank problems and failures adversely affect the market value of a bank's corporate borrowers, both in the United States and a number of other countries (Slovin, Sushka, and Polonchek, 1993; Yamori and Murakami, 1999; Djankov, Jindra, and Klapper, 2001; Bae, Kang, and Lim, 2002; Ongena, Smith, and Michalsen, forthcoming). This paper contributes to the literature both by providing evidence on the effects of bank failures on the banks' loan customers in Japan and by examining whether the adverse effects on the failed bank's customers differ from those of other firms.

In recent years, an extensive literature has developed that examines the costs and benefits of bank-customer relationships, typically defined as multiple interactions between banks or bank loan officers and their borrower customers, whereby the bank gathers valuable, often confidential, information about the client.[1] In the presence of asymmetric information between

[1] For recent reviews of the literature, see Boot (2000) and Ongena and Smith (2000a).

firms and investors, long-term banking relationships can provide Pareto-improving solutions to the financing of firms. Close ties between banks and customers can generate information that would otherwise be not available to investors in public markets; make it possible for banks and firms to write contracts with features that, among other things, are not feasible or enforceable in public markets or in one-time transactions; provide the flexibility and the ability to renegotiate contracts which would allow banks and firms to adjust to unanticipated shocks; allow banks to better monitor the assets and activities of clients, mitigating agency problems; certify the value of the firm to outside investors; and enable intertemporal smoothing of contract terms that enhance the value of contracts.

On the other hand, banking relationships can reduce social welfare by generating perverse incentives for banks in the enforcement of contracts, provision of follow-up financing, and financing of high risk projects with positive net present value; increasing monopoly powers of banks; and isolating both customer firms and their banks from timely market discipline and corporate governance.

The value of banking relationships is likely to change when the banking system as a whole is experiencing problems, particularly if there are few alternatives to bank financing. For instance, the value of an existing ongoing relationship with a healthy bank can be higher during a financial crisis since firms would have limited financing options from alternative sources.[2] At the same time, bank failures can forcefully sever or limit valuable banking relationships. Moreover, banks might make sub-optimal decisions during a financial crisis regarding termination of loan contracts and allow insolvent firms continue to operate in order to reduce the reported amount of nonperforming loans on their books or to inflate their reported capital. "Evergreening" of loans

[2] Spiegel and Yamori (2000) provide evidence that the market value of firms is more closely tied to the market value of their main bank during financially turbulent periods.

during the savings and loan crisis in the U.S. and repeated restructuring of loans to insolvent Japanese firms in recent years are some examples of such sub-optimal termination decisions. Problems in the banking sector can also result in fewer profitable investments by firms that are highly dependent on bank financing.

A number of papers provide empirical evidence on the costs and benefits of banking relationships. James (1987), Billett et. al. (1995), and Lummer and McConnell (1989) report a special role of banks in lowering the cost of capital for firms with limited access to alternative sources of financing. Petersen and Rajan (1994), Berger and Udell (1995), and Cole (1998) find the value of banking relationships to small businesses in the U.S. -- which typically face greater information problems than larger firms and have more limited access to public capital markets -- to be particularly important. Several papers present evidence on the value and the nature of banking relationships in other countries where banks play a greater role in financing of firms than in the United States. Hall and Weinstein (2000), Hoshi, Kashyap, and Scharfstein (1990 and 1991), Kaplan and Minton (1994), Kang and Shivdasani (1995), Morck and Nakamura (1999), Morck, Nakamura, and Shivdasani (2000), Peek and Rosengren (2002), and Weinstein and Yafeh (1998) focus on banking relationships in Japan. Degryse and Van Cayseele (2000), Detragiache et. al. (2000), Elsas and Krahnen (1998), Foglia et. al. (1998), and Ongena and Smith (2000b), examine banking relationships in Europe. These studies report that banking relationship enhance firm value by generating exchange of information that facilitates finance, provide corporate governance, enable intertemporal smoothing of loan prices, and provide liquidity insurance to borrowers during periods of financial distress. However, the studies also present evidence that banking relationships can, at times, involve costs in terms of lower growth experienced and higher interest rates paid by firms with close banking relationships (Weinstein

and Yafeh, 1998) as well as misallocate economic resources by allocating funds to poorly performing firms (Peek and Rosengren, 2002).

Several other papers focus on the effects of problems or failures of individual banks or multiple banks on banking relationships. Chiou (1999) reports that Japanese firms that were customers of Daiwa Bank suffered negative excess returns following the announcement of Daiwa's trading scandal in 1995. Gibson (1995 and 1997) shows that investments at bank-dependent Japanese firms were lower for firms with lower-rated main banks. Kang and Stulz (2000) provides evidence that Japanese firms that were more dependent on Japanese bank loans performed relatively better when their banks were doing well in the 1980s and more poorly when their banks were performing poorly in the 1990s, after the bubble in asset prices collapsed.

Slovin, Sushka, and Polonchek (SSP, 1993) examine the stock price reactions of client firms of the Continental Illinois National Bank during its period of economic insolvency leading up to its bailout by the FDIC in 1984. They find that firms with known lending relationships at Continental Illinois experienced significantly negative abnormal returns during the banking firm's financial difficulties before its resolution, but significant positive returns at the announcement of the bailout by the FDIC. However, the positive abnormal returns over the bailout event window were smaller than the aggregate negative abnormal returns over the event period immediately before the bailout. Hence, on net, clients of Continental experienced significant negative abnormal returns as a result of the banking firm's financial distress.

A number of papers extend the SSP approach to bank distress or failure announcements during financial crises in other countries. Yamori and Murakami (1999) focus on the failure of a Japanese bank -- Hokkaido Takushoku Bank in 1997 – and find that the customers of the bank earned negative abnormal returns at the time of the failure announcement. Djankov, Jindra, and

Klapper (2001) examine the stock market valuation effect of the insolvency of 31 banking organizations in East Asia (Indonesia, Korea, and Thailand) during the Asian Crisis on borrowing firms. They report that a bank's announcement of insolvency and pending liquidation led to a significant negative stock market reaction. On the other hand, nationalization announcements with subsequent recapitalization and new management were associated with positive abnormal returns.

Bae, Kang, and Lim (2002) examine the durability of bank relationships in Korea during that country's financial crisis. They find that bank financial distress was associated with negative abnormal returns for client firms, and the announcement effects were greater for the bank-dependent and financially weak firms of the weakest banks. This suggests that a combination of bank and firm characteristics determines the impact of bad news about a bank on its customers. Ongena, Smith, and Michalsen (forthcoming) examine impact of bank distress announcements in Norway on bank client firms. The authors find that the impact of these announcements on bank client firms were small and temporary, and did not statistically differ from their impact on unrelated firms. The authors also find that more liquid firms—as measured by access to unused bank funds and equity issues prior to the banking crisis—had higher abnormal returns.

We add to this literature in this paper by examining the impact of the failure of three large Japanese banks in 1997 and 1998 on the market valuation of nonfinancial firms. Following Slovin, Sushka, and Polonchek (1993) and others, we estimate the impact of the failure announcements on the market valuation of the client firms of the failed banks. We extend the analysis, however, by also estimating the impact of the failure announcements on all firms including the clients of surviving banks. With the exception of Ongena, Smith, and Michaelsen (forthcoming), previous studies have not analyzed this aspect of bank financial distress. By also

examining the stock valuation of the failure announcements for firms that did not have relationships with the failed institutions, we can identify any differences in the effects on clients and non-clients of the failed banks. This is particularly important when the distress or failure announcements occur in the midst of an on-going financial crisis, and therefore, can have strong implications for the viability of surviving banks and their relationships with client firms. In addition, we relate the estimated abnormal returns for both sets of nonfinancial firms to variables that capture the value of banking relationships. Prior studies suggest that the value of banking relationships should depend on the characteristics of firms and their banks. The stronger the financial health of a firm, the more alternatives it has to existing bank financing. Hence, we would expect firms with greater access to alternative sources of funding to have a less adverse reaction to the failure announcements. Similarly, relationships maintained by banks in relatively good financial condition are expected to last longer. Hence the impact of the failure announcements should be less negative for the clients of healthier banks.

We find that, as in previous studies, the market value of customers of the failed banks are adversely affected at the date of the failure announcements. In addition, the effects are related to the financial characteristics of the client firms and their banks. For nonfinancial firms that have a more valuable banking relationship, the less severe is the adverse impact. Moreover, consistent with expectations, the impact of the announcements are positively correlated with the financial condition of firms' primary bank. However, we find that these effects are not significantly different from the effects experienced by all firms in the economy. That is, the bank failures represent "bad news" for all firms in the economy, not only the customers of the failed banks. Our analysis focuses on an economy that is bank-dependent and in the midst of an extended financial crisis. Nevertheless, to the extent that these results for Japan are representative, they

raise questions regarding the total impact of bank failures on their clients and the rest of the economy.

The next section of this paper describes how bank failures can potentially influence the stock market value of bank borrowers and other firms. The third section describes the data and methodology. The empirical results for the effects of the bank failures on their loan customers and other firms is reported in section four. Robustness checks of our main results are presented in section five. The final section summarizes the findings and offers conclusions. The Appendix provides a brief overview of the events leading up to the three failures.

## II. The Impact of the Failures

We examine the market response at the failure announcements of three important Japanese banks in 1997 and 1998—Hokkaido Takushoku Bank on November 17, 1997, the Long-Term Credit Bank of Japan (LTCB) on October 23, 1998, and the Nippon Credit Bank (NCB) on December 13, 1998.[3] A defining characteristic of all these three failures was that the magnitude of bad loans and valuation losses previously disclosed by the failed institutions had been significantly understated. Thus, the banks concealed the true extent of their problems. The release of this new information might call into questions the availability of funds for client firms, especially for those experiencing financial distress and/or those that use bank loan agreements as a major source of liquidity and certification of value. Second, the failures might also have signaled a regulatory shift to increased probability of bank closures in the future, particularly for the riskier banks (Brewer et. al., forthcoming; Spiegel and Yamori, 2000a). In either of these cases, if banking relationships enhance the value of bank clients, we would expect clients of both announcing and surviving banks to be adversely affected by the failures.

[3] These failures are described in greater detail in the Appendix.

Third, the three failures revealed a significant change in the institutional and government support structure of Japanese financial institutions. Previously, , weak or troubled institutions could rely on implicit and explicit government support, capital injections and new loans from financially or otherwise affiliated companies, or "rescue mergers" with a stronger institution. The unwillingness of other banks to provide support and thus, permit these banks to fail suggests that the financial distress might extend beyond the failed bank and adversely affect the whole economy. Thus, a bank failure could have implications for the availability of bank credit for a nonfinancial firm irrespective of the identity of its lending bank.Fourth, failed banks in Japan generally are not closed and put into receivership. Two of our three failed banks were nationalized and kept in operation. The third bank was taken over by several other banks. If these changes cause the "new" banks to provide their loan customers with less favorable terms than the old banks, then the stock market valuation effects should be similar to those observed in Slovin, Sushka, and Polonchek (1993). On the other hand, if the nationalizations are perceived by the financial market as an attempt by the Japanese government to ensure that the client firms have continued assess to credit on the same basis, the stock market reactions' of clients of the nationalized banks should be non-negative.

It is also possible that the bank failures have no impact on the valuation of their clients, if it was common knowledge that the three banks were experiencing severe problems prior to their failures. If the failures were fully anticipated by investors and already priced in the stock prices of bank clients, we would expect no significant reaction to the failure announcements. However, previous papers by Brewer et. al. (forthcoming) and Spiegel and Yamori (2000a) show that these failures had a significant adverse impact on the market valuation of surviving banks, indicating that the events were not fully anticipated.

Lastly, previous studies suggest that the value of banking relationships is related to the ability of firms to access alternative sources of funding, the degree of information asymmetry between firms and investors, the future investment opportunities of firms, their profitability, and other firm characteristics. If the Japanese bank failures changed the value of banking relationships, we would expect the magnitude of the impact of these failures to be correlated to firm characteristics that enhance the value of the relationships. In particular, we would expect firms that are heavily dependent on their existing banks and have few alternatives to existing relationships to be more adversely affected by bank failure announcements. On the other hand, firms that are clients of relatively healthy banks should suffer less from these announcements. A relationship with a bank in good financial condition is less likely to be threatened by the failure of another bank; hence for firms whose primary bank is relatively healthy, the failure announcements should have a less adverse effect.

## III. Data and Methodology

Our empirical analysis is conducted in two parts. In the first part, we estimate the responses of industrial firms to the three bank failures. We compare the responses of firms that were clients of the three failed banks to the responses of a control set of firms that were clients of the surviving banks.

Our methodology closely follows the event study methodology used in previous papers examining the response of stock prices to changes in the regulatory environment and announcements. Specifically, the daily stock returns of firms are examined to identify any abnormal performance on or around the announcement of the three failure events. The impact of the events is measured by estimating a standard multivariate regression model, similar to that used by Binder (1988), Brewer et. al., forthcoming, Karafiath, Mynatt, and Smith (1991),

Malatesta (1986), Millon-Cornett and Tehranian (1990), and Schipper and Thompson (1983), among others. The model takes the following form:

$$R_{it} = a_i + b_i R_{mt} + \sum_{k=-1}^{+1} g_{ik} D_k + e_{it}, \qquad \textbf{(1)}$$

where $R_{it}$ is the stock return of firm $i$ on day $t$; $a_i$ is the intercept coefficient for firm $i$; $R_{mt}$ is the market index for day $t$; $b_i$ is the market risk coefficient for firm $i$; $D_k$ is a binary variable that equals 1 if day $t$ is equal to the event day or window $k$ ($k \in [-1,+1]$), zero otherwise; $g_{ik}$ is the event coefficient for firm $i$; and $e_{it}$ is a random error. Equation (1) is estimated as a system of separate equations for the individual firms in the sample using seemingly unrelated regressions, which permit the impact of the events examined and the variance of the residuals to vary across firms. The estimated parameters $g_{ik}$ capture any daily intercept shifts on event day (window) $k$ and provide an estimate of abnormal (excess or unexpected) returns associated with the failure announcement on day (window) $k$.

The announcement dates of the three failures were obtained through a search of *the Wall Street Journal*, *Reuters* news wire, *Newscast* news service, and the *Knight Ridder* business wire. These include news articles from Japanese and other international news sources. All dates are Japanese dates. If the failure announcement was made during a trading day in Japan, that date is used as the event day [0]. If an announcement was made after the market was closed or over the weekend, we use the next trading date as event date.[4] For the Long-Term Credit Bank we used the date of the first news stories that cited official government sources that the bank was in imminent danger of being nationalized. Daily stock prices and returns were obtained from the

[4] Consequently, the event dates for LTCB (October 19, 1998) and NCB (December 14, 1998) differ from the announcement dates.

University of Rhode Island's Pacific Basin Capital Markets Research Center (PACAP) 1999 database. Market returns are measured by the TOPIX index, which includes seasoned shares of over 1,000 major companies (First Section) traded on the Tokyo Stock Exchange, and were obtained from PACAP.

The values of the parameters in equation (1) are estimated daily over a sufficiently long observation period before and after each event date to obtain meaningful results, but short enough not to be affected by the other events examined in the study. The length of the sample periods is from 198 trading days before the first event date to 10 days after the last event date and conforms closely to those used in previous studies (e.g., MacKinlay, 1997; Smirlock and Kaufold, 1987). However, because the two events in 1998 are reasonably close to each other, we use a common estimation period for these two events. To reduce the effects of specific events on subsequent events in the common estimation period, equation (1) is modified for these two failures so as to permit a shift in both the intercept ($\alpha$) and the market index coefficient ($\beta$) after the first failure in each estimation period as follows (Binder and Norton, 1999):

$$R_{it} = a_i + b_i R_{mt} + a_i P + b_i P R_{mt} + \sum_{e} \sum_{k=-1}^{+1} g_{ik,e} D_{k,e} + e_{it,} \qquad \textbf{(1')}$$

where $e$ is the number of events in 1998 ($e$ =2), and $P$ is a binary variable that identifies post-event periods; i.e., P is equal to 1 after the LTCB failure, zero otherwise.

We examine the individual firms' estimated daily abnormal returns— $g_{ik}$ —for each event for two groups of firms-- the clients of failed banks and the control group of the clients of surviving banks. Following Gibson (1995 and 1997) and Yamori and Murakami (1999), we identify the clients of the three failed banks from the Autumn 1997 and Autumn 1998 issues of the *Japan Company Handbook (JCH)*, which identify the banks used by each company. Firms

are identified as clients of a failed bank if the failed bank appears anywhere on the bank list, irrespective of its rank. Because there were two failures in 1998, some firms are identified as clients of both the LTCB and NCB. All other firms included in the 1999 PACCAP database are identified as the clients of the surviving banks and are grouped in the control sample. Our sample for the failure of Hokkaido Takushoku Bank in 1997 includes 70 firms identified as clients of the failed bank and 1,214 firms identified as clients of surviving banks. For the failures in 1998 the sample includes 197 firms that were clients of LTCB only, 60 firms that were clients of NCB only, 29 firms that were clients of both LTCB and NCB, and 926 firms that were clients of the surviving banks. To ensure that the estimates of parameters in equations (1) and (1') are based on reliable data, we exclude from our sample any firm that did not have daily stock returns for at least one-half of the estimation period.

If the failures of the three banks severed or limited valuable banking relationships and had unanticipated negative implications for the value of the firms, we would expect the abnormal returns of client firms during the event window to be negative and statistically significant. If the events revealed no new information or were considered irrelevant by the shareholders of firms, the abnormal returns would be statistically indistinguishable from zero. To distinguish among the two scenarios, we test the hypothesis $H_0^1$, that the cross-sectional average of individual abnormal returns for the clients of the failed banks is equal to zero for each event, *e*, i.e.,

$$H_0^1 : \frac{1}{N_1}\sum_{i=1}^{N_1} g_{i,e} = 0$$

where $N_1$ is the number of clients of the failed bank.

We also conduct similar tests for the clients of surviving banks in the sample to determine if the failures had a significant impact on the stock market valuations of these firms. That is, we test the hypothesis:

$$H_0^2 : \frac{1}{N_2} \sum_{j=1}^{N_2} g_{j,e} = 0$$

where $N_2$ is the number of firms that were clients of surviving banks.

To determine whether the abnormal returns of the failed-bank clients are the same as those of the clients of surviving banks, we test the hypothesis that the average abnormal return for the clients of the failed banks equals the average abnormal return of the clients of the surviving banks. That is, we test the hypothesis:

$$H_0^3 : \frac{1}{N_1} \sum_{i=1}^{N_1} g_i = \frac{1}{N_2} \sum_{j=1}^{N_2} g_j$$

In addition to examine the robustness of the results, we also examine the cross-sectional median of abnormal returns and test the hypothesis that the number of firms with negative abnormal returns is equal to 50 percent of each sample against the alternative hypothesis that the number of firms with negative abnormal returns comprise more than 50 percent of the sample. A rejection of the null hypothesis for clients of the failed banks with a greater number of negative abnormal returns than positive ones would be consistent with the hypothesis that the failures resulted in the severance of valuable banking relationships. A rejection of this hypothesis for client firms of surviving banks with a greater number of negative abnormal returns than positive ones would be consistent with the hypothesis that the failures had negative spill-over effects on the remainder of the economy, or revealed adverse information about the surviving banks and/or their clients.

Lastly, we test the hypothesis that the clients of the failed and surviving banks belong to populations with the same distribution using the Mann-Whitney-Wilcoxon test. A rejection of this hypothesis that the median of the abnormal returns are the same for the two populations would be consistent with the notion that the failures had a different impact on the clients of the failed banks than on the rest of the economy.

In the second part of our analysis, we examine whether the individual abnormal returns estimated in equation (1') are related to the financial characteristics of firms and their banks. To do this, we pool the time series observations of the abnormal returns for the three-day event window [-1, +1] for each firm, $g_{[-1,1],i}$ across all three events in one equation. Hence, the final sample can include up to three observations for each firm: one measuring the firm's abnormal returns at the failure of announcement of Hokkaido Takushoku Bank, and one for the failure announcement of LTCB and the third for the failure announcement of NCB. We then relate these abnormal returns to variables that capture the value of banking relationships as follows:

$$g_{[-1,+1],i} = a + +d CL_i + f COND_i + y B_i + l(CL_i \; x \; COND_i) + q(CL_i \; x \; B_i) + \sum_j J_j DIND_j + m_{i,} \qquad \textbf{(2)}$$

where $CL_i$ is a binary variable that identifies the clients of the failed banks and is equal to one if firm *i* is a client of the failed bank, zero otherwise; $COND_i$ is a variable that describes the financial condition of firm *i* at the time of the event; and $B_i$ is a vector of variables that measure the financial characteristics of firm *i*'s primary bank. The interaction terms (*CL x COND* and *CL x B*) are included to examine whether the abnormal returns of clients of failed banks are more sensitive to firm and bank characteristics than the abnormal returns of the clients of surviving

banks. Six industry binary variables (DIND) are included in equation (2) to account for unobserved industry "fixed effects."[5]

We estimate equation (2) using ordinary least squares with White's (1980) adjustment for heteroskedasticity. The vector of firm characteristics, COND, includes firm size as measured by the log of total assets; firm age; future profit opportunities as measured by the ratio of market value of assets to book value of assets (Tobin's Q), and four alternative measures of the financial condition of firms: the ratio of loans to total assets (LOANS/TA); the ratio of book value of equity to total assets (EQUITY/TA); the average return on assets over the previous five years (ROA); and a measure of liquidity—the ratio of cash and securities to total assets.[6]

Asset size serves as a proxy for the potential information asymmetries faced by firms when seeking external financing (Petersen and Rajan, 1994). Larger firms are likely to be better known among market participants and tend to have easier access to external financing.[7] Hence we would expect stock returns of larger firms to be less adversely affected by the bank failures. We include firm age because previous research (Petersen and Rajan, 1994) suggests that older firms that have a more established reputation tend to have easier access to external financing and hence be less adversely affected by bank failures. A high ratio of market to book value of assets-- Tobin's Q—suggests more growth opportunities. Barclay and Smith (1997) find that firms with more growth opportunities have greater financing choices. Hence, we expect that firms with more growth opportunities should be less affected by the loss of a banking relationship. To allow for

[5] For a discussion of the existence of "other effects" in pooled cross-sectional time-series analysis see Balestra and Nerlove (1966).

[6] As an alternative to ROA, we also included return on equity in equation (2). The results were similar to those with ROA, and hence are not reported in the paper.

[7] The correlation between asset size and access to external financing is likely to be stronger in Japan where some of the eligibility requirements for issuing corporate bonds on the capital market are based on firm size.

nonlinear as well as linear relationships between abnormal returns and AGE and TOBQ, we also specify their squared terms-- $AGE^2$ and $TOBQ^2$.

The ratio of loans (both from banks and other financial intermediaries) to total assets captures the extent to which firms rely on intermediated credit for external funding. Firms with a greater amount of intermediated credit in Japan are also likely to be more bank dependent and thus, less able to find new external sources of financing. We expect that the abnormal returns should be negatively correlated with the ratio of loans to total assets.

The capitalization ratio measures firm leverage. Higher leveraged firms are perceived as more risky. In addition, given the adverse selection problem associated with external financing, a highly levered nonfinancial firm may face higher interest costs and/or other fees to replace an existing banking relationship or obtain another external monitor after the failure of the bank with which it has a relationship. Thus, the capitalization ratio should be positively correlated with nonfinancial firms' abnormal returns.

We also capture firm performance with return on assets (net income divided by book value of total assets) averaged over the five years prior to the failures. More profitable firms should have more financing options. We expect that firms with greater profitability should be less negatively affected by the loss of a banking relationship or bank financial distress in general.

The ratio of cash plus investment securities to total assets measures the firm's liquidity or amount of internal funds available to the firm. Firms with relatively more internal funds should be less dependent on external financing, and, therefore, less affected by bank failures. Because the above financial condition variables are highly correlated, we specify only one at a time in estimating equation (2).

The vector $B_i$ includes variables that measure the financial health of each firm's primary bank – identified as the first bank listed in the *Japan Company Handbook*: three accounting measures of condition, a market measure of the bank's financial health, and a measure of bank size..

The three accounting measures of bank financial condition are the capitalization ratio (Bank's Equity/TA), the ratio of loan loss reserves to total loans (Bank's Loan Loss Reserves / Total Loans), and return on assets averaged over the previous five years (Bank ROA). Equity capital and profits offer banks a buffer against adverse shocks. Hence, more profitable and better capitalized banks are more likely to survive in the long term, enhancing the value of relationships they maintain. Consequently, we would expect the clients of these banks to suffer less from the adverse consequences of bank failure announcements. On the other hand, greater loan loss reserves may indicate sub-par loan portfolios, and hence lack of bank longevity. Therefore, we would expect the clients of banks with larger loan loss reserves to suffer more from the failure announcements. As with firm characteristics, we introduce these variables one at a time to avoid multicollinearity problems.In addition to the accounting variables, the model includes a market measure of each bank's financial health: the bank's stock market reaction to each failure as measured by its abnormal returns over the [-1, +1] event window and estimated within the framework of equation (1'). Brewer et. al. (forthcoming) find that the failures of Hokkaido Takushoku Bank, LTCB, and NCB had, on average, a significant negative impact on the market valuation of surviving Japanese banks. Moreover, at the bank level, these effects were correlated with the financial condition of the surviving banks: healthier banks suffered significantly less from the failure announcements. These results indicate that the abnormal returns of banks at the announcement of each failure provide a market measure of bank longevity. Therefore, we would

expect the abnormal returns of bank clients to be positively correlated with those of their primary bank.

Bank size is also likely to be positively correlated with the value of relationships. Larger banks tend to be more diversified, and hence, are able to better withstand adverse shocks. Moreover, regulators may implement explicit or implicit "too-big-to-fail" policies that insulate larger banks from market forces and prolong their life. In addition to enhanced longevity, larger banks may be able to offer a wider scope of services to their clients, increasing their value in a relationship. Therefore, we would expect to observe a positive correlation between the impact of bank failure announcements on firms' stock returns and the size of their primary bank.All variables on the financial condition and other characteristics of firms and banks were obtained from the PACAP 1999 database and are measured as of the end of the fiscal year prior to each failure.

If the failure events had a significant impact on the stock market valuation of the firms which was systematically related to financial characteristics of firms and their banks, we would expect the coefficients $f$ , $l$ , $\psi$, and $\theta$ in equation (2) to be significantly different from zero. Hence, we test the hypotheses

$$H_0^4 : f + l = 0$$

and

$$H_0^5 : y + q = 0$$

for the clients of the failed banks, and

$$H_0^6 : l = 0$$

and

$$H_0^7 : y = 0$$

for the clients of the surviving banks.

To determine whether the relationship between abnormal returns and financial characteristics of firms differed systematically across clients of failed and surviving banks, we also test the hypotheses:

$$H_0^8 : f = 0$$

and

$$H_0^9 : q = 0$$

## IV. Empirical results

Table 1 provides estimates of abnormal returns for several portfolios of bank customers at the announcement dates of the three bank failures. Estimates reported are the mean and median of the individual equations of each firm. Separate results are reported for bank customers that are clients of one of the three failed banks and clients of one or more of the surviving banks. For the LTCB and NCB failures, we also report results for a portfolio of bank customers that list both failed banks as their primary banks. Thus, there are five different failed bank client portfolios and three surviving bank client portfolios. Table 1 also provides test statistics for three hypotheses for all three failure events: 1) that the abnormal returns for the portfolio of client firms equal to zero for each event ( $H_0^4$ through $H_0^7$); 2) that the portfolio abnormal returns of failed bank clients are equal to that of surviving bank clients ( $H_0^8$ and $H_0^9$); and 3) that 50 percent of the failed banks' client firms have negative abnormal returns on and around each of the three events. The first three columns of table 1 report the results of the estimated abnormal

returns of individual firms for days [-1], [0], and [+1] of each event window, respectively. The fourth column reports the average abnormal returns for the [-1, +1] window.

Of the 20 estimated abnormal mean returns of the failed bank clients (four event windows for five different failed bank client portfolios), 15 (75 percent) have the expected negative signs, but only 8 are statistically significant. Do these effects significantly different from those of clients of surviving banks? The results in table 1 suggest that they do not. Of the 12 estimated abnormal mean returns of the surviving bank clients, 11(92 percent) have the expected negative sign and 9 are statistically significant.

The results using the median abnormal returns are similar to those using the the mean returns. For example, the median abnormal return over the three-day [-1, +1] window was negative for each portfolio, but significant only for the failures of LTCB and NCB. Once again, we could find no evidence that the impact of the failures was greater for the clients of the failed banks. To determine whether client firms with negative abnormal returns statistically outnumbered those with positive returns, we computed the proportion of positive abnormal returns minus 0.5 divided by the standard deviation of a binomial distribution (the "sign test"). For the [-1, +1] window, the sign test indicates that the number of client firms with negative abnormal returns exceeded those with positive returns in 4 of the 5 cases for failed bank sample of firms and in all three cases for the clients of surviving banks.

The statistics in the rows labeled "T-test for equality of means" test the hypothesis that the impact of the announcements was equal across the two different client portfolios. We can reject the equality of the average abnormal returns and their distribution for the clients of failed and surviving banks only in 8 of the 40 cases. This collective evidence strongly suggests that bank failures have meaningful adverse effects on the stock market valuation of surviving as well as

failed bank client firms. Thus, our results suggest that bank failures serve as bad news for all firms in the economy, not just those of failed banks. In part this may reflect the fact that the whole banking sector in Japan was experiencing financial distress during the 1990s. This makes it more likely that bank dependence is costly for all firms regardless of the identity of their primary bank (Kang and Stulz, 2000).

*Cross-section tests of the relationship between firms financial characteristics and abnormal returns*

Failure announcements need not have equal effects on all bank client firms. Indeed, theory suggests that the announcement effects should be related to the financial and other characteristics of both the firms and their banks. In this section we explore this relationship. Table 2 provides summary statistics for the variables that we use in estimating the cross-section regression equation. For the Hokkaido Takushoku Bank, there appears to be no statistically significant differences in size, dependence on intermediated debt, profitability, liquidity, and age, between firms that are clients of the failed bank and those that are clients of surviving banks. However, client firms have less capital and fewer future profit opportunities (as measured by Tobin's Q) than clients of other banks.

On the other hand, there are more significant differences between the characteristics of clients of LTCB and NCB, and clients of surviving banks. As indicated in panel B of table 2, failed bank client firms are larger, less capitalized, more dependent on intermediated debt, and are less profitable and less liquid. There are, however, no significant differences between these firms in terms of future profit opportunities and age. A comparison of the clients of LTCB and NCB separately ("Clients of LTCB only, "Clients of NCB only," and "Clients of both banks")

indicates that, except for size, the significant differences persist in these smaller client groups as well.

*Regressions of abnormal returns on client firms financial characteristics*

The cross-section regression results are reported in table 3.[8] The dependent variable is abnormal returns for each firm as computed in the previous section. The four panels in the table report the results of estimating equation (2) with one of the four alternative measures of the financial condition of firms (Loans/TA, Equity/TA, ROA, and Liquidity). Each panel, in turn, contains three sets of three columns, results for each of the bank characteristics: Equity/TA, Loan Loss Reserves/Total Loans, and ROA. Within each set, columns one and two report the coefficient estimates for client firms of failed and surviving banks, respectively. Column three reports the significance levels for the test that the coefficients for clients of failed and surviving banks are equal.

If bank failure adversely affects valuable relationships, we should expect variables positively correlated with information problems, and hence bank dependence, to be negatively correlated with abnormal returns. Furthermore, we would expect the correlation to be stronger for the clients of failed banks.

The results in table 3 are broadly consistent with the prediction that firms for which existing banking relationships are more valuable suffer more at announcement from the failure of their bank. Clients of failed banks that relied more on intermediated debt, those that were less profitable, or less capitalized had significantly more negative reactions to the failure announcements.

[8] Industry binary variables are not included in table 3. The results are available from the authors upon request.

Similarly, client firms of surviving banks for which existing banking relationships are likely to be more valuable experienced more negative abnormal returns at announcement of the three bank failures. In particular, firms that relied more heavily on intermediated debt, those that had lower capital ratios, lower ROA, and lower liquidity had significantly more negative abnormal returns. These results are consistent with the hypothesis that bank failures threaten the viability of valuable banking relationships at all banks.

The only instance where we can reject the equality of coefficients on these firm characteristics for the clients of failed and surviving banks is for firm profitability. The correlation between abnormal returns and ROA of firms is stronger for the clients of failed banks. Hence, the results show little support for the prediction that the relationship between abnormal returns and financial characteristics is stronger for the clients of failed banks.

The coefficients on the variables {*Firm Size, Firm Age, and Firm's Tobin Q*} indicate that firm size is positively and significantly correlated with the abnormal returns of the failed bank clients in all models. Therefore, consistent with our predictions, larger clients suffered less from the failure of their banks. Moreover, we can reject the hypothesis that the correlation between size and abnormal returns for the clients of failed and surviving banks is equal in all of these models. The magnitudes of the coefficients on firm size for the two groups indicate that the abnormal returns of the failed-bank clients are two to three times as large as those of the surviving-bank clients. These results suggest that clients of failed banks that had greater access to external financing experienced less severe stock market reactions to the failure announcements than the clients of surviving banks with similar access.

The sign and magnitude of coefficients for AGE and its squared term in table 3 indicate that older firms suffered less from the failure announcements than younger firms, consistent with our

expectations.[9] In most cases, the coefficient on AGE is negative and significant and the coefficient on $AGE^2$ is positive and significant. When one calculates the marginal effect of age on abnormal returns, the age at which the relationship between abnormal returns and age turns from negative to positive ranges between 14 and 44 years. Hence, for relatively young firms (less than 44 years old at most), abnormal returns are negatively correlated with age. However, for mature firms (more than 44 years old), abnormal returns are positively correlated with age. Since the sample mean for age is about 55 years, for most of the firms in the sample, the net impact of AGE is positive.

Consistent with our predictions, clients of both the failed and surviving banks that had more future opportunities were less severely affected by the failure announcements, but this effect was declining in the level of TOBQ.

Also consistent with our expectations, we find that clients of healthier banks suffered less from the failure announcements. For the clients of surviving banks, the accounting measures of bank health were the significant determinants of cross sectional variation in firms' abnormal returns. Clients of banks that were better capitalized and more profitable, as well as the clients of banks that has lower loan loss reserves experienced less negative abnormal returns at the failure announcements. On the other hand, for the clients of failed banks, the market measure of bank health appears to be the most important. The more negative the stock market reaction of the primary bank of a client of the failed bank was, the more negative was the reaction of the firm.

The size of firms' primary bank appears to play no significant role in explaining the cross-sectional differences in the abnormal returns of bank clients.

Overall, the results in table 3 show support for the hypothesis that the abnormal returns of

[9] For ease of reading, the coefficients for $AGE^2$ in table 3 are normalized by dividing them by 100.

firms at the announcement of the three bank failures are correlated with the characteristics of both the firms and their primary bank. Moreover, the directions of these correlations are consistent with our predictions. However, table 3 offers little evidence that the relationship between firm and bank characteristics and abnormal returns is stronger for the clients of failed banks relative to the clients of surviving banks. The three failures had more severe adverse impacts on the valuations of all firms for which existing banking relationships were more valuable, regardless of whether their banks failed or survived.

## V. Robustness Checks

We checked the robustness of our results under an alternative definition of a bank client and alternative specifications of the baseline model. In this section we briefly discuss the results of these robustness checks.

*An Alternative Definition of a Client*

We altered the empirical definition of a bank client so that a firm is classified as a client of a failed bank only if the bank appeared as the first bank in the list published by *the Japan Company Handbook*. One direct impact of this, more conservative, definition of a client was a significant reduction in the number of firms identified as clients of the three failed banks from a total of 327 firms in the baseline model to 30 firms under the new definition. Nevertheless, our qualitative results remained the same.[10] The failure announcements were again associated with a decline in the share prices of the clients of both the failed and surviving banks and the differences between the two groups were again statistically insignificant. For both groups of firms, the stock market reactions were correlated with firm characteristics in the same manner as reported in table 3.

[10] To conserve space, we do not report the results with the alternative definition of a client in the paper. However, they are available from the authors upon request.

*Selection bias*

*a. Potential Reverse Causality*

Next, we focused on the issue of potential reverse causality, or endogenous self-selection between banks and client firms. It is possible that the negative impact of the three failure announcements on the share prices of bank clients that we report in the paper reflects not the value of banking relationships, but the information revealed by the failures on the creditworthiness of bank clients. If the banks failed because of poor underwriting standards—so poor banks are caused by poor client firms--, then it is difficult to interpret our results as evidence of changes in the value of banking relationships. There is no panacea for dealing with this potential problem. Previous papers have addressed it by either examining the impact of bank distress that does not result in outright failure (e.g. deterioration in bank capital or downgrades of banks' credit rating) or by excluding insolvent clients from the analysis. While these procedures exclude the some of the potential source of reverse causality, they do not completely remove it. In this paper, we take an alternative approach. Specifically, we assume that most of the potential causality arises from endogenous self-selection between banks and firms based on the financial characteristics of banks and their clients. That is, weak firms seek out weak banks. In that case, client firms of failed banks would be in worse financial condition than those of surviving banks. We can explicitly model this self-selection in a two-equation treatment model as follows:

$$
\begin{aligned}
g_{[-1,+1]} &= f(COND, \text{Firm Size}, CL, \text{Bank's Reaction to the Failure}, DIND) \\
CL^{*} &= g(COND, \text{Firm Size}, \text{Firm Age}, (\text{Firm Age})^{2}, \text{Firm's Tobin Q}, \\
&\qquad (\text{Firm's Tobin Q})^{2}, \text{Bank Size}, \text{Bank's Equity/TA}, DIND) \qquad \textbf{(3)} \\
CL &= \begin{cases} 1 & \text{if } CL^{*} > 0 \\ 0 & \text{otherwise} \end{cases}
\end{aligned}
$$

where the variables are defined as before, and the error terms in the models of $g$ and $CL^*$ are bivariate normal with mean zero and covariance matrix:

$$\begin{bmatrix} s & r \\ r & 1 \end{bmatrix}.$$

Hence, we assume that whether a firm is identified as a client of one of the three failed banks (CL=1) is the outcome of an unobserved variable $CL^*$ that is a function of firm and bank characteristics. We also assume that the abnormal returns of firms are related to their financial condition, size, industry, and an indicator variable for identifying the clients of failed banks. Note that the analysis of the correlation between abnormal returns of firms and their financial characteristics in equation (3) does not differentiate between the clients of failed and surviving banks. Instead, the relationship between these variables is analyzed by pooling all firms together, and the only differentiation for the clients of failed banks appears in the coefficient for the indicator variable for these firms, CL. However, firm (and bank) characteristics influence the matching between firms and the failed banks. Table 4 reports the summary of results from the maximum likelihood estimation of equation (3). Specifically, we report the coefficients on the variables of interest under both the OLS estimation of the $g$ model in equation (3) and the coefficients from the maximum likelihood estimation. We also report results for the hypothesis that the correlation between the error terms in the models of $g$ and $CL^*$ is zero ($r = 0$). In all four models we can reject the hypothesis that the selection and the excess returns models are independent. Hence, self-selection appears to play a role in the response of firms to the bank failures and how these responses relate to financial characteristics. Moreover, unlike the results in table 3, the coefficient on the indicator variable for the clients of failed banks is negative and significant in all four of the maximum likelihood models. Therefore, the clients of failed banks,

on average, had more negative abnormal returns than the clients of surviving banks. However, the maximum likelihood estimates of the coefficients on financial condition of firms are not very different from those obtained with a similarly specified OLS model. In both models, firms with fewer intermediated funds, higher capital, higher profits, higher liquidity, and larger firms suffer less from the adverse impact of the failure announcements. In addition, in most cases, the clients of banks with higher abnormal returns at the time of the announcements have higher abnormal returns. In summary, even when firms and banks are allowed to sort themselves based on their characteristics, firms' abnormal returns are related to firm and bank financial characteristics in the direction we predict. Therefore, to the extent that reverse causality arises from self-selection of the form modeled in equation (3), it does not appear to affect the results reported in table 3.

*b. Sorting by client firms*

Our analysis may also be subject to another form of selection bias. It is possible that particular clients of the failed banks anticipated the insolvency of their bank and, whenever possible or profitable, severed their relationship prior to the failure announcements. If this type of selection bias existed in our data, it is likely that firms that had the most access to alternative sources of funding terminated their relationship with the failing banks. In that case, the results from our baseline model would overestimate the impact of the failures on the clients of the failed banks and how the impact relates to firm characteristics. To explore the potential impact of this type of selection bias on our results, we examined the list of banks reported by a random sample of firms two and three years prior to the announcements. Banking relationships of this particular sample of firms were very stable. Indeed, for each firm in the sample, the banks listed three years prior to the failure announcements were the same as those listed just before the failure

announcements. Hence, if we were to use information three years prior to the failures to identify bank clients, it is unlikely that our results would change significantly.

*Endogenous Financial Characteristics*

It is also possible that, contrary to the assumptions of our baseline model, financial characteristics of banks and their clients are endogenously determined. If so, the coefficient estimates from our baseline model would be inconsistent. To correct for this potential problem, we assume that firms' financial characteristics are correlated with firm size, age, investment opportunities, and industry. We also assume that the abnormal returns of firms' primary banks are correlated with bank size and capitalization. These two endogenously determined variables, along with firm size and industry, are then correlated with firms' abnormal returns. We use instrumental variables to estimate this model as:

$$
\begin{aligned}
g &= f(COND, \text{Firm Size, Bank's Reaction to the Failure, } DIND) \\
COND &= g(\text{Firm Size, Firm Age, (Firm Age)}^2, \\
&\qquad \text{Firm's Tobin Q, (Firm's Tobin Q)}^2, DIND) \\
\text{Bank's Reaction to the Failure} &= h(\text{Bank Size, Bank's Equity/TA})
\end{aligned}
\qquad \textbf{(4)}
$$

Table 5 shows a summary of the results from the estimation of equation (4) separately for the clients of failed and surviving banks. The table also reports estimates from an OLS estimation of the abnormal returns as modeled in equation (4) and the statistic for the Hausman specification test. For the clients of surviving banks, we can reject the hypothesis that the OLS equation is misspecified. Hence, for these firms, the characteristics of firms and their banks are important in determining their financial condition and the reaction of their banks to the failure announcements. However, the OLS model appears to be well specified for the clients of failed banks. Moreover, in most of the models, the coefficient estimates obtained from the IV estimation are similar to those obtained from the OLS estimation. Hence, endogenously

determined financial characteristics do not appear to affect our main results, particularly for the clients of failed banks.

*Access to Foreign Funds*

It is possible that we do not find significantly different effects from the failure announcements for the clients of failed banks because these firms had greater access to foreign funds – either through intermediaries or capital markets- than the clients of surviving banks and that the foreign funds replaced those obtained from the failed banks. To check for this possibility, we looked to see if any firm listed a foreign bank in its Reference List of primary banks. None of the firms in our sample did. So, access to funds from foreign banks is not likely to explain our results. We also checked to see if firms in our sample had access to foreign capital markets by examining the exchanges in which their stock traded. For the sample firms listed the First Section of the Tokyo Stock Exchange – the largest, and hence the most likely, firms to have foreign listings – only 77 firms (5.8%) had their stock listed in exchanges outside of Japan. Of these 77 firms, only 41 (3.1% of the total sample) had their stock listed in more than one foreign stock exchange. Once again, access to foreign sources of funds does not appear to be a source of our main results. Moreover, firms that have access to foreign stock markets are significantly larger than those that do not. We control for access to foreign markets in our analysis with the *Firm Size* variable.

## VI. Conclusions

Bank failures are theorized to have adverse consequences for other firms, particularly if these firms are clients of the failed institutions. A number of recent studies have provided empirical evidence that bank problems and failures adversely affect the market value of a bank's corporate bank borrowers, both in the United States and a number of other countries. This paper

contributes to the literature both by providing evidence on the effects of bank failures on the banks' loan customers in another country—Japan—and by examining whether the adverse effects on the failed bank's customers differ from those on the clients of surviving banks.

We examine the stock market reaction of over 1,000 Japanese firms to the failure of announcements of three large banks--the Hokkaido Takushoku Bank in 1997, the Long-Term Credit Bank of Japan and the Nippon Credit Bank in 1998. We find that, as in previous studies, the market value of customers of the failed banks is adversely affected at the date of the failure announcements. In addition, the effects are related to the financial characteristics of the client firms and their banks. Firms that have greater access to alternative sources of funding or have an existing relationship with a relatively healthy bank experience a less severe adverse impact from bank failure announcements. However, we also find that these effects are not significantly different from the effects experienced by all firms in the economy. That is, the bank failures represent "bad news" for all firms in the economy, not just for the customers of the failed banks.

It should be noted that our results may be specific to Japanese bank failures in the 1990s. Nevertheless, they raise an interesting question regarding the impact of other announcements of bank distress examined in previous papers on the rest of the economy.

In the future, we plan to explore the long-term impact of bank failures on their clients. In particular, it is possible that even though there were no significant differences in the immediate impact of the failures on the clients of surviving and failed banks, the failures might have affected the long-term behavior of firms (e.g. their investments) differently.

Finally, our results should be interpreted with caution when formulating regulatory policy. Our results suggest that the impact of bank failures extend beyond those firms directly connected to the failed institutions. However, past banking crises in the U.S. and other countries

have shown that delaying recognition of bank losses and regulatory forbearance impose large costs on the economy. Therefore, it appears more prudent to mitigate the short-term adverse impact of bank failures by expanding the alternative sources of funding through structural changes, rather than by delaying the closure of insolvent institutions.

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## APPENDIX – THE THREE FAILURES

*Hokkaido Takushoku Bank (November 17, 1997)*

Hokkaido Takushoku Bank was the smallest so-called "city" bank, but one of the largest 20 commercial banks in Japan, with more than ¥9.5 trillion in assets.[11] On November 17, 1997, the bank announced that, due to its difficulties in raising funds, it would transfer its operations in the Hokkaido region in northern Japan to the North Pacific Bank. Its operations outside of Hokkaido were eventually sold to Chuo Trust and Banking Co. The bank's bad loans were sold to the Deposit Insurance Corporation (DIC), and the Bank of Japan extended emergency loans to the bank during the transition period to provide liquidity to meet deposit outflows. The problems of the bank were well-known, and its closure followed an aborted government-sanctioned merger attempt with the nearby Hokkaido Bank.[12]

*Long-Term Credit Bank of Japan (October 23, 1998)*

LTCB was one of the largest banks in Japan and was widely perceived to be in serious financial trouble prior to its failure. Despite an injection of capital from the government in March 1998, its debt was downgraded several times and its share price dropped sharply. A merger attempt with Sumitomo Trust Bank, a large bank in stronger financial condition, failed in the summer of 1998. On October 19, 1998, news reports indicated that the newly-established Financial Supervisory Agency (FSA) had informed LTCB earlier in the day that the bank was insolvent on a market-value basis as of the end of September, when it was last inspected.[13] The reports also indicated that LTCB was expected to be nationalized later in the week, when

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[11] Japanese banks are generally divided into four broad categories—city, trust, long-term credit, and regional—according to both size and type of business. Historically, the four types of banks have differed in their size, composition of assets and loans, customer base, funding sources, and regulatory requirements and treatment. Long-term credit and city banks were the larger banks and trust banks the most specialized. See Genay (1998) for a discussion of some of the differences in the operations of city, regional, long-term credit, and trust banks.

[12] News articles reported that depositors began to withdraw funds from the bank after it was announced that the planned merger with Hokkaido Bank would not happen. News reports also noted that many of the large stakeholders, e.g., the life insurance companies, refused to inject additional funds into the bank's capital base in the weeks leading up to its closure. The bank's share price, which was ¥222 at the beginning of 1997, had dropped to ¥65 the day before the failure announcement on November 17, 1997. The day after the announcement, shareholders could only receive ¥5 per share.

[13] The Financial Supervisory Agency, which assumed supervisory responsibilities for financial institutions from the Ministry of Finance, was established on June 22, 1998.

recently adopted banking legislation would take effect.[14] Four days later on October 23, 1998, LTCB applied for nationalization. The government announced that it would guarantee all obligations of LTCB, the DIC would purchase the bank's shares (last traded at ¥2), and the Bank of Japan would provide financial aid to LTCB as necessary to maintain liquidity in financial markets. According to the FSA report, at the end of September, the bank had total assets of ¥24 trillion and ¥160 billion in book-value capital. It also reported ¥500 billion, or three times its book value capital, of unrealized losses on its securities portfolio and other problem assets totaling ¥4.62 trillion, or 19 percent of total assets and roughly 30 times its capital.[15]

*F. Nippon Credit Bank (December 14, 1998)*

The semi-annual public financial statements issued by all Japanese banks on November 24, 1998 for the six months ending September 30 showed that another large long-term credit bank—the Nippon Credit Bank (NCB), with assets of ¥7.7 trillion as of September 1998—had significant amounts of problem loans and that its earnings had deteriorated significantly since March 1998. However, the bank stated that it was still solvent. On December 9, 1998, it was announced that NCB was abandoning its previously announced merger with and Chuo Trust and Banking Co. The abandoned merger was perceived as a sign of further problems at NCB. Shortly thereafter, news reports indicated that the FSA's examination of the bank showed that as of March 31, 1998, contrary to what NCB had reported, the bank had a capital deficit of ¥94.4 billion and was insolvent. On December 12, the government urged Nippon Credit to apply for nationalization, which it did on the next business day—December 14. The government provided assurances that the repayment of all of NCB's obligations would be satisfied in full and on time and that the Bank of Japan would provide loans to ensure the liquidity of the markets. The Bank injected some ¥80 billion into NCB to avoid having it default on its liabilities.

[14] A package of eight bills was approved by the parliament on October 12, 1998 aimed at resolving the bad loans of Japanese banks and dealing with the failure of financial institutions. The legislation allowed for recapitalization of banks with public funds and created the Financial Reconstruction Commission (FRC), to, among other duties, administer nationalized insolvent institutions.

[15] After the nationalization, the good assets of the bank were eventually sold to a consortium led by Ripplewood Holdings LLC in the U.S., which paid ¥1 billion for the bank and injected additional ¥120 billion in capital. The new bank also received ¥240 billion of public capital from the Financial Reconstruction Commission in March 2000.

**Table 1. Estimated of abnormal returns for failed and surviving bank client firms**

This table reports statistics for the distribution of abnormal returns for the clients of the three failed banks and the control group. For each firm, excess return at event date $k$ is the coefficient $g_{ik}$ in the following model, estimated by seemingly unrelated regression:

$$R_{it} = a_i + b_i R_{mt} + \sum_{k=-1}^{+1} g_{ik} D_k + e_{it},$$

For the 1998 failures, the above market model is expanded to allow for post-failure shifts in both the alpha and market beta coefficients. The rows labeled "Mean" report the cross-sectional average of excess returns for the appropriate sample and test whether the mean excess return is significantly different from zero. The rows labeled "Median" report the median excess returns for the relevant sample and the significance level for the one-sided sign test $H_0$: median =0 and $H_a$: median < 0. The two rows labeled "Wilcoxon test" and "T-test for equality of means" report tests for the equality of the distributions of excess returns for clients of the failed banks and the clients of surviving banks. The rows labeled "Wilcoxon test" reports the z-statistic and its significance level for the hypothesis that the failed bank clients and other bank clients are from populations with the same distribution. The rows labeled "T-test for equality of means" report the t-statistic for the equality of means across the two samples and its significance level. '***', '**', and '*' indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

**Panel A. Hokkaido Takushoku Bank failure (November 17, 1997)**

| | Event window | | | |
|---|---|---|---|---|
| | -1 | 0 | +1 | [-1, +1] |
| **Hokkaido Takushoku Bank client firms (N= 70)** | | | | |
| **Mean** | 1.002** | -0.733 | -0.606 | 0.170 |
| **Median** | 0.517 | -0.588* | -0.858** | -0.330 |
| **Surviving banks client firms (N= 1214)** | | | | |
| **Mean** | 0.377*** | -0.650*** | -0.183 | -0.115** |
| **Median** | 0.380 | -0.629*** | -0.266*** | -0.034 |
| **Tests for client effects** | | | | |
| **Wilcoxon test** | -1.24 | 0.25 | 1.33 | 0.12 |
| **T-test for equality of means** | -1.64 | -0.17 | 0.90 | -0.57 |

**Table 1. Estimated of abnormal returns for failed and surviving bank client firms (cont'd)**

**Panel B. LTCB failure (October 23, 1998)**

| | Event windows | | | |
|---|---|---|---|---|
| | -1 | 0 | +1 | [-1, +1] |
| **LTCB client firms (N=197)** | | | | |
| **Mean** | -2.288*** | -0.471* | -1.115*** | -1.324*** |
| **Median** | -2.288*** | -0.539** | -1.203*** | -1.156*** |
| **LTCB and NCB client firms (N=29)** | | | | |
| **Mean** | -3.877*** | 0.862 | -0.159 | -1.042 |
| **Median** | -3.502*** | 0.451 | -0.592 | -1.744* |
| **Surviving banks client firms (N= 926)** | | | | |
| **Mean** | -2.142*** | -0.611*** | -0.913*** | -1.226*** |
| **Median** | -2.061*** | -0.728*** | -1.013*** | -1.185*** |
| **Tests for client effects, LTCB clients only** | | | | |
| **Wilcoxon test** | 0.87 | -1.02 | 1.25 | 0.38 |
| **T-test for equality of means** | 0.51 | -0.59 | 0.43 | 0.85 |
| **Tests for client effects, both LTCB and NCB clients** | | | | |
| **Wilcoxon test** | 2.23** | -2.60*** | -0.31 | 0.30 |
| **T-test for equality of means** | 2.53** | -2.36** | -1.20 | -0.49 |

**Panel C. NCB failure (December 14, 1998)**

| | Event windows | | | |
|---|---|---|---|---|
| | -1 | 0 | +1 | [-1, +1] |
| **NCB client firms (N=60)** | | | | |
| **Mean** | -0.163 | 0.118 | -1.345*** | -0.497** |
| **Median** | 0.279 | -0.216 | -0.532** | -0.424** |
| **LTCB and NCB client firms (N=29)** | | | | |
| **Mean** | 0.460 | -0.698 | -1.228** | -0.522 |
| **Median** | 0.501 | -0.207 | -1.328*** | -0.364** |
| **Surviving banks client firms (N=926)** | | | | |
| **Mean** | -0.355*** | -0.214 | -0.454*** | -0.342*** |
| **Median** | -0.312*** | -0.212** | -0.329*** | -0.237*** |
| **Tests for client effects, NCB clients only** | | | | |
| **Wilcoxon test** | -1.21 | -0.25 | 1.78* | 1.15 |
| **T-test for equality of means** | -0.47 | -0.60 | 2.17** | 0.78 |
| **Tests for client effects, both LTCB and NCB clients** | | | | |
| **Wilcoxon test** | -1.79* | 0.46 | 2.74*** | 0.94 |
| **T-test for equality of means** | 1.40 | 0.61 | 1.35 | 0.64 |

**Table 2. Summary statistics of financial characteristics for failed and surviving bank client firms**

This table presents financial characteristics of failed and surviving bank client firms at the end of March of the each failure year. Failed bank clients are defined as firms that have Hokkaido Takushoku Bank, LTCB or NCB anywhere on the References list. Tobin's Q is the ratio of firm market value (market value of equity plus total assets minus book value of equity) to total assets. ROA is net income divided by total assets, and ROE is net income divided by book value of equity. In the column labeled "mean," '***', '**', and '*' indicate statistical differences in the mean values of the variables for failed and surviving bank client firms at the 1%, 5%, and 10% levels, respectively.

**Panel A. Hokkaido Takushoku Bank failure (November 17, 1997)**

| | Mean | St. Dev | Min | Max |
|---|---|---|---|---|
| Total Assets (trillion yen) | | | | |
| All firms | 0.27 | 0.65 | 0.00 | 11.18 |
| Nonclients | 0.27 | 0.67 | 0.00 | 11.18 |
| Clients | 0.14 | 0.18 | 0.01 | 1.04 |
| Equity / Total Assets (%) | | | | |
| All firms | 42.40 | 20.01 | -48.37 | 94.54 |
| Nonclients | 42.58 | 20.11 | -48.37 | 94.54 |
| Clients | 39.34*** | 18.20 | 2.83 | 77.61 |
| Loans / TA (%) | | | | |
| All firms | 20.05 | 17.81 | 0.00 | 130.82 |
| Nonclients | 20.04 | 17.90 | 0.00 | 130.82 |
| Clients | 20.15 | 16.41 | 0.00 | 66.25 |
| ROA (five-year average, %) | | | | |
| All firms | 1.19 | 2.31 | -21.29 | 11.32 |
| Nonclients | 1.19 | 2.32 | -21.29 | 11.32 |
| Clients | 1.03 | 2.05 | -7.97 | 8.52 |
| ROE (five-year average, %) | | | | |
| All firms | 1.88 | 7.24 | -53.27 | 15.91 |
| Nonclients | 1.90 | 7.19 | -53.27 | 15.91 |
| Clients | 1.45 | 8.11 | -49.09 | 13.00 |
| (Cash and Securities) / Total Assets (%) | | | | |
| All firms | 16.01 | 10.93 | 0.22 | 75.00 |
| Nonclients | 16.03 | 10.96 | 0.22 | 75.00 |
| Clients | 15.68 | 10.45 | 1.96 | 55.78 |
| Tobin's Q | | | | |
| All firms | 1.30 | 0.40 | 0.59 | 5.60 |
| Nonclients | 1.31 | 0.40 | 0.59 | 5.60 |
| Clients | 1.20*** | 0.23 | 0.84 | 1.87 |
| Age (years) | | | | |
| All firms | 55.84 | 16.58 | 9.00 | 116.00 |
| Nonclients | 55.91 | 16.70 | 9.00 | 116.00 |
| Clients | 54.74 | 14.31 | 17.00 | 83.00 |

**Table 2. Summary statistics of financial characteristics for failed and surviving bank client firms (cont'd)**

**Panel B. LTCB and NCB failures (October 23, 1998 and December 14, 1998)**

| | Mean | St. Dev. | Min. | Max. |
|---|---|---|---|---|
| Total Assets (trillion yen) | | | | |
| All firms | 0.279 | 0.667 | 0.005 | 10.839 |
| Nonclients | 0.259 | 0.648 | 0.005 | 10.839 |
| Clients | 0.344* | 0.719 | 0.005 | 7.025 |
| LTCB clients only | 0.386* | 0.823 | 0.005 | 7.025 |
| NCB clients only | 0.231 | 0.378 | 0.012 | 1.892 |
| Clients of both banks | 0.290 | 0.418 | 0.032 | 1.904 |
| Equity / Total Assets (%) | | | | |
| All firms | 43.63 | 20.62 | 1.50 | 94.07 |
| Nonclients | 45.49 | 20.61 | 2.50 | 94.07 |
| Clients | 37.59*** | 19.49 | 1.50 | 93.45 |
| LTCB clients only | 39.45*** | 19.53 | 2.96 | 88.75 |
| NCB clients only | 34.54*** | 17.64 | 6.27 | 93.45 |
| Clients of both banks | 31.22*** | 21.25 | 1.50 | 82.06 |
| Loans / TA (%) | | | | |
| All firms | 20.12 | 18.37 | 0.00 | 83.41 |
| Nonclients | 17.74 | 17.32 | 0.00 | 78.09 |
| Clients | 27.83*** | 19.56 | 0.00 | 83.41 |
| LTCB clients only | 26.51*** | 18.99 | 0.00 | 83.41 |
| NCB clients only | 27.77*** | 19.78 | 0.00 | 76.58 |
| Clients of both banks | 36.99*** | 21.13 | 0.00 | 73.06 |
| ROA (five-year average, %) | | | | |
| All firms | 1.16 | 2.46 | -32.86 | 10.69 |
| Nonclients | 1.24 | 2.57 | -32.86 | 10.69 |
| Clients | 0.88** | 2.04 | -10.69 | 7.01 |
| LTCB clients only | 1.10 | 1.90 | -5.45 | 7.01 |
| NCB clients only | 0.54 | 2.30 | -10.69 | 5.29 |
| Clients of both banks | 0.08* | 2.17 | -5.64 | 5.23 |
| ROE (five-year average, %) | | | | |
| All firms | 1.57 | 7.63 | -61.49 | 15.05 |
| Nonclients | 1.80 | 7.54 | -61.49 | 15.05 |
| Clients | 0.84* | 7.91 | -49.39 | 11.21 |
| LTCB clients only | 1.57 | 7.05 | -49.39 | 11.21 |
| NCB clients only | 0.77 | 7.28 | -31.57 | 11.05 |
| Clients of both banks | -3.93*** | 12.22 | -39.96 | 7.22 |
| (Cash and Securities) / Total Assets (%) | | | | |
| All firms | 15.45 | 10.79 | 0.09 | 74.68 |
| Nonclients | 16.41 | 11.16 | 0.31 | 74.68 |
| Clients | 12.33*** | 8.80 | 0.09 | 59.21 |
| LTCB clients only | 12.74*** | 9.01 | 0.09 | 59.21 |
| NCB clients only | 11.39*** | 7.97 | 1.30 | 46.30 |
| Clients of both banks | 11.51* | 9.11 | 0.81 | 42.44 |

**Table 2. Summary statistics of financial characteristics for failed and surviving bank client firms (cont'd)**

**Panel B. LTCB and NCB failures (October 23, 1998 and December 14, 1998)**

| | Mean | St. Dev. | Min. | Max. |
|---|---|---|---|---|
| Tobin's Q | | | | |
| All firms | 1.06 | 0.45 | 0.40 | 6.58 |
| Nonclients | 1.07 | 0.48 | 0.40 | 6.58 |
| Clients | 1.04 | 0.35 | 0.41 | 3.12 |
| LTCB clients only | 1.06 | 0.39 | 0.41 | 3.12 |
| NCB clients only | 0.98 | 0.20 | 0.68 | 1.90 |
| Clients of both banks | 1.06 | 0.30 | 0.66 | 1.85 |
| Age (years) | | | | |
| All firms | 56.61 | 17.01 | 10.00 | 117.00 |
| Nonclients | 56.39 | 16.96 | 11.00 | 117.00 |
| Clients | 57.30 | 17.18 | 10.00 | 113.00 |
| LTCB clients only | 57.47 | 18.63 | 10.00 | 113.00 |
| NCB clients only | 56.32 | 11.40 | 22.00 | 82.00 |
| Clients of both banks | 58.17 | 17.30 | 37.00 | 109.00 |

**Table 3. Cross-section relationship between abnormal returns and client firms' financial characteristics**

This table presents estimates of the correlation between abnormal returns and selected measures of client firms' financial condition modeled as:

$$g_{[-1,+1],i} = a + f\,COND_i + y\,X_i + d\,CL_i + l\,(CL_i\ x\ COND_i) + q\,(CL_i\ x\ X_i) + \sum_j J_j DIND_j + m_{it,}$$

where the financial condition variables (COND) employed are: 1) asset size; 2) the ratio of bank loans to total assets; 3) the ratio of book-value equity to total assets; 4) the ratio of net income to total assets (or book-value of equity); and 5) the ratio of cash plus investment security to total assets. $CL_i$ is a binary variable that identifies the clients of the failed banks and is equal to one if firm $i$ is a client of the failed bank, zero otherwise. The X variables are age and the ratio of market value of assets to book value of assets (TOBQ). We also include the square of these variables. The coefficient estimates of COND and X for client firms of failed banks are ($\phi + \lambda$) and ($\psi + \theta$), respectively. The coefficient estimates of COND and X for client firms of surviving banks are ($\phi$) and ($\psi$), respectively. The model also includes indicator variables for industries, which are not reported below. The number of observations in each regression is 3,708; of these, 3,323 relate to the clients of surviving banks and, 385 relate to the clients of failed banks. '***', '**', and '*' indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The columns labeled DIFF provide asterisks to indicate statistical significance between the coefficients for the clients of failed and surviving banks.

Firm Characteristic – Loans/TA

| | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF | | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF | | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intercept | -3.014 | -1.067 | | | -2.468 | -0.141 | | | -2.631 | -0.462 | |
| Firm's Loans/TA | -0.018*** | -0.014*** | | | -0.019*** | -0.014*** | | | -0.018*** | -0.014*** | |
| Firm Size | 0.316*** | 0.116*** | ** | | 0.315*** | 0.117*** | ** | | 0.316*** | 0.115*** | ** |
| Firm Age | -0.005 | -0.006*** | | | -0.005 | -0.005** | | | -0.005 | -0.005*** | |
| $(\text{Firm Age})^2$ | 0.012* | 0.010*** | | | 0.012* | 0.010*** | | | 0.012* | 0.010*** | |
| Firm's Tobin's Q | 2.548*** | 1.305*** | | | 2.575*** | 1.312*** | | | 2.557*** | 1.299*** | |
| $(\text{Firm's Tobin's Q})^2$ | -0.617*** | -0.194*** | | | -0.626** | -0.196*** | | | -0.621** | -0.193*** | |
| Bank's Equity/TA | 0.048 | 0.073** | | | | | | | | | |
| Bank's Loan Loss Reserves/ Total Loans | | | | | -0.018 | -0.049** | | | | | |
| Bank ROA | | | | | | | | | 0.025 | 0.080** | |
| Bank Size | 0.077 | -0.002 | * | | 0.056 | -0.036 | * | | 0.064 | -0.022 | |
| Bank's Reaction to the Failure | 0.132* | -0.002 | | | 0.127* | -0.007 | | | 0.130* | -0.004 | * |
| F-Statistic | 17.38*** | | | | 17.50*** | | | | 17.26*** | | |

*Firm Characteristic – Equity/TA*

| | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF | | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF | | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intercept | -4.023 | -2.000 | | | -3.780 | -1.361 | | | -3.223 | -1.000 | |
| Firm's Equity/TA | 0.011* | 0.010*** | | | 0.011* | 0.010*** | | | 0.003* | 0.002*** | |
| Firm Size | 0.330*** | 0.135*** | * | | 0.330*** | 0.136*** | * | | 0.330*** | 0.135*** | |
| Firm Age | -0.005 | -0.005** | | | -0.004 | -0.005** | | | -0.005 | -0.005** | |
| $(\text{Firm Age})^2$ | 0.013* | 0.010*** | | | 0.014* | 0.010*** | | | 0.014* | 0.009*** | |
| Firm's Tobin's Q | 2.681*** | 1.405*** | | | 2.712*** | 1.410*** | | | 2.689*** | 1.398*** | |
| $(\text{Firm's Tobin's Q})^2$ | -0.639** | -0.216*** | | | -0.650** | -0.216*** | | | -0.644** | -0.214*** | |
| Bank's Equity/TA | 0.056 | 0.076** | | | | | | | | | |
| Bank's Loan Loss Reserves/ Total Loans | | | | | -0.020 | -0.053*** | | | | | |
| Bank ROA | | | | | | | | | 0.032 | 0.085 | |
| Bank Size | 0.093 | 0.023 | | | 0.070 | -0.013 | | | 0.078 | 0.002 | |
| Bank's Reaction to the Failure | 0.142** | 0.001 | ** | | 0.137** | -0.005 | ** | | 0.140** | -0.002 | |
| F-Statistic | 15.86*** | | | | 16.02*** | | | | 15.75*** | | |

*Firm Characteristic – ROA*

| | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF | | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF | | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intercept | -3.520 | -1.540 | | | -2.832 | -0.504 | | | -3.001 | -0.891 | |
| Firm ROA | 0.187*** | 0.075*** | ** | | 0.185*** | 0.074*** | ** | | 0.186*** | 0.075*** | ** |
| Firm Size | 0.333*** | 0.115*** | ** | | 0.332*** | 0.116*** | ** | | 0.333*** | 0.114*** | ** |
| Firm Age | -0.006 | -0.007*** | | | -0.006 | -0.007*** | | | -0.006 | -0.007*** | |
| $(\text{Firm Age})^2$ | 0.016** | 0.010*** | | | 0.016** | 0.010*** | | | 0.016** | 0.010*** | |
| Firm's Tobin's Q | 1.726* | 1.185*** | | | 1.764* | 1.192*** | | | 1.735* | 1.178*** | |
| $(\text{Firm's Tobin's Q})^2$ | -0.444* | -0.182*** | | | -0.455* | -0.183*** | | | -0.447* | -0.180*** | |
| Bank's Equity/TA | 0.065 | 0.078*** | | | | | | | | | |
| Bank's Loan Loss Reserves/ Total Loans | | | | | -0.020 | -0.056*** | | | | | |
| Bank ROA | | | | | | | | | 0.037 | 0.087*** | |
| Bank Size | 0.106 | 0.017 | | | 0.079 | -0.021 | | | 0.088 | -0.004 | |
| Bank's Reaction to the Failure | 0.142** | 0.001 | * | | 0.136* | -0.005 | * | | 0.139** | -0.001 | * |
| F-Statistic | 15.78*** | | | | 16.02*** | | | | 0.139** | | |

Firm Characteristic – Liquidity

| | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF | | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF | | CLIENTS OF FAILED BANKS | CLIENTS OF SURVIVING BANKS | DIFF |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Intercept | -2.983 | -1.840** | | | -2.320 | -0.877 | | | -2.525 | -1.256 | |
| Firm Liquidity | 0.002 | 0.008*** | | | 0.002 | 0.008*** | | | 0.002 | 0.008*** | |
| Firm Size | 0.291*** | 0.109*** | * | | 0.290*** | 0.110*** | * | | 0.291*** | 0.109*** | * |
| Firm Age | -0.008 | -0.008*** | | | -0.008 | -0.007*** | | | -0.008 | -0.007*** | |
| $(\text{Firm Age})^2$ | 0.014* | 0.009*** | | | 0.014** | 0.009*** | | | 0.014** | 0.009*** | |
| Firm's Tobin's Q | 2.276** | 1.351*** | | | 2.305** | 1.354*** | | | 2.281** | 1.344*** | |
| $(\text{Firm's Tobin's Q})^2$ | -0.491* | -0.196*** | | | -0.501* | -0.197*** | | | -0.494* | -0.195*** | |
| Bank's Equity/TA | 0.057 | 0.070** | | | | | | | | | |
| Bank's Loan Loss Reserves/ Total Loans | | | | | -0.023 | -0.054** | | | | | |
| Bank ROA | | | | | | | | | 0.035 | 0.080** | |
| Bank Size | 0.061 | 0.022 | | | 0.036 | -0.013 | | | 0.045 | 0.003 | |
| Bank's Reaction to the Failure | 0.148** | 0.001 | ** | | 0.142** | -0.005 | ** | | 0.146** | -0.001 | ** |
| F-Statistic | 15.07*** | | | | 15.24*** | | | | 14.99*** | | |

**Table 4. Treatment Model of the Relationship between the Abnormal Returns of Firms, Financial Characteristics of Firms and Their Primary Bank**

| | Treatment Model | OLS |
|---|---|---|
| **Model 1** | | |
| Firm's Loans/TA | -0.012*** | -0.016*** |
| Firm Size | 0.259*** | 0.228*** |
| Bank Abnormal Returns | 0.051*** | 0.069*** |
| Client Indicator | -1.480*** | -0.115 |
| Intercept | 0.374** | 0.343** |
| $c^2$ for $r = 0$ | 24.84*** | |
| **Model 2** | | |
| Firm's Equity/TA | 0.007*** | 0.010*** |
| Firm Size | 0.278*** | 0.252*** |
| Bank Abnormal Returns | 0.055*** | 0.074*** |
| Client Indicator | -1.583*** | -0.155 |
| Intercept | -0.209 | -0.437** |
| $c^2$ for $r = 0$ | 26.23*** | |
| **Model 3** | | |
| Firm ROA | 0.108*** | 0.113*** |
| Firm Size | 0.249*** | 0.214*** |
| Bank Abnormal Returns | 0.051*** | 0.070*** |
| Client Indicator | 1.610*** | -0.187* |
| Intercept | 0.010 | -0.089 |
| $c^2$ for $r = 0$ | 22.89*** | |
| **Model 4** | | |
| Firm Liquidity | 0.006** | 0.011*** |
| Firm Size | 0.253*** | 0.221*** |
| Bank Abnormal Returns | 0.054*** | 0.073*** |
| Client Indicator | -1.593*** | -0.176* |
| Intercept | 0.068 | -0.114 |
| $c^2$ for $r = 0$ | 20.94*** | |

**Table 5. Instrumental Variables Estimation of the Relationship between the Abnormal Returns of Firms, Financial Characteristics of Firms and Their Primary Bank**

| | Clients of the Failed Banks (N=546) | | | | Clients of the Surviving Banks (N=3,000) | | |
|---|---|---|---|---|---|---|---|
| | IV | OLS | Hausman Test $c^2$ | | IV | OLS | Hausman Test $c^2$ |
| | | | | | | | |
| Firm's Loans/TA | -0.051** | -0.021*** | | | -0.028*** | -0.015*** | |
| Firm Size | 0.395*** | 0.336*** | 6.82 | | 0.162*** | 0.190*** | 72.59*** |
| Bank's Reaction to the Failure | 0.460 | 0.144** | | | 0.621*** | 0.060*** | |
| | | | | | | | |
| Firm's Equity/TA | 0.011 | 0.012** | | | 0.014** | 0.009*** | |
| Firm Size | 0.409** | 0.367** | 2.38 | | 0.192*** | 0.214*** | 72.55*** |
| Bank's Reaction to the Failure | 0.551** | 0.161** | | | 0.649*** | 0.064*** | |
| | | | | | | | |
| Firm ROA | 0.429*** | 0.229*** | | | 0.260*** | 0.103*** | |
| Firm Size | 0.376*** | 0.321*** | 5.97 | | 0.141** | 0.177*** | 76.57*** |
| Bank's Reaction to the Failure | 0.530** | 0.161** | | | 0.546*** | 0.060*** | |
| | | | | | | | |
| Firm Liquidity | 0.156*** | 0.010 | | | 0.083*** | 0.011*** | |
| Firm Size | 0.418*** | 0.317*** | 9.24 | | 0.189*** | 0.186*** | 71.48*** |
| Bank's Reaction to the Failure | 0.107 | 0.163** | | | 0.597*** | 0.063*** | |

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