Lending to Unhealthy Firms in Japan during the Lost Decade:

WTF?

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Abstract

Using a dataset that matches individual Japanese firms to individual lending institutions, this study revisits the issue of the misallocation of credit in Japan associated with the perverse incentive faced by a bank to provide additional credit to the weakest firms in a bid to avoid realizing loan losses on its own balance sheet. We distinguish between two types of firm distress: financial distress that is marked by a (perhaps temporary) weakening of financial health, and technical distress that reflects weak operational capabilities, as indicated by low total factor productivity (TFP). Our results show that while lenders did extend additional credit to financially distressed borrowers, the recipients of increased loans were not necessarily technically distressed; that is, many of the loans did not represent banks "evergreening" loans to "zombie" firms when firm health is measured by technical health. In fact, firms with the strongest TFP were the firms that tended to convert additional credit into the most subsequent growth in TFP. Moreover, our results show that the interpretation of previous results that banks evergreened loans to financially distressed firms may reflect the effect of stronger loan demand rather than loan supply behavior.

Keywords: total factor productivity, bank lending, Japan, zombie firms, financial crisis

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I. Introduction

The long period of economic malaise in Japan following the bursting of the stock market and real estate bubbles of the 1980s presents a number of puzzles, including some with answers that may go against conventional wisdom. The easy one is, of course: How long is a decade? Based on Japan's "Lost Decade," a decade is not necessarily the conventionally defined 10 years. But a much more difficult question concerns the extent to which Japanese banks were "evergreening" loans during this time, narrowly defined as extending additional credit to enable unhealthy (zombie) firms to continue making interest payments on existing loans, but more generally to enable a firm to meet its expenses to avoid default. At this point, the conventional wisdom appears to be that evergreening did occur (for example, Peek and Rosengren 2005; Caballero, Hoshi and Kashyap 2008). Among the various explanations provided for such bank behavior are bank responsibilities emanating from historical bank-firm keiretsu relationships, government pressure on banks to help avoid firm bankruptcies, and the perverse incentives faced by troubled banks to delay the bankruptcy of their unhealthy borrowers that would, in turn, damage the banks' own balance sheets (mutually assured destruction). This study takes a closer look at the latter question by distinguishing between two alternative concepts of firm health: technical and financial. In particular, we ask an important question about the sense in which the firms that Japanese banks were lending to were unhealthy; that is: Which, technical or financial (WTF)?

While the existing literature has, for the most part, interpreted the evidence as providing strong confirmation of evergreening behavior by Japanese banks, this evidence has been produced in the context of the financial health of firms, being related to measures based on a firm's balance sheet and income statement rather than to measures of a firm's underlying technological efficiency (for example, Peek and Rosengren 2005; Caballero, Hoshi, and Kashap 2008). However, because in many cases weak balance sheet and income measures are associated with increased loan demand to address a shortfall in the firm's cash flow or liquidity, the observed increase in bank lending to financially distressed firms may reflect stronger loan demand rather than increased loan supply. Moreover, it is entirely plausible that some firms classified as unhealthy, or even nonviable zombies, might have been financially distressed but operationally viable. Insofar as lending to these relatively productive firms enabled them to invest in new capacity or to restructure in a way that enhanced their efficiency, the additional lending should not necessarily be classified as a misallocation of credit.

Deviating from the past literature, we distinguish between two types of distress: financial distress and technical distress. A financially distressed firm is identified as one that performs poorly (relative to firms in its industry) on key financial measures, such as the return on assets. A technically distressed firm is one that performs poorly (relative to firms in its industry) operationally, here measured by the firm's total factor productivity (TFP). An operationally efficient firm could, at the same time, be financially distressed. This financial stress might be temporary or more permanent, and could be related to such factors as a shift in relative prices for inputs, technological innovations, or shifts in the demand for its products. Insofar as the firm faces a temporary liquidity crunch that can be alleviated by additional credit, some of which can be used for such things as restructuring its operations as well as net investment, additional loans could improve subsequent firm performance. Thus, bank lending to financially distressed but economically viable firms might have beneficial effects. On the other hand, additional loans to a firm that was not fundamentally sound could represent a misallocation of credit by allowing the firm to merely cover ongoing financial losses, lessening the pressure on management either to make needed structural changes to become a viable firm or to file for bankruptcy (or try to be acquired) to bring to an end its existence as a zombie (nonviable) firm.

In this study, we use a panel dataset that matches individual firm borrowers to individual lenders to investigate the extent of evergreening in Japan during the 1990s. Because we need a measure of technical distress, our sample is limited to manufacturing firms for which TFP can be calculated at the individual firm level. However, as Caballero, Hoshi, and Kashap (2008) note, manufacturing is the industry least affected by the presence of zombie firms. Still, our comparisons are across manufacturing firms, which do show substantial variation in technical (and financial) health.

A number of possible explanations exist for the differential treatment of firms by lenders. For example, banks may have been more willing to provide credit to financially distressed firms if their underlying, long-term technical health was strong. Thus, the first step is to separate the roles played by financial distress and technical distress in determining to whom additional bank credit was provided. The next step is to investigate the extent to which receiving additional loans contributed to an improvement in the firm's operational performance.

We find that financially distressed firms did obtain increased loans, not only in the Lost Decade of the 1990s, but even during the boom period of the 1980s. This result suggests that previous interpretations of increased lending to financially distressed firms may have been misinterpreted as evidence of the widespread evergreening of loans when, in fact, it may have, in large part, reflected increased loan demand by financially distressed firms due to shortfalls of cash flows. Thus, it is important to distinguish between financial distress and technical distress. We find that firms that were operationally healthy were more likely to obtain increased loans, especially during the crisis years of the 1990s when the underlying health of the firms became a more important determinant of bank lending, perhaps because of the increase in firm bankruptcies (Hoshi and Kashyap 2001; Hamao, Mei, and Xu 2004). That is, during the boom period of the 1980s, banks may not have carefully distinguished among listed firms using credit risk analysis because default risk was minimal, unlike the post-bubble period experience in the 1990s when large firms did fail and default on loans.

To the extent that a bank loan provides the necessary financial means to overcome temporary liquidity problems and invest in growth-promoting measures, one might expect an increase in bank loans to be positively correlated with a subsequent increase in a firm's productivity. In fact, our results indicate that firms with the highest TFP that obtained increased loans tended to experience a stronger subsequent increase in TFP, suggesting that bank lending in the 1990s did not necessarily exhibit widespread misallocation of credit. However, for firms with the lowest TFP, additional credit did not tend to enhance subsequent performance, especially for loans from unhealthy main banks, consistent with evergreening behavior.

The remainder of the paper is organized as follows. The next section provides some background for the relevant issues addressed in this study. Section III describes the data used and the method for calculating total factor productivity. Section IV provides details of our empirical specification and estimation strategy. Section V presents the empirical results, and Section VI concludes.

II. Background

While most firms rely on credit to finance their operations, this credit may be obtained directly from credit markets, such as through commercial paper and bond issuance, through financial intermediaries in the form of loans, or some combination, at least for those firms that are large enough and transparent enough to have direct access to credit markets. Although bond markets began to be deregulated in Japan in the 1980s, Japan remains among the set of countries that are typically considered to have a bank-centered, rather than market-centered, economy. As such, Japanese firms tend to rely more heavily on intermediated credit, with most of that credit being provided by banks. Thus, how banks allocate credit to firms and the extent to which those loans are used by the firms to improve productivity are extremely important issues for the performance of the Japanese economy.

Substantial evidence exists that Japanese banks continued to make additional loans to severely distressed firms following the bursting of the stock market and real estate bubbles, even as both the banking sector and the economy were in crisis. For example, Sekine, Kobayashi, and Saita (2003), Peek and Rosengren (2005), Ahearne and Shinada (2005), and Caballero, Hoshi and Kashyap (2008) each find that bank credit was allocated to relatively unhealthy firms during this period, suggesting that the banking system misallocated credit. Moreover, this misallocation of bank credit is likely to have contributed to the persistence of the economic malaise experienced by the Japanese economy, insofar as additional bank credit provided to distressed firms reduced the pressure on those firms to restructure their operations and/or poisoned the economic recovery by allowing nonviable firms to live beyond their expiration dates.

In particular, banks were more likely to increase loans to the weakest firms, with the effect being even stronger the weaker was the bank's health. Peek and Rosengren (2005) attribute this behavior in large part to the perverse incentives faced by troubled banks to continue allocating credit to many of their weakest borrowers in order to avoid "mutually assured destruction." Because the reported capital ratios of troubled banks were already barely above the regulatory minimums, the banks wanted to avoid reporting further increases in nonperforming loans that would require them to charge off, at least in part, existing loans and add to their loan loss reserves, actions that would reduce their reported capital ratios. One mechanism for doing so is "evergreening" loans, whereby a bank makes additional loans to a troubled firm that can be used to cover operating expenses and repay interest on the firm's existing loans so that the loans would not go into default. Consequently, troubled borrowers could avoid, or at least delay, declaring bankruptcy.

Of course, this requires bank regulators to be complicit in allowing such bank behavior, permitting banks to overstate their capital and understate their problem loans, in part to avoid the high costs that would be associated with widespread bank failures and a massive increase in unemployment if many large firms fell into bankruptcy. In fact, using aggregate data, Hosono and Sakuragawa (2003) argue that the discretionary enforcement of minimum capital requirements by bank supervisors was a key determinant of forbearance lending by Japanese banks. In addition, Peek and Rosengren (2005) cite claims that during the crisis 75 percent of the loans made by the Japanese banks that declared bankruptcy were classified as sound or only in need of monitoring. Moreover, Tett and Ibison (2001) find that almost half of the early injections of public capital into the Japanese banking system were passed on to construction firms, many of which were insolvent due to the sharp declines in real estate prices, suggesting widespread evergreening behavior by banks.

Using data on loans from individual banks to individual firms, Peek and Rosengren (2005) provide direct evidence of evergreening behavior by Japanese banks. They identify firms in distress using two measures based on firm balance sheet and income statements, the return on assets and working capital, as well as a third measure based on the stock market's (relative) perception of firm health. They find that troubled banks with reported capital ratios close to the required minimum value were more likely to increase loans to their weakest borrowers. They also find that banks were more likely to increase loans to a weak firm if the bank was in the same *keiretsu* as the firm. Moreover, focusing on the debt-to-asset ratio, another measure based on a firm's balance sheet, Sekine, Kobayashi, and Saita (2003) find similar evidence of forbearance lending to nonmanufacturing firms, especially in particularly troubled industries such as real estate and construction, adversely impacting bank profitability. While the extensive misallocation of credit may have prevented widespread bankruptcies of Japanese firms, it also likely impaired the creative destruction that would have contributed to the restructuring of troubled firms and the reallocation of resources to more productive uses necessary for the Japanese economy to have a sustained recovery.

However, a problem with interpreting results that indicate increased bank lending to unhealthy firms based on measures of financial distress constructed from a firm's balance sheet and income statement as evergreening behavior by banks is that the increased lending may primarily reflect increased loan demand by the firms. For example, if a firm suffers a decline in its income (return on assets), the reduced cash flow may increase the need for the firm to borrow funds to be able to continue its operations unimpeded. Similarly, a reduced volume of working capital could signal an increased need for funds to rebuild the firm's liquidity position. To the extent that banks respond to this resulting increase in loan demand by increasing loans to the firm, we would observe a negative correlation between loans to the firm and its working capital or return on assets, even if banks have not shifted their credit supply curve. Thus, it is important to control for a firm's health with a measure that is not likely to also be driving the firm's short-term demand for credit.

Caballero, Hoshi and Kashyap (2008) take a different approach for identifying severely distressed, or zombie, firms, focusing on the average interest rates paid by firms rather than looking at a firm's profitability. The idea is that one way for banks to support troubled firms is to provide them with subsidized interest rates on their loans. Thus, they identify zombie firms as those firms obtaining loans at a subsidized interest rate. An alternative measure identifies different degrees of "zombiness" based on the extent to which a firm is subsidized. The extent of the subsidization is based on the difference between the firm's observed interest payments and a hypothesized lower bound for interest payments based on what the highest quality firms would pay.

After measuring the prevalence of zombie firms, Caballero, Hoshi and Kashyap (2008) focus on how this forbearance lending to otherwise insolvent borrowers interfered with the restructuring of troubled firms necessary for the recovery of the Japanese economy. Not only did this forbearance lending allow zombie firms to continue to operate, but their continued operations had an adverse effect on healthier firms by distorting competition, deterring entry of new competitors and discouraging non-zombie firms from investing due to their reduced profitability arising from being forced to compete with these zombie firms. Their results also highlight the decline in the average TFP of industries that had a higher concentration of zombie firms, both because zombie firms have lower TFP and because they create barriers to entry for newer, productive firms. In fact, Ahearne and Shinada (2005) find similar evidence that industries with a concentration of zombie firms tended to have lower productivity growth rates, in part because forbearance lending aided weak firms at the expense of the more productive firms in those industries, restraining the ability of the more productive firms to gain market share at the expense of the least productive firms.

While the evidence does appear to be consistent with Japanese banks evergreening loans to financially distressed firms, the extent to which credit was being misallocated is not clear. The existing literature tends not to explore the link between banks providing additional loans to a firm and the longer-term viability of the firm, based on a measure of operational efficiency such as firm-level productivity. It is entirely plausible that some firms classified as financially distressed might still be operationally viable, with additional lending to these firms having beneficial effects by enabling these firms to survive a short-term adverse shock or to undertake needed restructuring.

In addition to distinguishing between financially and technically distressed firms to better understand the extent to which credit was misallocated in Japan during the Lost Decade, it also is useful to take the further step to determine the characteristics of those firms that used the additional loans to improve their operational efficiency. For example, Amiti and Weinstein (2013) find that bank loan supply shocks have substantial effects on firm investment. Thus, to the extent that viable firms use additional loans in a productive manner, while nonviable firms use the additional funding merely to cover current expenses in an effort to delay bankruptcy, conclusions about the extent to which credit was misallocated in Japan requires distinguishing between financially distressed, but technically viable, firms and nonviable zombie firms.

III. Data

Our empirical analysis relies on a number of data sources. The two main sources are the Development Bank of Japan (DBJ) and the Nikkei NEEDS Bank Loan Database (NEEDS). The DBJ provides detailed annual balance sheet and income statement information (consolidated as well as unconsolidated), as well as information on the firms' outputs and inputs. We use the unconsolidated data for our analysis. We restrict our sample to manufacturing firms for which total factor productivity is well-defined. NEEDS contains loans outstanding to individual firms from individual lenders, including loans from banks, government institutions, and other financial institutions. This database is merged with the DBJ using the unique Tokyo Stock Exchange (TSE) code, restricting our sample to publicly listed firms with a TSE code.

These firms are reclassified from the DBJ industries to match the industry classifications provided in the Japanese Industrial Productivity (JIP) database that is compiled by the Research Institute of Economy, Trade and Industry and Hitotsubashi University in order to use the industry-specific price deflators from the EUKLEMS Growth and Productivity database to transform the nominal DBJ values into real terms.

A further complication is that Japanese firm fiscal years are spread throughout the calendar year. While more than 90 percent of our sample has a March fiscal yearend, the remaining firms have fiscal years that end in other months. To form our annual observation database for the regression analysis, we must allocate each firm observation into one of the regression years. Because so few Japanese firms end their fiscal years in the summer, we have formed our regression year observations by splitting the firms between June and July fiscal year-ends. For example, regression year 1994 contains the firm observations with fiscal years ending from July 1994 through June 1995. Because some firms changed their fiscal yearend during our sample period, we include only those fiscal year observations that contain a full 12 months to avoid data distortions associated with such changes.

Because of the strong bank-firm relationships in Japan that influence the availability of loans to firms, we identify a main bank for each firm. Using NEEDS, we designate as the main bank the bank with the largest volume of loans outstanding to the firm in each fiscal year. Because the identity of the main bank can potentially shift from year to year as loans mature and new loans are originated, we then smooth the main bank series for each firm by requiring that a firm's main bank changes only when another bank exceeds the volume of loans outstanding to the firm by the current main bank by 10 percent.

Because credit availability may depend on bank health, we control for main bank health using the bank's market-to-book ratio, using market values from the Nikkei Financial Database. We do not rely on bank balance sheet information such as capital ratios or nonperforming loan ratios because of the widespread (and well-known) forbearance practiced by bank regulators during this period that allowed banks to substantially overstate their capital and understate their problem loans. Finally, to control for group affiliations, we use horizontal keiretsu groupings from the Industrial Groupings of Japan (Dodwell).

We restrict our sample period to regression years 1984 to 1989 prior to the bursting of the stock market and real estate bubbles, referred to as the boom years, and the post-bubble years from

1993 to 2000. We end our sample period in 2000 because of the major consolidation of the banking sector, and we omit the transition period from 1990 to 1993 immediately following the bursting of the bubbles.

We omit observations with missing values and eliminate observations with extreme values (outliers) for any of our variables. Extreme values are defined as values that are more than four standard deviations away from the mean value of that variable for firms in the same industry and for the same year. Outlier observations are identified in this way rather than for the overall sample to avoid disproportionately omitting observations in specific industries that tend to perform much better or worse than firms in other industries and to avoid disproportionately omitting observations in specific years tied to the business cycle when economic performance is particularly good or bad. Our final sample includes 9,953 observations from 1,008 manufacturing firms spanning 27 industries.

Measurement of TFP

Total factor productivity plays a key role in our analysis. As such, it is important that we use state-of-the-art techniques for computing firm-level TFP. We assume that every industry operates according to a Cobb-Douglas production function using capital, labor and materials as its inputs. TFP is then measured as the residual of output adjusting for the share of capital, labor and material inputs.

The production function is of the standard form:

$$Y_{i,j,t} = A_{i,j,t}\left(K_{i,j,t}^{\beta_j^k}\right)\left(L_{i,j,t}^{\beta_j^l}\right)\left(M_{i,j,t}^{\beta_j^m}\right), \quad (1)$$

where $Y_{i,j,t}$, representing the output of firm *i* belonging to industry *j* at time *t*, is a function of the firm's capital stock, $K_{i,j,t}$, labor, $L_{i,j,t}$, and material inputs, $M_{i,j,t}$. β_j^k , $\beta_j^l$and β_j^m are the industry-specific parameters of the production function and denote the shares of capital, labor and materials in output. These parameters are constant across time for each industry, but differ across industries. The $A_{i,j,t}$'s measure total factor productivity, popularly called the Solow residual.

Expressing equation (1) in logarithms yields a linear relationship between output and inputs:

$$\log(Y_{i,j,t}) = \log(A_{i,j,t}) + \beta_j^k \log(K_{i,j,t}) + \beta_j^l \log(L_{i,j,t}) + \beta_j^m \log(M_{i,j,t}) \quad (2)$$

Given the linear equation above and using regression analysis to estimate the coefficients on inputs, the logarithm of TFP is calculated as the residual of output after accounting for the share of capital, labor and material inputs:

$$\log(A_{i,j,t}) = \log(Y_{i,j,t}) - \beta_j^k \log\left(K_{i,j,t}\right) - \beta_j^l \log\left(L_{i,j,t}\right) - \beta_j^m \log\left(M_{i,j,t}\right) \tag{3}$$

Measurement of the production function parameters is not trivial because standard ordinary least squares (OLS) techniques yield biased estimates owing to possible correlation between inputs and predicted shocks to TFP or productivity (for a full discussion, see Marschak 1974, Olley and Pakes (OP) 1996, and Levinsohn and Petrin (LP) 2003). Two commonly accepted solutions to the simultaneity bias plaguing OLS techniques have been provided by Olley and Pakes (1996) and Levinsohn and Petrin (2003) who suggest using investment (OP) or material inputs (LP) as proxies for predictable productivity shocks. While the simultaneity bias is resolved in the canonical OP or LP estimator, they both still suffer from some collinearity problems (see Ackerberg, Caves and Fraser (ACF) 2008 for a discussion). In this study, we use the modification of the LP technique suggested by Wooldridge (2009), popularly referred to as the Wooldridge-Levinsohn-Petrin methodology (WLP, see Petrin, White and Reiter 2011) that allows for better measurement of TFP by further correcting the collinearity issues of the LP method.

Because the calculation of firm-level TFP relies on estimating production functions at the industry level, we combine smaller industries with similar products and require that an industry have at least 10 firms on average during our sample period to ensure that there are enough observations per industry to conduct the WLP procedure. The production functions, in logarithm form, are estimated over the period 1980 through 2003 for a set of 27 industries included in our final sample.

The Wooldridge (2009) correction can be applied to the LP technique both for the "output" approach, where TFP is the residual of output after adjusting for the shares of capital, labor or materials, and the "value-added" approach, where we first define value added as output adjusted for the cost of material inputs and then define TFP as the residual share of value added after adjusting for the shares of capital and labor. While both approaches have been applied in the literature (for example, Javorcik (2004) and Javorcik and Spatareanu (2011) use the output approach, and Petrin, Rieter and White (2011) use the value-added approach), we follow the suggestions of ACF and Petrin, Reiter and White (2011) and apply the WLP method to the 27 industry-specific "value-added" production functions, where equation (2) is modified to the value-added (VA) form:

$$\log(VA_{i,j,t}) = \log(A_{i,j,t}) + \beta_j^k \log(K_{i,j,t}) + \beta_j^l \log(L_{i,j,t}) , \quad (4)$$

where value added is defined as output minus intermediate inputs, and where output is measured as gross sales of a firm adjusted for the change in finished goods, half-finished goods and work in progress. Intermediate inputs are measured as material costs adjusted for changes in raw materials.[1] The capital stock is measured as the firm's tangible fixed assets. Value added, capital stock and intermediate inputs data are in nominal terms (the unit of measurement is 10,000 yen), which are converted to real terms (1995 base year) using industry-specific price deflators obtained from the EUKLEMS Growth and Productivity database.

The remaining variable, labor, is measured as man-hours (employment multiplied by the average number of hours worked per employee). We take the average of employment at the end of periods t and (t-1) as the measure of the firm's employees during period t. One drawback, not unique to our study, is the paucity of coverage for the average number of hours worked by employees at the firm level. The literature has largely handled this issue by ignoring hours and instead measuring labor input more simply as the number of employees (see, for example, Amiti and Konings)2007), Javorcik (2004), Javorcik and Spatareau (2011)). Instead, we choose to include the industry-level average of hours worked by employees as our measure of hours and multiply hours by the firm-specific employment data to obtain an approximate measure of labor hours. Second, and more importantly, while average industry-specific hours are the same across all firms belonging to a given industry (thus not capturing any firm-level heterogeneity that might exist in the number of hours worked per employee), they do vary over time. This variation might have a non-trivial effect on the measurement of the parameters of the production function.

Applying the WLP (2009) technique to equation (4), we estimate the parameters of the production process, which are then used to calculate the share of capital and labor in value added. Once we obtain the estimated shares, we subtract the shares of capital and labor from value added

[1] A more precise estimation of intermediate inputs would also adjust material costs by including electric, water, gas and power expenses in addition to raw materials. However, for many of the firms in our sample, these variables are missing. Consequently, we choose not to include utilities in our calculation of intermediate inputs.

to obtain our estimate of the Log of TFP that is used in our analysis as a proxy for the technical health of a firm.[2]

IV. Specification

Evergreening refers to the loan supply behavior of banks based on the health of the borrowers, as well as possibly the health of the lenders. Consequently, measures of both firm health and bank health are required. In addition, the estimation faces the standard problem of controlling for shifts in a firm's demand for credit.

We conduct our investigation in two steps. The first concerns the determinants of a firm obtaining additional loans, concentrating on both firm and bank characteristics while controlling for the general macroeconomic environment. The focus is on the distinction between firm financial health and firm technical health as factors determining the magnitude of any increase in loans obtained by a firm. We focus on a firm obtaining an increase in loans outstanding compared with the prior year because to do so a firm must request additional loans and be granted additional loans from its potential lenders. On the other hand, ambiguity surrounds situations when loans outstanding to a firm are unchanged or decline from the amount in the prior year. If loans are unchanged, it could be because the firm did not request additional loans or because, even though the firm did request additional loans, potential lenders denied the request(s). If loans outstanding to the firm decline, it could be because of the amortization of outstanding loans, that loans matured and the firm did not request replacement loans, that lenders refused to roll over existing loans, or even that lenders forgave existing loans. These alternative explanations for why loans outstanding were either unchanged or declined have different implications for loan supply and/or demand.

The second step investigates the extent to which additional loans are used by the firms to improve their TFP, emphasizing differences in firm characteristics and main bank health. This analysis can shed some light on the nature of any misallocation of credit during the 1990s.

The baseline random effects Tobit specification for the first step is:

$$\frac{Loan_{i,j,t}-Loan_{i,j,t-1}}{Asset_{i,j,t-1}} = b_0 + b_1 FIRM_{i,j,t-1} + b_2 BANK_{i,j,t-1} + b_3 AFFILIATION_{i,j,t-1} + b_4(INDUSTRY_j * YEAR_t) + v_{i,j,t} \quad (5)$$

[2] Interested readers can obtain the estimated parameters from the authors.

$$where\ \frac{Loan_{i,j,t} - Loan_{i,j,t-1}}{Asset_{i,j,t-1}} = \frac{Loan_{i,j,t} - Loan_{i,j,t-1}}{Asset_{i,j,t-1}}$$

$$if\ Loan_{i,j,t} - Loan_{i,j,t-1} > 0$$

$$and\ 0\ otherwise$$

Note that a Tobit specification is used because the dependent variable is censored at zero. This specification of the dependent variable takes into account the ambiguous signal provided by either no change or a decline in loans outstanding to a firm. The equation can be thought of as trying to identify the determinants of the magnitude of the increase in loans to the firm, given that the firm does experience an increase in loans.

FIRM is a vector of firm characteristics that includes Log of TFP, our measure of technical health. It also includes Average ROA, constructed as the average of period (t-1) and (t-2) values of the firm's return on assets, a common measure of financial health. The average value rather than just the annual value is used because ROA can fluctuate substantially from one year to the next. The vector also includes Sales Growth, the percentage change in total real sales, as a measure of firm health. Unfortunately, both of these measures of firm health can also be determinants of a firm's demand for credit. For example, low ROA might signal that a firm's cash flow alone is insufficient to cover its current expenses, and high sales growth might signal the need for additional credit to fund an expansion of productive capacity. The vector also includes Average Working Capital, the average of the firm's working capital for periods (t-1) and (t-2) as a control for the demand for credit, with a low value signaling a need for additional funding. Working capital is measured as current assets minus current liabilities, scaled by total assets. The vector also includes Change in ROA and Change in Working Capital (each calculated as the change between period (t-1) and the average of periods (t-2) and (t-3)) to capture what perhaps might be a temporary change in a firm's financial health. In particular, a decline in either ROA or working capital might signal a deterioration in the firm's financial health.

Additional control variables contained in **FIRM** include Current Bonds/Assets, Loans/Assets, Tangible Asset Share, and Log of Assets. Current Bonds/Assets as of period (t-1) captures potential demand for additional loans in period t, insofar as current bonds measure the volume of a firm's bonds maturing within a year. If a firm is unable to issue new bonds to replace the maturing bonds, for example due to a deterioration in its health, or chooses to replace all or part of the maturing bonds with bank loans, loan demand would increase. Loans as a percentage of total assets controls for the exposure of banks to the firm. Tangible Asset Share is the ratio of tangible assets to total assets and reflects the extent to which a firm has assets that can serve as potential collateral for loans. The Log of Assets is the logarithm of real total assets of the firm and serves as a control for firm size.

BANK includes two indicator variables for the health of a firm's main bank. For each year, each bank that serves as a main bank is classified into one of three groups (healthy, medium health or unhealthy) based on the bank's market-to-book ratio at the end of its prior fiscal year. Because main banks serve widely varying numbers of firms, the three groupings of main banks are based on serving approximately one-third of the firms rather than accounting for one-third of the main banks. We include (1, 0) dummy variables for healthy and unhealthy main banks, with a value of one if the firm's main bank is in the group, and zero otherwise. The estimated effects are differential effects measured relative to that of the omitted group, medium-health main banks. Because evergreening has been shown to be more prevalent among unhealthy banks, these main bank health classification variables should help capture the link between bank health and the granting of increased loans to a firm.

AFFILIATION contains a single variable, Same Keiretsu. This variable is a (1, 0) dummy variable that has a value of one if a firm and its main bank belong to the same horizontal keiretsu, and zero otherwise. The presumption is that if a troubled firm is in the same keiretsu as its main bank, the bank's relationship with the firm provides a stronger incentive for the bank to support a troubled firm by evergreening its loans to the firm.

We also include a set of (1, 0) dummy variables formed from the interaction of the set of industry dummy variables with the set of year dummy variables, INDUSTRY*YEAR. These variables control for macroeconomic effects over time and systematic differences across industries. Interacting the industry and year dummy variables allows the timing and magnitudes of business cycles to differ across industries. Finally, the Tobit model controls for firm-specific random effects.

The equation specification for the second step of the analysis concerning the effect of obtaining additional loans, as well as other firm and bank characteristics, on subsequent TFP is:

$$TFP\ Growth_{t,t-1} = c_0 + c_1 FIRM_{i,j,t-1} + c_2 BANK_{i,j,t-1} + c_3 YEAR_t + w_{i,j,t}. \qquad (6)$$

The dependent variable is measured as Log of TFP in period t minus Log of TFP in period (t-1). The set of FIRM explanatory variables includes Change in Bonds/Assets, Change in Main Bank

Loans/Assets, Change in Secondary Bank Loans/Assets, Log of Assets, Average Working Capital, Tangible Asset Share, and Loans/Assets. BANK includes Healthy Main Bank and Unhealthy Main Bank dummy variables. In addition, we include the two bank health dummy variables interacted with both Change in Main Bank Loans and Change in Secondary Bank Loans. The measure of bonds outstanding used to calculate the change in bonds includes commercial paper as well as straight and convertible bonds and bonds with attached warrants. The change in bonds and the change in loans are censored as before so that if the change is negative, our measure takes on a value of zero. All explanatory variables are entered as lagged values. In addition, for the changes in bonds, main bank loans, secondary bank loans and main bank health measures, alone and interacted, a second lagged value is included to allow for "time to build," insofar as the additional credit provided to the firm is used for investment which may have an effect that takes some time to fully affect TFP. The regression includes firm and year fixed effects, and the standard errors are robust and clustered at the firm level.

We further investigate the mechanism through which additional credit to a firm impacts the firm's subsequent change in TFP. A natural path is through the credit funding net investment, which in turn contributes to improved TFP. We start by estimating regressions with the firm's net investment scaled by its beginning of period capital stock, using the changes in bonds, main bank loans, and secondary bank loans, as well as the main bank health dummy variables and the firm characteristics. Here, because funding of the investment would occur in the same fiscal year as the investment itself, we use contemporaneous values for the change in credit measures, picking up correlations rather than a causal relationship, and split the sample by firm technical health and main bank health. We then re-estimate equation (6) with the addition of the first and second lagged values of net investment to investigate whether the various credit variables have any effect on the change in TFP beyond that flowing through net investment.

Table 1 provides suggestive evidence about the nature of evergreening behavior by Japanese banks. Firm observations are divided into three equal cohorts based on firm health. The final column indicates the number of observations in which a firm obtained an increase in loans, while the first three columns indicate the percentage of that total accounted for by firm observations in each of the three firm health cohorts. Panel A is based on firm financial health (Average ROA) and Panel B is based on firm technical health (TFP). The top part of each panel is based on increases in total loans, while the lower part is for increases in main bank loans. The panels contain rows for all firms, followed by the results when the observations are disaggregated into cohorts of firms with healthy main banks, medium-health main banks and unhealthy main banks. To account for differences across industries and across time, Average ROA and TFP are each measured relative to the median for the firm's industry for each year. Because the firm health cohorts represent approximately one-third of the observations in each row, deviations from 33.33 percent indicate the extent to which firms obtaining increased loans were distributed disproportionately across the firm health cohorts.

The top part of Panel A indicates that a disproportionate share of the firms obtaining increased total loans were in the low ROA cohort, consistent with evergreening behavior by banks. However, this pattern generally holds across the three cohorts based on the firms' main bank health. That is, the panel provides no evidence that firms with unhealthy main banks were more likely to obtain increased loans than were firms with healthy main banks. A similar pattern occurs for firms obtaining increased main bank loans. Thus, while we see general evidence consistent with evergreening behavior by banks, we do not observe heightened evergreening behavior by the least healthy main banks.

Strikingly, that same pattern is not repeated in Panel B, where firms are separated into cohorts based on their technical health. The top part of the panel shows that the healthiest firms are disproportionately represented among those firms obtaining increased total loans when all observations are considered. However, the next three rows provide an interesting contrast when the firms are disaggregated based on the health of their main bank. For firms with the healthiest main banks, the high TFP firms are even more likely to obtain increased total loans, while those firms with the least healthy main banks are even less likely to obtain increased loans. That is, the evidence here is not consistent with evergreening behavior by banks in terms of supporting the least healthy firms when firm health is measured by technical rather than financial health. In contrast, for firms with unhealthy main banks, the opposite pattern emerges. Low TFP firms with unhealthy main banks were more likely to obtain increased loans, while those with high TFP were less likely. Moreover, the bottom part of the panel shows that the pattern is reversed for all observations, and when the observations are disaggregated by main bank health the patterns for total loans are even more prevalent when we focus on the incidence of increased main bank loans for which main bank health is most relevant. Thus, the patterns of bank lending appear to suggest different stories about the extent to which evergreening occurred during the post-bubble period, depending on whether firm health is based on financial health or on technical health. Moreover, the contrast between Panels A and B suggests that many of the technically healthy firms that received additional loans may have, at least temporarily, been financially distressed.

Table 2 contains the summary statistics for the variables used in the regression analysis. The statistics are presented separately for the boom period (1984 to 1989) and the post-bubble period (1993 to 2000). We show the data for the two periods separately because the focus of our subsequent analysis is on the post-bubble period when banks were most likely to be evergreening loans to their troubled borrowers.

While many of the variables have similar values for the two periods, a number of the variables do differ notably, as might be expected given the sharp divergence in economic performance between the two periods. For example, TFP Growth, Net Investment, Average ROA, Sales Growth, Change in ROA and Change in Working Capital each deteriorate from the boom to the post-bubble periods. In addition, as a consequence of the progressive deregulation of the Japanese bond markets beginning in the 1980s, Increase in Bonds/Assets is much lower and Current Bonds/Assets is much higher in the post-bubble period. Finally, as noted earlier, the separation of firm observations into thirds based on main bank health is only approximate because of the lumpiness in the number of firms associated with each main bank, with a few banks serving as the main bank for a large number of firms.

V. Empirical Results

The benchmark results are presented in **Table 3**. The first two columns contain the base specification that allows the boom (1984-1989) and post-bubble (1993-2000) subsamples to have different estimated coefficients. As expected, firm technical health, as measured by Log of TFP, has positive estimated coefficients for both sub-periods. However, the estimated coefficient is almost twice as large in the post-bubble period. Not only is the effect statistically significant only in the post-bubble period, the estimated coefficient differs significantly from that for the boom period. This result suggests that when the crisis set in, the technical health of firms became an important consideration for requesting and receiving additional loans, something that did not seem to matter during the boom years when firm bankruptcies were less prevalent.

The negative estimated coefficients on Average ROA, the primary measure of firm financial health, in both sub-periods indicate that firms tend to receive a larger increase in loans the lower is ROA. The fact that the negative effect is significant even in the boom years when banks were not characterized as undertaking the evergreening of loans to unhealthy firms is consistent with Average ROA reflecting primarily loan demand effects rather than loan supply effects. That is, a firm with weak ROA may increase its demand for loans to fund its expenses due to a shortfall of cash flow. Moreover, the fact that the point estimates for the two sub-periods are almost identical suggests that a negative ROA effect in the post-bubble period cannot be interpreted as indicating the presence of evergreening behavior by banks.

Higher sales growth tends to increase the volume of additional loans to the firm, consistent with either a loan demand effect, or insofar as banks are more willing to lend to healthier firms, a loan supply effect. The negative effect of Average Working Capital is consistent with a loan demand effect, and, as an indicator of loan supply effects, consistent with banks providing additional loans to firms in worse financial health (evergreening). Similarly, the effects of both Change in ROA and Change in Working Capital can reflect either loan demand or loan supply effects. Here, both variables have negative estimated coefficients in both sub-periods, with only that for Change in ROA in the boom period failing to be statistically significant, suggesting that firms obtained larger increases in loans as their financial health deteriorated. While we cannot be sure whether the increased loans associated with deteriorating firm health are primarily associated with increased loan demand or increased loan supply, the fact that the effects are larger (in absolute value) in the post-bubble period and differ significantly from those in the boom period (when evergreening behavior is thought to be more likely) is consistent with an enhanced loan supply effect associated with evergreening behavior by banks in the post-bubble period.

Current Bonds/Assets serves as an indicator for potential loan demand, insofar as a firm with bonds that mature within current year may replace those bonds with bank loans, especially if the health of a firm has deteriorated to the extent that it will have trouble issuing new bonds to arms-length investors. Consistent with this view, the estimated effects are positive, with that for the post-bubble period being larger and statistically significant, although it does not differ significantly from that for the boom period. The negative effect of Loans/Assets is consistent with there being limits on the degree of leverage by firms in the form of bank loans. The negative effect of bank size indicates that smaller firms tended to obtain larger increases in loans (relative to their assets), although that could reflect, at least in part, the fact that larger firms tended to have access to the bond market. None of the other explanatory variables have statistically significant effects.

Columns 3 and 4 add interactive terms for both TFP and ROA with the bank health dummy variables to investigate the extent to which bank behavior might have changed between the two sub-periods in terms of their reactions to either firm financial or technical health. The positive significant coefficients for the post-bubble period that differ significantly from those for the boom period for TFP interacted with both Healthy Main Bank and Unhealthy Main Bank indicates that in the post-bubble period banks paid more attention to firm technical health. Given that firm bankruptcies were more prevalent in the post-bubble period, placing greater emphasis on firm technical health during this time is a reasonable response by banks.

Columns 5 and 6 repeat this specification replacing the dependent variable based on total loans with our measure of the increase in main bank loans, while Columns 7 and 8 use our measure of the increase in secondary bank loans as the dependent variable. Among the differences are that for main bank loans, TFP now has a statistically significant effect in the boom period, although Sales Growth in the post-bubble period and Average Working Capital in the boom period are no longer significant. Similarly, Loans/Assets loses its significance in both sub-periods, while Tangible Asset Share is now significant in both sub-periods, perhaps because main banks focus more on the collateral available for loans. Finally, Unhealthy Main Bank now has a significant positive coefficient for the boom period, although its total effect is complicated by the fact that its interaction with Average ROA now has a negative significant coefficient, consistent with main bank evergreening behavior through providing larger loans to firms with weaker financial health. For secondary bank loans, the negative Average ROA coefficients are not significant, suggesting that secondary banks, unlike main banks, do not tend to provide larger increases in loans to firms in poor health. In addition, the TFP*Healthy Main Bank effect is not significant, perhaps because the health of the firm's main bank is less relevant for secondary bank lending than for main bank lending. On the other hand, secondary banks do tend to increase loans by more to firms with higher TFP if the firm's main bank is unhealthy. This would be consistent with secondary banks being more likely than main banks to make strictly business decisions by being more willing to satisfy the loan demand by technically healthy firms whose weak main banks are unwilling or unable to do so.

The remaining tables focus on the post-bubble period when evergreening is more likely to have occurred. **Table 4** splits the observations into approximate thirds based on the health of a firm's main bank. Here, the dependent variable is our measure of the increase in main bank loans because it is main bank lending that should be most sensitive to main bank health. Moreover, the distinction between main bank loans and secondary bank loans is made because main banks, due to their long-term relationship with a firm, may be more likely to evergreen loans to troubled firms than are secondary banks, which presumably have weaker connections to the firms for which they are not the main bank.

Comparing the results across the three columns, we see that TFP, ROA, Sales Growth and Tangible Asset Share have significant effects only for firms with healthy or medium-health main banks. Thus, it appears that the unhealthy main banks did not rely as much on a firm's technical health, its strength in terms of its sales growth, or collateral availability in making loan decisions. While it appears that unhealthy main banks did not tend to provide a larger increase in loans to the firms with the weakest financial health, the significant negative coefficient on Change in ROA does suggest that they were more likely to lend more to firms as their financial health deteriorated.

For **Table 5**, the sample is split into thirds based on firm financial health (ROA). TFP has a significant positive effect only for the medium-health cohort, so we see no evidence that for firms with the lowest ROA that main banks place more weight on the firm's technical health; that is, it does not appear to be the case that main banks use technical health to distinguish among those firms with poor financial health in deciding how much to increase loans to the firm. Moreover, declining ROA leads to larger increases in loans for firms in the lower two ROA cohorts. In addition, healthy main banks increase loans more to the financially healthy cohort of firms, other things equal. Moreover, both healthy and unhealthy main banks tend to provide larger increases in loans to financially healthy firms with higher TFP, although the effect is also there for healthy main banks across firm health cohorts.

For **Table 6**, the sample is split into thirds based on firm technical health (TFP). The statistically significant negative coefficients on ROA for the two lowest firm health cohorts suggest that main banks are more willing to increase loans to firms with low ROA even if they are not among the firms with the best TFP performance. Moreover, a deteriorating ROA is associated with a larger increase in loans to technically unhealthy firms, again consistent with banks being more willing to help the least healthy firms, although it may be the case that these effects reflect increased loan demand by low ROA and declining ROA firms. Still, one would imagine that a bank basing its lending on credible credit risk analysis would be more willing to lend more to firms with the most solid technical health. On the other hand, it is only for the (technically) healthy firm cohort that we obtain significant negative coefficients on the interaction terms for Average ROA and bank health, suggesting that for the firms with the strongest technical health, main banks are more willing to meet increased loan demand from firms with lower ROA.

The remaining three tables investigate the effects of increased loans on the growth in TFP. For comparison, we include an additional source of firm financing, the change in bonds, in addition to the changes in main bank loans and secondary bank loans. In addition, we focus on the subsamples based on high, medium and low TFP and main bank health to better understand how firm behavior may differ across these firm groupings in terms of how increased credit contributes to improvements in firm TFP. For example, are high TFP firms more likely to convert additional credit into improved performance? Similarly, are loans from healthier main banks more likely to be used in a manner that enhances firm TFP? Because we use the measure of net investment in Tables 8 and 9, we remove additional observations with extreme values for net investment that are likely to be associated with either the selling of fixed capital or the acquisition of another firm or part of a firm that would increase fixed capital. We omit observations for which net investment is negative and exceeds (in absolute value) depreciation (that is, gross investment is negative) and observations in which net investment exceeds 50 percent of the firm's capital stock.

Table 7 shows the results for the full sample and for the three subsamples based on the level of TFP. We include two lagged values for the credit variables, main bank health, and their interactions to allow for the credit that might fund investment to be converted into improved firm performance. Column 1 indicates that the first lag of the change in bonds and both lags of the change in main bank loans contribute to improved TFP. In addition, having a healthy main bank is associated with improved TFP.

However, the more interesting results occur when the relationship is estimated for the subsamples based on the level of TFP. Both lagged values of the change in bonds are associated with enhanced TFP for both high TFP firms and medium TFP firms, with the size of the estimated coefficients declining as we move from high to medium to low TFP subsamples and with the effects not being statistically significant for the low TFP cohort. The same pattern is present for the change in main bank loans and for secondary bank loans, except that the second lagged values are not significant for the medium TFP cohort.

For the interaction terms, the change in main bank loans interacted with both healthy main banks and unhealthy main banks are associated with additional positive effects on the change in TFP for both the first and the second lagged values for the high TFP cohort of firms. For the change in secondary bank loans, its interaction with unhealthy main banks has a positive effect for both lagged values for the high TFP cohort, with only the second lag being significant for the medium TFP cohort. Interestingly, the only change in loans variables with a significant effect for the low TFP cohort are the two lags of the change in main bank loans interacted with the unhealthy main bank indicator. The negative estimated effects more than offset the (statistically insignificant) positive effects of the change in main bank loans, consistent with additional loans provided by unhealthy main banks to low TFP firms being used for operating expenses and interest payments rather than for purposes such as financing net investment that might improve firm performance; that is, this evidence is consistent with evergreening behavior by unhealthy main banks.

For the main bank health variables themselves, having a healthy main bank is associated with improvement in the firm's TFP. Overall, this table provides evidence that firms with the best TFP tended to use credit for purposes that produced a larger enhancement in firm TFP, whether those loans were from healthy or unhealthy main banks. That is, firms that already had higher TFP were more likely to make better use of additional credit. However, for firms with the lowest TFP, additional loans from unhealthy main banks were associated with a decline rather than a rise in TFP, consistent with evergreening behavior by unhealthy main banks.

Table 8 investigates one possible mechanism through which increased credit is converted into improvements in TFP. For this specification, the dependent variable is net investment scaled by the firm's beginning of period stock of fixed capital. Because the credit is likely converted into investment within the period in which it is obtained, we use the contemporaneous values of the credit variables. That is, the estimated relationships can be interpreted only as correlations, not as necessarily reflecting causal relationships, insofar as firms borrow for the purpose of funding investment. The first three columns use subsamples based on the TFP cohorts, while the next three columns use subsamples based on the health of the firm's main bank.

The results show that changes in bonds, main bank loans and secondary bank loans are, indeed, positively correlated with net investment, with the correlations declining with the level of

TFP and with the health of the main bank. In fact, none of the variables indicating additional credit have a statistically significant effect on the low TFP firms or the firms with an unhealthy main bank. In terms of the interaction terms for the TFP cohorts, main bank loans from healthy main banks and secondary bank loans to firms with healthy main banks are associated with greater net investment for high TFP firms, while the change in secondary bank loans also are associated with medium TFP firms with healthy main banks. Thus, these results are consistent with much of the effects shown in Table 7 for additional credit operating through the financing of net investment.

Table 9 addresses the question of whether the additional credit contributes to TFP growth beyond operating through net investment. That is, once we control for net investment do any of the additional credit variables retain their significant effects? The results show that the first lag in the change in bonds remains significant for high and medium TFP firms, as well as being significant for firms with either medium or unhealthy main banks. However, the first lag of the change in main bank loans is no longer significant for the TFP cohorts, although the change in secondary bank loans remains significant, especially if the firm has an unhealthy main bank. This might be explained by the fact that secondary banks, having a weaker relationship tie to the firm than the main bank, is more likely to make a business decision based on the net present value of the loan and thus is less likely to undertake evergreening behavior. In addition, secondary banks may step in to fill the gap for firms they deem to have good prospects when a firm's unhealthy main bank is unable or unwilling to make the loan. For firms with healthy or medium-health main banks, main bank loans do still matter even after controlling for net investment, while secondary bank loans matter for firms with medium-health and unhealthy main banks.

VI. Conclusion

This study investigates evergreening behavior by Japanese banks during the post-bubble period. Whether banks were more likely to increase lending to firms with weaker financial health depends importantly on how poor health is defined. That is, should the focus be on financial health or technical health? The conclusions differ depending on the choice.

Comparing the boom period (1984-1989) to the post-bubble period (1993-2000), we find similar sized negative estimated effects of ROA on the magnitude of increased bank loans to firms, suggesting that evidence of such an inverse relationship in the post-bubble period cannot be interpreted as evidence of bank evergreening behavior. Rather, the negative relationship likely reflects increased loan demand emanating from firms suffering from low cash flows. Moreover, we find that better technical health (higher TFP) is associated with larger increases in loans in the post-bubble period, consistent with sensible credit risk analysis by banks. We also find that in the post-bubble period, firms with healthy main banks have an even stronger positive relationship between having higher TFP and obtaining larger increases in loans.

In addition, the positive association of higher TFP with a firm obtaining a larger increase in main bank loans occurs among the two-thirds of firm observations with the healthiest main banks. We do not observe this relationship for firms with the least healthy main banks. Moreover, healthy main banks provide larger increases in loans if a firm is in the cohort with the best financial health. However, it is the least technically healthy firms that have a significant negative relationship between ROA and the size of the increase in loans, consistent with banks evergreening loans to firms with low ROA even if their underlying technical health is not strong.

But do firms use the increase in loans productively; that is, to enhance subsequent TFP? The answer is yes for both main bank and secondary bank loans, with the effects tending to be stronger than for increases in bonds. However, for low TFP firms, additional loans from unhealthy main banks are associated with slower TFP growth. One could interpret this result as suggestive of unhealthy main banks being more likely to evergreen loans. Finally, it is the firms with higher TFP that make the best use of credit for subsequent TFP growth.

We also find evidence that the increases in credit operate in large part through funding net investment, at least for the more productive firms. In fact, no relationship is found for additional credit being associated with net investment for those firms with the lowest TFP. However, we also find evidence of additional credit having some effects operating outside of any contribution to funding net investment.

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Table 1: Share of the Firms Obtaining Increased Loans in each Firm Health Cohort, for All Banks and for Main Bank Health Cohorts

PANEL A: Firms divided into cohorts based on average ROA

	High ROA	**Medium ROA**	**Low ROA**	**Number of Observations with Increased Loans**
Share of Total Firm Observations with Increased Total Loans				
All Observations	30.71%	32.29%	36.99%	2,585
Healthy Banks	29.85%	31.94%	38.22%	908
Medium-Health Banks	30.88%	33.36%	35.76%	1,007
Unhealthy Banks	29.71%	30.62%	39.68%	680
Share of Total Firm Observations with Increased Main Bank Loans				
All Observations	29.42%	32.94%	37.64%	2,189
Healthy Banks	27.20%	32.69%	40.11%	728
Medium-Health Banks	30.44%	34.49%	35.07%	864
Unhealthy Banks	30.65%	30.99%	38.36%	597

PANEL B: Firms divided into cohorts based on TFP

	High TFP	**Medium TFP**	**Low TFP**	**Number of Observations with Increased Loans**
Share of Total Firm Observations with Increased Total Loans				
All Observations	35.03%	33.87%	31.10%	2,585
Healthy Banks	38.78%	33.81%	27.41%	908
Medium-Health Banks	35.37%	32.47%	32.15%	1,007
Unhealthy Banks	25.44%	36.03%	38.53%	680
Share of Total Firm Observations with Increased Main Bank Loans				
All Observations	30.01%	34.45%	35.54%	2,189
Healthy Banks	39.85%	33.79%	26.36%	728
Medium-Health Banks	36.00%	33.33%	30.67%	864
Unhealthy Banks	24.46%	34.34%	41.21%	597

Note: In the panels above, our sample covers the post-bubble period from 1993 to 2000. Panel A indicates how the firm-year observations with increased loans are distributed across the three average ROA cohorts, while Panel B indicates how the firm-year observations with increased loans are distributed across the three TFP cohorts. The total number of observations with a positive change in outstanding loans appears in column 4. Average ROA is the average return on assets over the two years prior to the year that the increased loans are obtained, while TFP is the total factor productivity of the year prior to the year that the increased loans are obtained. TFP is measured using the Wooldridge-Levisohn-Petrin (2009) estimation technique. Firms are divided into three cohorts based on their average ROA or TFP measured relative to the median value of the firm's industry for each year, with approximately one-third of the observations in each category. Main banks are divided into three groups based on their market-to-book ratio in each year, with approximately one-third of the firm observations in each category.

Table 2: Summary Statistics

	Boom Period				Post-Bubble Period			
	Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Minimum	Maximum
Increase in Total Loans/Assets	1.65	3.53	0	36.73	1.53	3.10	0	35.98
Increase in Main Bank Loans/Assets	0.61	1.56	0	36.73	0.47	1.18	0	33.55
Increase in Secondary Bank Loans/Assets	1.19	2.64	0	36.60	1.23	2.61	0	29.68
TFP Growth	0.16	0.30	-1.01	1.81	-0.27	2.14	-6.82	3.26
Net Investment/Capital	6.75	11.36	-28.51	49.73	0.11	7.75	-19.22	49.90
Log of TFP	4.00	4.36	-3.36	25.44	3.67	4.98	-4.61	29.45
Average ROA	5.31	4.01	-24.79	26.20	2.92	3.38	-14.29	20.53
Sales Growth	4.52	12.28	-49.96	71.13	-1.37	10.17	-60.34	64.13
Average Working Capital	14.64	17.71	-36.18	89.43	15.91	17.31	-62.57	91.28
Change in ROA	-0.06	3.60	-22.65	23.27	-0.48	2.68	-22.01	14.73
Change in Working Capital	1.12	7.85	-52.81	71.42	-0.72	6.95	-66.36	42.28
Current Bonds/Assets	0.15	0.54	0	8.62	1.34	3.27	0	24.85
Loans/Assets	24.54	17.22	0.01	105.97	21.45	16.73	0.02	205.25
Tangible Asset Share	24.70	10.36	1.95	68.72	28.80	12.27	0.47	77.11
Log of Assets	17.53	1.47	13.72	22.70	17.17	2.31	12.26	25.61
Healthy Main Bank	0.37	0.48	0	1	0.36	0.48	0	1
Unhealthy Main Bank	0.30	0.46	0	1	0.25	0.43	0	1
Same Keiretsu	0.34	0.47	0	1	0.31	0.46	0	1
Increase in Bonds/Assets	2.03	4.78	0	42.34	0.63	2.46	0	65.37

Note: After eliminating the extreme values, the boom period consists of 756 firms with 3,514 observations. The post-bubble period consists of 971 firms with 6,439 observations. When we introduce TFP Growth and Increase in Bonds/Assets in the Hypothesis 2 specifications, the number of observations is reduced slightly due to the elimination of the extreme values of these variables.

TABLE 3: BENCHMARK RESULTS
Comparison of boom and post bubble periods

	(1) Boom	(2) Post Bubble	(3) Boom	(4) Post Bubble	(5) Boom	(6) Post Bubble	(7) Boom	(8) Post Bubble
Log of TFP	0.2723	0.4626**[a]	0.3127	0.4166**	0.2651*	0.1703**	0.1498	0.2811*
	(0.2409)	(0.1325)	(0.2479)	(0.1342)	(0.1091)	(0.0622)	(0.2038)	(0.1098)
Average ROA	-0.1513**	-0.1282**	-0.1423*	-0.1250**	-0.0760**	-0.0590**	-0.0644	-0.0628
	(0.0371)	(0.0310)	(0.0551)	(0.0449)	(0.0241)	(0.0201)	(0.0455)	(0.0369)
Sales Growth	0.0468**	0.0325**	0.0465**	0.0332**	0.0154**	0.0086	0.0414**	0.0303**
	(0.0129)	(0.0114)	(0.0129)	(0.0114)	(0.0056)	(0.0050)	(0.0107)	(0.0094)
Average Working Capital	-0.0295**	-0.0370**	-0.0310**	-0.0369**	-0.0075	-0.0112**	-0.0300**	-0.0354**
	(0.0107)	(0.0084)	(0.0107)	(0.0084)	(0.0047)	(0.0038)	(0.0088)	(0.0069)
Change in ROA	-0.0517	-0.2008**[a]	-0.0502	-0.2043**[a]	-0.0112	-0.0566**	-0.0536	-0.1789**[a]
	(0.0426)	(0.0418)	(0.0426)	(0.0418)	(0.0183)	(0.0185)	(0.0356)	(0.0346)
Change in Working Capital	-0.0425**	-0.0665**[a]	-0.0418**	-0.0681**[a]	-0.0220**	-0.0185**	-0.0289**	-0.0602**[a]
	(0.0161)	(0.0138)	(0.0161)	(0.0138)	(0.0071)	(0.0061)	(0.0134)	(0.0114)
Current Bonds/Assets	0.1917	0.3328**	0.1946	0.3324**	0.1338	0.1185**	0.0202	0.2443**
	(0.2367)	(0.0277)	(0.2365)	(0.0277)	(0.1004)	(0.0125)	(0.2016)	(0.0229)
Loans/Assets	-0.0350**	-0.0187*	-0.0359**	-0.0189*	-0.0068	0.0024	-0.0218**	-0.0081
	(0.0103)	(0.0087)	(0.0103)	(0.0088)	(0.0044)	(0.0038)	(0.0085)	(0.0070)
Tangible Asset Share	0.0143	0.0149	0.0139	0.0147	0.0260**	0.0126**	-0.0078	0.0067
	(0.0159)	(0.0094)	(0.0159)	(0.0094)	(0.0069)	(0.0043)	(0.0130)	(0.0077)
Log of Assets	-0.8879**	-0.5520**[a]	-0.8873**	-0.5585**[a]	-0.5029**	-0.3411**[b]	-0.5583**	-0.3365**
	(0.1079)	(0.0833)	(0.1081)	(0.0835)	(0.0486)	(0.0389)	(0.0882)	(0.0677)
Healthy Main Bank	0.1087	-0.1402	0.1403	-0.2247	-0.0088	-0.2034	0.1290	0.0203
	(0.2865)	(0.2023)	(0.5492)	(0.3081)	(0.2407)	(0.1396)	(0.4553)	(0.2539)
Unhealthy Main Bank	0.0840	0.3517	0.7474	-0.3565	0.6009*	0.0627[a]	0.2922	-0.2490
	(0.3070)	(0.2274)	(0.5479)	(0.3432)	(0.2381)	(0.1520)	(0.4554)	(0.2825)
Same Keiretsu	-0.2662	0.0514	-0.2494	0.0164	0.0937	-0.0559	-0.2880	-0.0039
	(0.2818)	(0.2091)	(0.2822)	(0.2095)	(0.1248)	(0.0971)	(0.2311)	(0.1695)
Log of TFP*Healthy Main Bank			-0.0536	0.0594**[a]	-0.0424	0.0378*[a]	-0.0025	0.0303
			(0.0679)	(0.0042)	(0.0297)	(0.0187)	(0.0567)	(0.0343)
Log of TFP*Unhealthy Main Bank			-0.0902	0.1505**[b]	-0.0281	0.0179	-0.0455	0.1319**[a]
			(0.0696)	(0.0448)	(0.0301)	(0.0200)	(0.0578)	(0.0372)
Average ROA*Healthy Bank			0.0299	-0.0418	0.0251	-0.0325	-0.0194	-0.0211

			(0.0716)	(0.0607)	(0.0315)	(0.0276)	(0.0591)	(0.0499)
Average ROA*Unhealthy Bank			-0.0642	0.0479	-0.0923**	0.0146[a]	0.0136	0.0121
			(0.0735)	(0.0660)	(0.0320)	(0.0293)	(0.0607)	(0.0547)
Pseudo R-squared	0.0404		0.0409		0.0535		0.0397	
Number of Firm-Year Observations	9, 953		9, 953		9, 953		9, 953	

*: Significant at 5%; **: Significant at 1%; Robust standard errors in parentheses.

[a] and [b] denote that the coefficient for the post-bubble period differs from that for the boom period at 5% and 1% levels of significance, respectively. In addition to industry*year fixed effects, all regressions control for random effects at the firm level. All regressions have a Tobit specification where the dependent variable is measured as the change in loans between periods t and (t-1) divided by assets in period (t-1) if the change in loans is positive, and zero otherwise. Columns (1) to (4) summarize the results for the change in total loans. Columns (5) and (6) are for the change in main bank loans, and Columns (7) and (8) are for the change in secondary bank loans.

Table 4: Determinants of Increase in Main Bank Loans by Main Bank Health

	(1)	(2)	(3)
VARIABLES	**Healthy MB**	**Medium Health MB**	**Unhealthy MB**
Log of TFP	0.2720*	0.2193**	-0.0656
	(0.1113)	(0.0788)	(0.1193)
Average ROA	-0.0848**	-0.0665**	0.0051
	(0.0241)	(0.0182)	(0.0282)
Sales Growth	0.0218*	0.0138*	-0.0067
	(0.0083)	(0.0067)	(0.0097)
Average Working Capital	-0.0100	-0.0049	-0.0115
	(0.0067)	(0.0050)	(0.0073)
Change in ROA	-0.0587	-0.0023	-0.1006**
	(0.0302)	(0.0260)	(0.0357)
Change in Working Capital	-0.0212*	-0.0137	-0.0302*
	(0.0099)	(0.0080)	(0.0132)
Current Bonds/Assets	0.0807**	0.1363**	0.1564**
	(0.0194)	(0.0166)	(0.0282)
Loans/Assets	0.0080	0.0040	0.0083
	(0.0064)	(0.0049)	(0.0073)
Tangible Asset Share	0.0284**	0.0124*	-0.0047
	(0.0077)	(0.0054)	(0.0083)
Log of Assets	-0.3864**	-0.3722**	-0.1922*
	(0.0679)	(0.0489)	(0.0780)
Same Keiretsu	-0.0495	-0.0239	-0.1000
	(0.1558)	(0.1233)	(0.2310)
Constant	2.8032	5.9865**	2.2904
	(1.7442)	(2.1547)	(2.4192)
Pseudo R-squared	0.0919	0.0913	0.0898
Number of Firm-Year Observations	2,327	2,521	1,591

*: Significant at 5%; **: Significant at 1%; Robust standard errors in parentheses.

In addition to industry*year fixed effects, all Tobit regressions also control for random effects at the firm level. The dependent variable is measured as the change in main bank loans between periods t and (t-1) divided by assets in period (t-1) if the change in main bank loans is positive, and zero otherwise. Column (1) contains the observations for those firms with the healthiest main banks, while column (2) and column (3) are based on the observations for firms with main banks of medium health and poor health, respectively. Main banks are divided into the three groups year by year, based on their market-to-book ratio.

Table 5: Determinants of Increase in Main Bank Loans by Firm Financial Health

	(1)	(2)	(3)
VARIABLES	**ROA High**	**ROA Medium**	**ROA Low**
Log of TFP	0.1035	0.2918**	-0.0283
	(0.1009)	(0.0877)	(0.1129)
Sales Growth	0.0051	0.0128	0.0071
	(0.0076)	(0.0082)	(0.0084)
Average Working Capital	-0.0136*	-0.0089	-0.0085
	(0.0056)	(0.0059)	(0.0068)
Change in ROA	-0.0226	-0.0757*	-0.0852**
	(0.0266)	(0.0336)	(0.0315)
Change in Working Capital	-0.0235**	-0.0380**	-0.0033
	(0.0087)	(0.0103)	(0.0108)
Current Bonds/Assets	0.0711**	0.1119**	0.1419**
	(0.0213)	(0.0187)	(0.0212)
Loans/Assets	0.0098	0.0098	0.0069
	(0.0057)	(0.0057)	(0.0061)
Tangible Asset Share	0.0153*	0.0003	0.0126
	(0.0068)	(0.0063)	(0.0073)
Log of Assets	-0.2511**	-0.4218**	-0.4609**
	(0.0617)	(0.0565)	(0.0690)
Healthy Main Bank	0.5788**	0.2936	0.0066
	(0.1809)	(0.1737)	(0.2024)
Unhealthy Main Bank	-0.2141	-0.0857	0.2937
	(0.1959)	(0.1900)	(0.2293)
Same Keiretsu	-0.1274	-0.0127	-0.1206
	(0.1569)	(0.1382)	(0.1617)
Log of TFP*Healthy Main Bank	0.0591*	0.0617*	0.0638*
	(0.0203)	(0.0290)	(0.0280)
Log of TFP*Unhealthy Main Bank	0.0722*	-0.0400	-0.0136
	(0.0305)	(0.0313)	(0.0366)
Constant	3.2681*	6.2229**	3.1915
	(1.6552)	(1.8682)	(2.3230)
Pseudo R-Squared	0.0935	0.1057	0.0800
Number of Firm-Year Observations	2,147	2,148	2,144

*: Significant at 5%; **: Significant at 1%; Robust standard errors in parentheses. See notes for Table 4. Observations are split into approximate thirds year by year based on the value of Average ROA.

Table 6: Determinants of Increase in Main Bank Loans by Firm Technical Health

VARIABLES	(1) TFP High	(2) TFP Medium	(3) TFP Low
Average ROA	-0.0225	-0.0653*	-0.0667*
	(0.0339)	(0.0308)	(0.0330)
Sales Growth	0.0097	0.0013	0.0186*
	(0.0071)	(0.0082)	(0.0090)
Average Working Capital	-0.0137*	-0.0118	-0.0062
	(0.0058)	(0.0060)	(0.0067)
Change in ROA	-0.0388	-0.0130	-0.0869**
	(0.0306)	(0.0292)	(0.0317)
Change in Working Capital	-0.0405**	-0.0243**	0.0021
	(0.0104)	(0.0089)	(0.0104)
Current Bonds/Assets	0.0867**	0.0875**	0.1828**
	(0.0188)	(0.0197)	(0.0220)
Loans/Assets	0.0025	0.0037	0.0120
	(0.0058)	(0.0057)	(0.0063)
Tangible Asset Share	-0.0070	0.0190**	0.0122
	(0.0073)	(0.0068)	(0.0074)
Log of Assets	-0.2275**	-0.2472**	-0.3153**
	(0.0462)	(0.0569)	(0.0691)
Healthy Main Bank	0.0169	-0.2709	-0.1236
	(0.1990)	(0.1808)	(0.1959)
Unhealthy Main Bank	-0.2678	0.0421	0.0887
	(0.2440)	(0.2005)	(0.1937)
Same Keiretsu	-0.0531	-0.1755	0.0417
	(0.1454)	(0.1469)	(0.1794)
Average ROA*Healthy Main Bank	-0.0374**	0.0082	0.0049
	(0.0052)	(0.0398)	(0.0493)
Average ROA*Unhealthy Main Bank	-0.0157**	-0.0124	0.0564
	(0.0042)	(0.0445)	(0.0461)
Constant	3.5865**	3.1027	4.4609
	(1.5544)	(2.0558)	(2.3429)
Pseudo R-Squared	0.0958	0.0988	0.0937
Number of Firm-Year Observations	2,147	2,148	2,144

*: Significant at 5%; **: Significant at 1%; Robust standard errors in parentheses. See notes for Table 4. Observations are split into approximate thirds year by year based on the value of the Log of TFP.

TABLE 7: TFP GROWTH & CREDIT

	(1)	(2)	(3)	(4)
	Log of TFP (t) – Log of TFP (t-1)			
VARIABLES	**Full**	**TFP High**	**TFP Medium**	**TFP Low**
Change in bonds lagged	0.0129**	0.0120**	0.0115**	0.0062
	(0.0043)	(0.0022)	(0.0029)	(0.0105)
Change in bonds twice lagged	0.0030	0.0060*	0.0048*	0.0035
	(0.0031)	(0.0030)	(0.0020)	(0.0044)
Change in main bank (MB) loans lagged	0.0191*	0.0422**	0.0365*	0.0105
	(0.0094)	(0.0115)	(0.0165)	(0.0169)
Change in secondary bank (SB) loans lagged	0.0119	0.0200*	0.0050*	0.0034
	(0.0073)	(0.0081)	(0.0017)	(0.0070)
Change in MB loans lagged*Healthy MB lagged	0.0239	0.0581**	0.0251	0.0090
	(0.0273)	(0.0107)	(0.0290)	(0.0359)
Change in MB loans lagged*Unhealthy MB lagged	0.0112	0.0520*	-0.0157	-0.0181**
	(0.0335)	(0.0179)	(0.0202)	(0.0014)
Change in SB loans lagged*Healthy MB lagged	0.0127	0.0123	0.0033	0.0026
	(0.0091)	(0.0095)	(0.0072)	(0.0118)
Change in SB loans lagged*Unhealthy MB lagged	0.0058	0.0157**	0.0047	-0.0172
	(0.0149)	(0.0011)	(0.0075)	(0.0232)
Change in main bank (MB) loans twice lagged	0.0374**	0.0688**	0.0089	0.0068
	(0.0177)	(0.0228)	(0.0133)	(0.0210)
Change in secondary bank (SB) loans twice lagged	0.0063	0.0212***	0.0078	0.0047
	(0.0081)	(0.0066)	(0.0081)	(0.0113)
Change in MB loans twice lagged*Healthy MB twice lagged	0.0074	0.1173*	0.0217	0.0120
	(0.0281)	(0.0503)	(0.0185)	(0.0387)
Change in MB loans twice lagged*Unhealthy MB twice lagged	-0.0151	0.0677*	-0.0166	-0.0811*
	(0.0323)	(0.0316)	(0.0169)	(0.0385)
Change in SB loans twice lagged*Healthy MB twice lagged	0.0063	0.0123	0.0055	0.0024
	(0.0111)	(0.0079)	(0.0088)	(0.0155)
Change in SB loans twice lagged*Unhealthy MB twice lagged	0.0161	0.0234*	0.0137*	-0.0048
	(0.0139)	(0.0115)	(0.0065)	(0.0200)
Healthy Main Bank (MB) lagged	0.0907**	0.1239**	0.0160	0.0134
	(0.0285)	(0.0227)	(0.0209)	(0.0504)
Unhealthy Main Bank (MB) lagged	-0.0095	0.0340	0.0048	-0.0950
	(0.0326)	(0.0397)	(0.0282)	(0.0553)
Healthy Main Bank (MB) twice lagged	0.0396	0.0764*	0.0118	0.0050
	(0.0305)	(0.0337)	(0.0173)	(0.0445)
Unhealthy Main Bank (MB) twice lagged	-0.0767	-0.0157	-0.0442	-0.0716
	(0.0410)	(0.0339)	(0.0299)	(0.0665)
Log of assets lagged	-1.3583**	-1.1051**	-0.8657**	-0.5788**
	(0.0118)	(0.0559)	(0.2094)	(0.0266)
Average working capital lagged	0.0058*	0.0127**	0.0014	0.0006
	(0.0025)	(0.0025)	(0.0022)	(0.0045)
Tangible asset share lagged	0.0060	0.0093*	0.0063*	0.0010
	(0.0033)	(0.0045)	(0.0027)	(0.0078)
Loan share lagged	-0.0012	-0.0043*	-0.0053**	-0.0078**
	(0.0024)	(0.0020)	(0.0020)	(0.0014)
Constant	24.7006**	21.0432**	-15.6795**	52.5537**

	(0.2509)	(1.0418)	(3.8344)	(1.5995)
Firm-year Observations	5,514	1,841	1,846	1,827
Within R-squared	0.7121	0.6763	0.6599	0.6263

*: denotes significance at 5% level or better but less than 1%. **: denotes significance at 1% level or better. All regressions contain year fixed effects and firm level fixed effects. The standard errors are robust and clustered at the firm level.

TABLE 8: NET INVESTMENT & CREDIT

	(1)	(2)	(3)	(4)	(5)	(6)
	Net Investment/Capital					
VARIABLES	**TFP High**	**TFP Medium**	**TFP Low**	**Healthy MB**	**Medium Health MB**	**Unhealthy MB**
Change in bonds/assets	0.4765**	0.3352**	0.2109	0.3629**	0.3413**	0.0106
	(0.1132)	(0.1027)	(0.1061)	(0.0850)	(0.1109)	(0.1590)
Change in MB loans/assets	0.7466*	0.5992	0.2439	0.3012*	0.1377	0.0665
	(0.3358)	(0.4251)	(0.6558)	(0.0983)	(0.2960)	(0.3793)
Change in SB loans/assets	0.3312**	0.2675*	0.1233	0.4252**	0.2736*	0.1291
	(0.1248)	(0.1161)	(0.1843)	(0.1320)	(0.0949)	(0.1366)
Change in MB loans/assets*Healthy MB	0.9390*	0.6460	0.0695			
	(0.3613)	(0.6377)	(0.7367)			
Change in MB loans/assets*Unhealthy MB	0.5750	-0.0964	-0.1044			
	(0.5788)	(0.6189)	(0.8766)			
Change in SB loans/assets*Healthy MB	0.5984*	0.4867*	0.1838			
	(0.2126)	(0.2024)	(0.2323)			
Change in SB loans/assets*Unhealthy MB	0.0763	0.0547	0.0397			
	(0.2188)	(0.2574)	(0.2767)			
Healthy MB	0.4650	0.0759	0.0025			
	(0.5316)	(0.5355)	(0.5448)			
Unhealthy MB	0.6847	0.1312	-0.3043			
	(0.6339)	(0.7395)	(0.6888)			
Log of assets lagged	-0.1338	-0.1796	-1.3823*	-0.0066	-0.1547	-0.3013
	(0.4223)	(0.2189)	(0.1063)	(0.1926)	(0.1587)	(0.2249)
Average working capital lagged	0.0231	-0.0315	-0.0550	0.0635	-0.0429	-0.0096
	(0.0662)	(0.0547)	(0.0719)	(0.0585)	(0.0669)	(0.0917)
Tangible asset share lagged	-0.8146**	-0.8217**	-0.9070**	-1.1450**	-0.8133**	-0.7051**
	(0.1037)	(0.1280)	(0.1065)	(0.1063)	(0.1108)	(0.1279)
Loan share lagged	-0.0539	-0.0778	-0.0744	-0.1145	-0.1077	-0.0266
	(0.0546)	(0.0602)	(0.0637)	(0.0603)	(0.0584)	(0.0676)
Constant	21.2677*	26.7104**	144.3751*	34.7476**	26.2150**	24.9444**
	(8.8620)	(5.8458)	(56.9298)	(5.4450)	(4.8934)	(6.3214)
Firm-Year Observations	1,841	1,846	1,827	2,018	2,151	1,345
Within R-squared	0.1964	0.1381	0.1604	0.2089	0.1246	0.1372

*: denotes significance at 5% level or better but less than 1% **: denotes significance at 1% level or better. All regressions contain year and firm fixed effects. The standard errors are robust and clustered at the firm level. This table captures the contemporaneous relationship between net investment and additional credit.

TABLE 9: TFP GROWTH, NET INVESTMENT & CREDIT

	(1)	(2)	(3)	(4)	(5)	(6)
	Log of TFP (t) – Log of TFP (t-1)					
VARIABLES	**TFP High**	**TFP Medium**	**TFP Low**	**Healthy MB**	**Medium Health MB**	**Unhealthy MB**
Net investment lagged	0.0061**	0.0008**	-0.0014	0.0036**	0.0021*	0.0002
	(0.0014)	(0.0003)	(0.0009)	(0.0003)	(0.0008)	(0.0008)
Net investment twice lagged	0.0016*	0.0003	-0.0001	0.0023*	-0.0020	-0.0015
	(0.0008)	(0.0019)	(0.0007)	(0.0011)	(0.0025)	(0.0017)
Change in bonds lagged	0.0211*	0.0121**	-0.0007	0.0102	0.0171*	0.0126*
	(0.0106)	(0.0024)	(0.0029)	(0.0078)	(0.0080)	(0.0058)
Change in bonds twice lagged	0.0037	0.0012	-0.0039	0.0018	0.0048	0.0041
	(0.0044)	(0.0032)	(0.0029)	(0.0052)	(0.0070)	(0.0059)
Change in MB loans lagged	0.0289	0.0442	0.0087	0.0601*	0.0306*	0.0099
	(0.0161)	(0.0364)	(0.0166)	(0.0242)	(0.0118)	(0.0287)
Change in SB loans lagged	0.0098**	0.0091**	-0.0039	0.0082	0.0109**	0.0057*
	(0.0018)	(0.0008)	(0.0058)	(0.0071)	(0.0024)	(0.0021)
Change in MB loans lagged*Healthy MB lagged	0.0139	0.0116	0.0025			
	(0.0345)	(0.0409)	(0.0292)			
Change in MB loans lagged*Unhealthy MB lagged	0.0145	0.0004	-0.0156			
	(0.0405)	(0.0370)	(0.0201)			
Change in SB loans lagged*Healthy MB lagged	0.0133	0.0123	0.0042			
	(0.0109)	(0.0095)	(0.0073)			
Change in SB loans lagged*Unhealthy MB lagged	0.0113**	0.0109**	-0.0037			
	(0.0026)	(0.0011)	(0.0076)			
Change in MB loans twice lagged	0.0479*	-0.0069	-0.0032	0.0441*	0.0555*	0.0137
	(0.0186)	(0.0161)	(0.0132)	(0.0205)	(0.0233)	(0.0204)
Change in SB loans twice lagged	0.0114	0.0184**	-0.0078	0.0086	0.0078**	0.0051*
	(0.0110)	(0.0064)	(0.0081)	(0.0102)	(0.0014)	(0.0024)

Change in MB loans twice lagged*Healthy MB twice lagged	0.0282	0.1131	0.0220			
	(0.0370)	(0.0756)	(0.0183)			
Change in MB loans twice lagged*Unhealthy MB twice lagged	-0.0695	-0.0630	-0.0185			
	(0.0369)	(0.0326)	(0.0170)			
Change in SB loans twice lagged*Healthy MB twice lagged	0.0015	0.0107	0.0046			
	(0.0150)	(0.0078)	(0.0088)			
Change in SB loans twice lagged*Unhealthy MB twice lagged	0.0316*	0.0256*	-0.0045			
	(0.0112)	(0.0128)	(0.0086)			
Healthy MB lagged	0.1220*	0.0237	0.0057			
	(0.0497)	(0.0226)	(0.0207)			
Unhealthy MB lagged	0.0883	-0.0350	-0.0075			
	(0.0554)	(0.0397)	(0.0281)			
Healthy MB twice lagged	0.0430*	0.0799*	0.0101			
	(0.0137)	(0.0347)	(0.0178)			
Unhealthy MB twice lagged	-0.0765	-0.0170	-0.0050			
	(0.0663)	(0.0341)	(0.0299)			
Log of assets lagged	-2.9881**	-1.1044**	0.9043**	-1.3922**	-1.4358**	-1.2606**
	(0.0871)	(0.0558)	(0.2152)	(0.0289)	(0.0388)	(0.0526)
Average working capital lagged	0.0136**	-0.0023	-0.0003	0.0108	0.0098*	0.0103*
	(0.0044)	(0.0024)	(0.0022)	(0.0055)	(0.0045)	(0.0049)
Tangible asset share lagged	-0.0083	0.0012	0.0102*	-0.0059	0.0100	0.0119
	(0.0085)	(0.0051)	(0.0046)	(0.0082)	(0.0084)	(0.0072)
Loan share lagged	-0.0049	-0.0037	-0.0043*	-0.0008	-0.0004	-0.0010
	(0.0053)	(0.0023)	(0.0019)	(0.0051)	(0.0052)	(0.0051)
Constant	52.9636**	21.0275**	-16.4675**	26.1388**	26.0083**	22.0787**
	(1.6247)	(1.0416)	(3.9592)	(0.6197)	(0.7447)	(0.9216)
Firm-Year Observations	1,841	1,846	1,827	2,018	2,151	1,345
R-squared	0.7272	0.6864	0.6501	0.7174	0.7043	0.6858

*: denotes significance at 5% level or better but less than 1% **: denotes significance at 1% level or better. All regressions contain year and firm fixed effects. The standard errors are robust and clustered at the firm level.