The Effects of Firm and Bank Balance Sheet Conditions to Net Interest Margins: Evidence from Loan-level Firm Survey Data

Aizawa-Tanemura, Tomoko
Nishiyama, Shinichi

The Effects of Firm and Bank Balance Sheet Conditions to Net Interest Margins: Evidence from Loan-level Firm Survey Data

Tomoko AIZAWA-Tanemura
Shin-Ichi NISHIYAMA

November 2022

Discussion Paper No. 2215

GRADUATE SCHOOL OF ECONOMICS

KOBE UNIVERSITY

ROKKO, KOBE, JAPAN

The Effects of Firm and Bank Balance Sheet Conditions to Net Interest Margins: Evidence from Loan-level Firm Survey Data*

Tomoko AIZAWA-Tanemura†
College of Commerce,
Nihon University

Shin-Ichi NISHIYAMA‡
Graduate School of Economics,
Kobe University

Abstract

This paper uses the interpretation of the monetary transmission channel model in Japan under low interest rates to clarify the factors that determine the net interest margin (NIM). An analysis using Loan-level data from the Tohoku region from 2012 to 2015 shows that the Capital-to-Asset Ratio of a firm is an important factor in determining NIM. Even if we consider that firms and banks have suffered Nuclear Damage, Bad reputation Damage, and Supplier Damage due to the Great East Japan Earthquake as control variables, the channel through the agency cost of the borrower is effective. Even if we put the policy response of Rents and leases Subsidy, Interest or guarantee fee Subsidy, Interest reductions, and Group Subsidy into the estimation formula as a control variable, the channel through the agency cost of the borrower is effective. On the other hand, the existence of a channel through banks' agency costs, funding costs of capital and borrowing, and liquidity costs cannot be shown to be stable. In other words, financial institutions can earn high NIMs when they lend to firms that have relatively small net worth and depend on banks for funding. Financial institutions in Japan's Tohoku region that wish to profit from lending need to face the agency problem between borrower firms and lender banks.

Key words: Net Interest Margin, Capital-to-Asset Ratio, Balance Sheet Channel,

---

* We would like to thank Nobuyoshi Yamori and Masahiko Shibamoto for their insightful comments. Needless to say, the remaining errors are the responsibility of the authors. Tohoku University Earthquake Recovery Firm Survey (TERFS) 2012-2015 dataset is provided by Regional Innovation Research Center, Graduate School of Economics and Management, Tohoku University. Nishiyama gratefully acknowledges financial support from JSPS Grant-in-Aids for Scientific Research (KAKENHI) No. 18K01687 and No. 16H03608.

† E-mail: aizawa-tanemura.tomoko@nihon-u.ac.jp

‡ Corresponding Author. E-mail: nishiyama@econ.kobe-u.ac.jp

Loan-level Data

JEL Classification: E43, E51, E52, G21

Index

1. Introduction

1.1. Motivation and Research Question

The purpose of this paper is to clarify the determinants of the net interest margin (NIM), which has a significant impact on bank profits under low interest rates in Japan from 2012 to 2015. The economic environment of low interest rates continues due to monetary policy, and deposit interest rates are low and constant, as shown in Figure 1. On the other hand, positive NIM is secured. The lending interest rate level is considered to change depending on the factors on the firm side and the factors on the bank side. Therefore, in order to clarify the determinants of NIM, it is necessary to perform multifaceted analysis using Loan-level Firm Survey Data.

The uniqueness of this paper is that it focuses on clarifying the determinants of NIM by utilizing the interpretation of the monetary transmission channel model. In this paper, we use the monetary transmission channel model and the NIM determination model to hypothesize that factors on the firm side and/or factors on the bank side determine NIM. And we will clarify whether the NIM of financial institutions in the Tohoku region depends on the factors on the firm side or the factors on the bank side. Specifically, we will clarify which of the borrower's agency cost, the bank's agency cost, the bank's capital and borrowing funding cost, and the bank's liquidity cost has a significant effect on NIM. Chapter 2 introduces previous research. Chapter 3 describes the data. Chapter 4 shows the framework of empirical analysis, and Chapter 5 shows the results of empirical analysis. The conclusion is summarized in Chapter 6.

2. Literature Review

2.1. Review of Banking Literature

In a general equilibrium model, such as the Arrow-Debreu model, firms and households can take full advantage of financial markets, making banks unable to make profit and the banking sector becoming unnecessary in the economy. In reality, financial markets are not perfect, and banks offer their customers a variety of financial products and services and get their rewards.

Ho and Saunders (1981), pioneers of the NIM model, use portfolio selection theory for bank hedging and the bank's expected utility maximization model to create a model that determines a bank's NIM. The NIM is determined by spreads due to financial transaction uncertainty, implicit interest expense, opportunity cost of reserve requirements, and default premium of lending. NIM is always positive, as banks face transaction uncertainty. NIM is determined by the degree of risk aversion of bank owners, the size of bank transactions, the market structure of banks, and the diversification of interest rates. A time-series and cross-section analysis using data from more than 100 US banks from the fourth quarter of 1976 to the fourth quarter of 1979 shows that NIM is significantly associated with the diversification of one-year bond rates. Furthermore, when they analyzed the small banks and the large banks separately, it was shown that the small banks had significantly larger NIMs by 0.3682 percentage points than the large banks.

While Ho and Saunders (1981) assumed uncertainty in the deposit and lending rates, McShane and Sharpe (1985) create a model that assumes uncertainty in the short-term money market interest rate in the context of the Australian financial market. Using 148 observations, they measure the NIM of Australian banks in time series and cross-section. As a result, they find that there is a non-linear relationship between the NIM of Australian commercial banks and measures of market dominance, absolute risk aversion and interest rate uncertainty.

Angbazo (1997) extends Ho and Saunders (1981)'s interest rate margin dealer model, which investigated the relationship between interest rate risk and NIM, to create a model that includes the interaction between default risk and interest rate risk. NIM is determined by Default risk, Interest rate risk, Liquidity risk, Leverage, Implicit interest payments, Opportunity cost of non-interest bearing reserves, Management efficiency, and Branching regulation.

They used data from 286 commercial banks and 1400 observations from the 1989-1993 Call Report of the US and conducted a cross-sectional analysis. They find that banks with higher risk loans and higher interest rate risk exposure achieve higher NIM. NIM is positively correlated with core capital ratio, non-interest bearing reserve ratio and efficiency, and negatively correlated with liquidity risk. In the Angbazo model, as the core capital ratio increases, the cost of funds borrowed decreases because Solvency Risk decreases. Since the cost of funding by equity is higher, as equity increases, the average cost of borrowing equity becomes higher. Thus, an increase in the core capital ratio increases the NIM. The current assets/liabilities ratio has a negative effect on NIM because an increase in the current assets/liabilities ratio lowers liquidity risk and hence the liquidity premium.

They also conduct empirical analysis by bank size, showing through GLS estimation that NIMs of large banks are affected by default risk, NIMs of large regional banks are affected by interest rate risk, and NIMs of small regional banks are affected by both default risk and interest rate risk.

Hamadi and Awdeh (2012) identify the factors that determine the NIM of banks in Lebanon. They use a panel data set of 53 banks (32 domestic commercial banks and 21 foreign commercial banks) from 1996 to 2009 using the Bilan Banques database to estimate the NIM in a fixed effects model. They believe that a bank's NIM is determined firstly by bank-specific factors, secondly by banking industry-specific factors, thirdly by monetary policy factors, and fourthly by macroeconomic factors. In more detail, the NIM is determined first by bank-specific factors such as bank asset size, deposit growth rate, capital adequacy ratio, liquidity ratio, efficiency (cost/income), loan ratio, and non-performing loan ratio; second by factors related to the structure of the banking sector such as concentration, interbank interest rates, and foreign currency loan and deposit ratios; and third by monetary Thirdly, the one-year discount rate of the central bank as a monetary policy factor; fourthly, the economic growth rate, inflation rate, gross national savings as a percentage of GDP, and gross investment as a percentage of GDP, which take into account macroeconomic variables, will be used as explanatory variables in the empirical analysis.

Their estimation of the fixed effects model shows that the results are very different for domestic and foreign banks. For domestic banks, bank asset size, liquidity ratio, efficiency, capital adequacy ratio, nonperforming loan ratio, concentration, foreign currency loan ratio, and foreign currency deposit ratio have a negative impact on NIM. Deposit growth rate, loan to value ratio, inflation rate, central bank discount rate, gross national savings ratio, and gross investment ratio have a significant positive impact on NIM. On the other hand, for foreign banks, only efficiency and the gross national savings ratio have an impact on the NIM. This indicates that the NIM of domestic banks is significantly affected by their own monetary policy and macroeconomic factors, while the NIM of foreign banks is unaffected by them.

According to the estimation results of Angbazo (1997) and Hamadi and Awdeh (2012), an increase in banks' liquidity ratio has a negative impact on NIM. In Angbazo (1997), an increase in banks' capital adequacy ratio has a positive impact on NIM, while in Hamadi and Awdeh (2012), an increase in banks' capital adequacy ratio has a negative impact on NIM.

2.2. Review of Macro Literature

The transmission mechanisms of monetary policy are explained by Mishkin (1995), who divides them into Traditional Interest Rate Channels, Exchange Rate Channels, Equity Price Channels, and Credit Channels. Kuttner and Mosser (2002) show the monetary transmission mechanism in a flowchart. Credit Channels are divided into Bank Lending Channel and Balance-Sheet Channel.

Bernanke and Gertler (1989) use the overlapping generations model to argue that the borrower's capital affects agency costs and, as a result, investment. A large amount of borrower's capital reduces the agency cost of raising capital investment. A boom accelerates the economy by increasing capital, lowering agency costs, and increasing investment. In times of recession, it accelerates in the opposite direction. Shocks that affect capital stock are factors that cause economic fluctuations. This indicates that there is a credit channel through the borrower's balance sheet.

Kiyotaki and Moore (1997) build a dynamic economic model with credit constraints that borrowing is not possible without collateral. The farmer borrows funds using land as collateral. The farmer produces fruits that can be sold and fruits that are self-consumed based on the constant returns to scale production function. The collector lends money using the land as collateral and produces only fruits that can be sold based on the decreasing returns to scale production function. As a result, when the farmer experiences a temporary productivity shock, his capital decreases and he reduces his investment expenditures, including investments in land. The reduction in investment spending reduces income in the next period, reduces capital, and further reduces investment due to credit constraints. In the simulation, a temporary 1% increase in productivity in the first period leads to a 0.36% increase in land prices, a 0.1% increase in farmers' land holdings, and a 0.13% increase in debt. In the seventh period, farmers' land holdings and debt increase by 0.37% and 0.55%, respectively, to reach their peak. Productivity shocks have a persistent impact on the economy. Thus, in a credit-constrained economy, they show that temporary shocks to technology and income generate persistent fluctuations in output and asset prices.

Bernanke et al. (1999) develop a dynamic general equilibrium model based on the theory of Bernanke and Gertler (1989) and Kiyotaki and Moore (1997). In their model, as in Kiyotaki and Moore (1997), the agency problem is applied to the producers of the final product who own the permanent capital stock of the economy in a classical sticky-price setting in a DNK model. Since the borrower owns the capital stock of the economy, changes in the price of capital have a direct impact on their net worth.

They create a stochastic growth model that incorporates money, monopolistic competition, and nominal price rigidities. Entrepreneurs choose physical capital and labor to maximize total production according to the Cobb-Douglas production function. Physical capital is financed by entrepreneurial capital and borrowing. Capital increases when capital is invested and accumulated in the previous period, or when income from supplying labor is invested. Capital determines the cost of external financing. More capital reduces the external financing premium because it reduces the agency problem. Unexpected changes in asset prices will affect the capital held by entrepreneurs. Unexpected changes in profits affect the financial position of the firm. Two basic factors of financial accelerators are the endogenous change in capital stock and the influence of fluctuations in capital stock on the cost of capital.

They use an impulse response with a quarterly VAR model to examine the impact on output, investment, etc. in the presence of four shocks: (1) a monetary policy shock, (2) a technological innovation shock, (3) a government spending shock, and (4) a single unexpected transfer of assets from households to entrepreneurs. The results clarify that the presence of a financial accelerator can amplify and propagate the business cycle.

Bernanke and Gertler (1989), Kiyotaki and Moore (1997), Bernanke et al. (1999) present a theoretical model of the existence of a firm's balance sheet channel by introducing agency problems between borrowers and lenders. Furthermore, Bernanke et al. (1999) show the existence of financial accelerators in which there is mutual feedback between the financial sector and the real economy, and that finance amplifies the business cycle.

Meanwhile, Gertler and Kiyotaki (2010) consider disruptions in financial intermediaries to be an important feature of the recent historical financial crisis. There is an agency problem that imposes endogenous balance sheet constraints on financial institutions when raising funds from depositors or in the interbank market. Banks that cannot raise enough funds offer higher lending interest rates to firms. Banks with low net worth lend at high interest rates.

Kashyap and Stein (2000) show that monetary policy works well for banks with a low ratio of securities to assets, especially small banks. Using 1976Q1-1993Q2 data for all insured commercial banks in the U.S., they examine whether monetary easing policies affect securities + Fed funds sold / total assets, which in turn affect lending volume. In the event of a contractionary monetary shock, financial institutions with large liquid assets do not have to change their lending portfolios. The effect of monetary policy on lending behavior is stronger for banks with more illiquid balance sheets, i.e., those with a lower ratio of securities to assets. Moreover, this trend works strongly for smaller banks, the bottom 95% of the size distribution. This result supports the existence of bank lending channels.

Gertler and Kiyotaki (2010) show the existence of financial transmission channels through banks' equity capital, and Kashyap and Stein (2000) show the existence of financial transmission channels through bank liquidity. These indicate the existence of a bank lending channel.

There are the following previous studies on empirical analysis using Loan-level data. Aysun and Hepp (2013) use individual loan data from the Capital IQ Compustat database for 15,794 loans from 1995 to 2009 to discuss the relationship between borrower balance sheets and bank liquidity to bank lending. They also find out if monetary policy affects those relationships. First, for each period, NIM is regressed by the total debt / equity ratio (leverage ratio) of borrower i and the liquidity / total asset ratio (liquidity ratio) of lender j, logarithmic value of total assets and liquidity ratio to total assets as firm-specific control variable vectors, logarithmic value and leverage ratio (total debt ratio to equity capital) of total assets as control variable vectors specific to lenders, loan-specific control variable.

Next, they regress the estimated coefficients of borrowers' leverage ratio and banks' liquidity ratio as explained variables on the stance of monetary policy, the output gap of US GDP, the output gap of quarterly (seasonal) dummy, and the trend output gap. The results show that the credit channel through borrowers' balance sheets works effectively due to monetary policy, but the credit channel through banks' liquidity does not play an important role.

Hosono and Miyakawa (2014) use a match-level dataset of firms and banks from the Nikkei NEEDS Financial Quest since FY1977 to control for loan demand and identify the effects of the business cycle and monetary policy on loan supply. They use the logarithmic difference in loans as the explained variable, the logarithmic value of banks' total assets to show banks' financial characteristics, banks' net business profit/total assets, government bonds/total assets to show banks' portfolio structure, loans/deposits to measure lending opportunities, net worth/total assets to measure capital ratios, and Bank liquidity, as well as macro-level variables and monetary policy variables as explanatory variables, are used in a fixed effects model for panel data analysis. The results show that financial institutions with higher net worth ratios, capital adequacy ratios, and liquidity ratios tend to provide larger loans, while financial institutions with higher holdings of government bonds tend to lend smaller amounts because they are exposed to market risk arising from changes in government bond prices. Second, when economic growth rates are low, the effect of banks' net worth, capital adequacy, and liquidity ratios on lending is greater. This indicates that financial institutions with poor bank balance sheet conditions are less likely to allocate funds to borrower firms when macroeconomic conditions deteriorate. Third, when policy rates are lower than in the previous year, the economic importance of banks' capital adequacy ratios becomes less important.

In this paper, according to the analysis method of Aysun and Hepp (2013), it is clarified that the fluctuation of NIM is caused by the firm side through the agency problem, the Capital-to-Asset Ratio of the bank, or the liquidity problem of the bank.

3. Loan-level Firm Survey and Data Summary

3.1. About Tohoku Earthquake Recovery Firm Survey

The Center for Recovery from the Earthquake at the Graduate School of Economics of Tohoku University has prepared unbalanced panel data on the post-earthquake situation of small and large firms and the names of the financial institutions they were dealing with at the time of the earthquake. The Tohoku Earthquake Recovery Firm Survey (TERFS) targets firms with one or more employees headquartered in the affected areas (Hachinohe City, Aomori Prefecture, Iwate Prefecture, Miyagi Prefecture, Fukushima Prefecture). In the 2012 survey, questionnaires were distributed to 30,000 firms, and responses were received from 7,021 firms (survey form collection rate 23.4%). In the 2013 survey, among the firms that responded to the 2012 survey, the questionnaire was distributed to 6,983 firms that have survived in 2013 and 23,017 newly selected firms, for a total of 30,000 firms, and responses were obtained from 7,481 firms (survey form collection rate 24.9%). In the 2014 survey, the questionnaire was distributed to 6,983 firms that responded to the 2012 survey and 3,973 firms that responded to the new survey in 2013, for a total of 10,956 firms, and 5,713 firms responded (survey form collection rate 52.14%). In the 2015 survey, among the firms distributed in the 2014 survey, the questionnaire was distributed to 10,560 firms that did not go bankrupt or closed in 2015, and 4,116 firms responded (survey form collection rate 38.98%). TERFS has loan level data for SMEs.

3.2. Preliminary Results

Figure 2 shows that the NIM has increased in 2015. In contrast, the capital adequacy ratio of banks has remained unchanged between FY2012 and FY2015, while the capital adequacy ratio of corporations has increased slightly. A closer look at Figure 3 shows that the average NIMs from FY2012 to FY2014 are almost the same, but there is one NIM with a Frequency above 600 in FY2012, indicating that some policy effect may have ensured the same lending rate level for all financial institutions. In FY2015, the standard error became larger, indicating that the policy effect decreased and new loans may have been made at various lending rate levels. To see the trends in the data in a simple way, Figure 4 shows an OLS regression of NIMs on corporate and bank capital ratios. Most of the NIMs are below 5%. The Capital-to-Asset Ratio of firms and NIM shows a positive correlation, and the Capital-to-Asset Ratio of banks and NIM shows a negative correlation.

3.3. Data Descriptions

Our purpose is to find out whether it is the firm's or the bank's factors that determine the NIM. For this purpose, we use data from the TERFS annual data by borrower, including the Capital-to-Asset Ratio, size of the firm, amount of new debt after the earthquake, and the name of the financial institution from which the firm borrowed the most at the time of the earthquake.

The financial institution that the firm borrowed the most money from at the time of the earthquake is called the primary bank (PB). We derived the Capital-to-Asset Ratio, size, and liquidity of the bank using the Bank's Financial Statement and statement of accounts data (FFS). Therefore, we use matched panel data of firms and banks for estimation.

Table 1 shows the sources and details of the data we used. First, we describe Loan-specific variables. INT indicates the contracted interest rate for the new loan after the earthquake disaster. DEP is a deposit interest rate calculated using deposit and interest on deposit from the financial statements and disclosure magazines of each financial institution. NIM is Net Interest Margin, which is the difference between INT and DEP. Log_Loan is a logarithmic value of the new loan amount. Maturity is the borrowing period (in terms of months) of new loan. Primary_Vintage is the number of years the firm receiving the new loan has been doing business with the financial institution. Primary_Share is the ratio of debt from PB to the total debt. Physical_Inv_Dum is a dummy variable where 1 is for firms that use their new loans for capital investment and 0 for other firms. Guarantee_Dum is a dummy variable where 1 is for firms whose new loans are guaranteed by credit guarantee associations and 0 is for all other firms. Collateral_Dum is a dummy variable where 1 is for firms that have collateral or personal guarantees for new loans and 0 is for all other firms.

We describe two Firm-specific variables. One is Capital_Asset_Firm, which is the firm's asset minus the liability divided by the asset, which indicates the firm's capital ratio. The other is Log_Asset_Firm, which is a logarithmic value of firm assets and indicates size.

We use Bank-specific variables to extract the bank side factors. Number_Bank is the total number of banks (including government-affiliated banks, non-banks, etc.) that were borrowing at the time of the Great East Japan Earthquake (as of March 11, 2011). Capital_Asset_Bank is the data obtained by dividing the amount of the bank's assets minus the liabilities by the assets using the bank's financial statement data, and indicates the capital adequacy ratio of the bank. Liquidity_Bank is the sum of the bank's cash holding and government bond holding, municipal bonds, commodities government bonds, commodities local bonds, and call loan, divided by the total assets of the bank, and indicates the liquidity ratio of the bank. Log_Asset_Bank is the logarithm of total assets listed on each bank's balance sheet. ROA_Bank is the net business profit of each bank divided by the total assets.

Furthermore, unlike the usual case, during this estimation period, the Great East Japan Earthquake damaged the capital equipment and supply chain of firms in the Tohoku region, and the capital equipment and human capital of financial institutions. Therefore, we will clarify the factors that determine NIM after considering the influence of these special factors as control variables by using Firm-specific damage variables and Bank-specific damage variables.

In addition, after the Great East Japan Earthquake, earthquake insurance and subsidies were provided, taxes were reduced and exempted, and the debt burden on existing debt was reduced and exempted. Even if we consider those effects, we will also investigate whether we can obtain robust results for the channel.

3.4. Summary Statistics

Table 2 shows the basic statistics for time-varying variables. INT shows that in some cases, financial institutions were lending at almost zero interest rates. This indicates that some firms were borrowing through various subsidy programs. Even if a firm's capital was damaged immediately after the earthquake, the business feasibility of the firm was evaluated and it was shown that the firm considered to be low risk could borrow funds with virtually no interest. We see that INT has a large variation, but DEP does not have much variation. Financial institutions set high interest rates on high-risk borrowers, so when a firm raises funds, the interest rate changes according to the risk of the firm. On the other hand, when a bank raises funds from a depositor, it indicates that the depositor finally determines that the risk is almost the same depending on the bank because of the deposit insurance system. As a result, INT determines NIM.

The Capital-to-Asset Ratio of a firm is generally higher than that of a bank. While there are small to large firms, banks are not licensed unless they meet the financial basis, so the asset size does not change significantly between banks.

Table 3 shows the basic statistics of time-invariant variables. Firm-specific damage variables show that there are about half of the firms affected by the earthquake, about 25% of the firms affected by the tsunami, 8% of the firms directly affected by the nuclear power plant accident, and 18% of the firms indirectly affected by the nuclear power plant accident. About 30% of the firms have suffered indirect damage due to damage to their Supplier or Client. In addition, 85% of the companies said that the damage to their tangible assets was insignificant, but less than 6% of the companies said that more than 76% of their tangible assets were destroyed.

Subsidy and aid measure variables show that about 30% of firms have received earthquake insurance, about 20% have received tax exemption from local governments, and about 15% have received subsidies.

4. Empirical Framework

4.1. Theory (NIM and Firm CAR, NIM and Bank CAR)

In this paper, according to Aysun and Hepp (2013), firstly, the logarithmic value of new loans, the borrowing period, the transaction period with PB, and the borrowing ratio from PB determine NIM as factors specific to loans. Secondly, the Capital-to-Asset Ratio of borrower i and the logarithmic value of total assets determine NIM as factors specific to the firm. Third, we consider that the Capital-to-Asset Ratio, liquidity ratio, logarithmic value of total assets, and ROA of lender j determine NIM as factors specific to banks.

In addition to these, in this paper, we will explain with dummy variables whether new loans were used for capital investment, whether they were guaranteed by the Credit Guarantee Association, and whether they were secured or guaranteed as factors specific to loans. We add the number of banks as a firm-specific factor.

According to the balance sheet channel of Bernanke and Gertler (1989), as a firm's Capital-to-Asset Ratio rises, lending interest rates fall. If a firm's Capital-to-Asset Ratio significantly lowers NIM, we can indicate the existence of a firm's balance sheet channel.

In Gertler and Kiyotaki (2010) and Hamadi and Awdeh (2012), lending interest rates fall as banks' Capital-to-Asset Ratios rise. On the other hand, in Angbazo (1997), when the bank's core capital ratio rises, the solvency risk decreases, which lowers the bank's external funding premium. However, the cost of raising capital is higher, so as capital increases, the average cost of capital increases. Therefore, an increase in a bank’s Capital-to-Asset Ratio increases NIM. If a bank's Capital-to-Asset Ratio significantly affects NIM, we will indicate a channel through the bank's capital.

According to Kashyap and Stein (2000), when banks have fewer securities/assets, lending decreases due to liquidity problems, and as a result, NIMs increase. Angbazo (1997) also finds that an increase in the liquid assets/liabilities ratio leads to a decrease in the liquidity risk and thus a decrease in the liquidity premium, which leads to a decrease in the NIM. Hamadi and Awdeh (2012) also find that the liquid assets/total assets ratio of domestic banks has a negative impact on the NIM. If the liquidity ratio of banks has a negative impact on NIM, we can specify the channel through the bank's liquidity.

4.2. Regression Equations (Model A, B, C, and D)

In Model A (Table 4), we use pooling data to determine whether it is the firm's or the bank's balance sheet conditions that significantly determine the NIM when new loans are made by PBs. In Model A, we estimate the following equation.

$$NIM = F(Log\_Loan, Maturity, Primary\_Vintage, Primary\_Share, \\ Physical\_Inv\_Dum, Guarantee\_Dum, Collateral\_Dum, \\ Capital\_Asset\_Firm, Log\_Asset\_Firm, Number\_Bank, \\ Capital\_Asset\_Bank, Liquidity\_Bank, Log\_Asset\_Bank, Roa\_Bank)$$

Then, variables that may have a significant impact on the NIM in the Tohoku region after the Great East Japan Earthquake, such as earthquake and tsunami dummies, are added to the explanatory variables as control variables to examine whether the significance of the explanatory variables determining the NIM remains unchanged. In Model B (Table 5) we analyze the interest rate on new loans from all banks, including PBs, and in Model C (Table 6) we analyze the interest rate on new loans from banks other than PBs to show the robustness of the explanatory variables. In Model D (Table 7), we examine the robustness of the determinants of NIM for new loans from PBs for firms that have not been severely affected by the Great East Japan Earthquake. Table 4 to Table 7 show the results of the pooled data analysis, and Table 8 presents the unbalanced panel data analysis for model A to model D.

5. Empirical Results

5.1. Results with Tables

P1. Model A (Table 4) Pooled regression results

New loans are made by PB. -Table 4 shows the estimates and standard errors of the baseline model. In Table 4, we examine the effect of which factors on the NIM of new loans made by PB. It can be estimated by taking into account the interest rate on funding, depending on the risk of each financial institution.

Model A1 examines how loan-specific, firm-specific, and bank-specific explanatory variables affect the NIM. Kasman et al. (2010) show that due to the effect of economies of scale, an increase in lending volume reduces the cost per unit and thus reduces the NIM. In this paper, as in Kasman et al. (2010), the NIM decreases as the loan amount increases; the bank-specific variable, Log_Asset_Bank, is negative and significant for the NIM. As the size of the bank increases, the effect of economies of scale kicks in and the NIM decreases.

Petersen and Rajan (1994, 1995) and Berger and Udell (1995) argue that close and continuous interaction mitigate information asymmetry between firms and financial institutions. Ortiz-Molina and Penas (2008) hypothesized that strong relationships and longer maturities are related. Their hypothesis was rejected. However, in the estimation of A1-A3, maturity is negative and significant for NIM. Table 4 analyzes the NIM of new loans lent by the financial institution with the largest loan amount immediately after the Great East Japan Earthquake. This result suggests the existence of strong relationships between firms and PBs.

The bank-specific variable Log_Asset_Bank is negative and significant for NIM. The larger the bank, the higher the effect of economies of scale and the lower the NIM.

In model A1, we find that the higher the firm's capital-to-asset ratio, the smaller the NIM. Therefore, the borrower's balance sheet channel presented by Bernanke and Gertler (1989) is valid. Since the bank's capital-to-asset ratio is positive and significant, there exists a channel through the bank's equity capital as indicated by the Angbazo model. The coefficient of the bank's liquidity ratio is not significant but is consistent with the sign condition of Angbazo (1997) and Hamadi and Awdeh (2012).

Model A2 adds firm-damage variables as control variables to the explanatory variables of model A1. Firm-damage variables are control variables, but we try to interpret them. Nuclear_Dum lowers the NIM, indicating that there was a system to lower the NIM for SMEs directly affected by the nuclear power plant accident. Supplierdamage_Dum indicates that the firm may have been rated as risky by the PB because damage to a supplier would disrupt the firm's business activities, even if the firm could operate. As in Model A1, the channel through the firm's equity capital of the Bernanke and Gertler model and the channel through the bank's equity capital of the Angbazo type are supported. The channel through bank's liquidity ratio is not significant but consistent with the sign condition of Angbazo (1997) and Hamadi and Awdeh (2012).

In model A3, bank-damage variables were added as control variables to the explanatory variables in model A2. Although they are control variables, when we try to interpret them, the bank-damage variables Branch_Changed_Dum and Bank_VisitFrequencyDecreased_Dum are negative and significant. The NIM declines when the trading branch is changed or when the frequency of visits by bank employees declines. However, the bank-damage variables become insignificant in Model A4-A6 when the explanatory variables are subsidies and aid measures for firms, and in Model A5-A6 when the time dummy is included. The lender's balance sheet channel of Angbazo type is also significant for the capital-to-asset ratio, but not for the liquidity ratio. The lender's balance sheet channel of Angbazo type is also significant for the Capital-to-Asset Ratio, and the sign condition is consistent for the Liquidity Ratio.

Model A4 is based on the explanatory variables of model A3 with the addition of subsidies and aid measures for firms as control variables. For example, Miyagi Prefecture's SME loan program is a cooperative effort between the prefecture, financial institutions, and the Miyagi Credit Guarantee Association. If the loan is approved, the prefecture will reimburse the SME for the interest paid by the SME to the financial institution for three years from the date of loan. Lease_Subsidy_Dum and Interest_Subsidy_Dum were negative and significant, and NIM was lowered by rental lease subsidy and interest subsidy programs. Here, Guarantee_Dum, which was not significant in model A3, changed to positive and significant. The results show that the SME loan system in Miyagi Prefecture requires a credit guarantee, except for the SME central association organized finance. As a result, A1-A3 did not accurately capture the impact on the NIM when SMEs borrow new funds after the Great East Japan Earthquake. Furthermore, the degree of freedom-adjusted R square of Model A3 is 0.027, while the degree of freedom-adjusted R square of Model A4 is 0.039, which increases the explanatory power of the model. The borrower's balance sheet channel is effective in Model 4 as in Models A1-A3. As for the lender's balance sheet channel of Angbazo type, it is significant for the capital-to-asset ratio, and the sign condition is consistent for the liquidity ratio.

Model A5 adds macro variables to the explanatory variables of model A4, and since we only have time series data for four periods, macro variables have the same effect as the time dummy introduced in model A6. In Model A5, the credit guarantee expands the NIM by about 0.26%, and the interest subsidy system reduces the NIM by about 0.34%. the borrower's balance sheet channel is also effective in Model 5. The borrower's balance sheet channel is still valid, but neither the bank's channel through the capital-to-asset ratio nor the channel through liquidity is significant. In particular, the bank's liquidity channel has different sign condition from Angbazo (1997) and Hamadi and Awdeh (2012).

model A6 is the explanatory variables of model A4 plus time-dummy variables. Under the interest subsidy program or interest reduction and exemption program, SMEs receive interest subsidies or reduction and exemption only for the first three years of borrowing. As a result, the NIM is shown to have increased by 0.97 percentage points in FY2015 when the interest subsidy ended. In the case of lending after the Great East Japan Earthquake, the inclusion of a time dummy captures the impact of the interest subsidy for three years and avoids the omitted variable bias. We can improve the explanatory power of the model by including the aid measures for firms and time dummy in the estimation equation. In other words, the NIM after the Great East Japan Earthquake should be explained by the subsidies and aid measures for firms and time dummy instead of the bank-damage variables introduced in Model A3. In Models A1-A6, the borrower's balance sheet channel is always effective. On the other hand, the lender's balance sheet channel cannot be shown to exist in a stable manner.

P2. Model B (Table 5) Pooled regression results

New loan made by primary or other banks. — In Table 5, we examine the effect of the borrower's balance sheet channel on the interest rate of new loans made by all banks. As a result, the Bernanke and Gertler model is strongly supported in models B1-B5.

Model B1 does not explicitly include the impact of the Great East Japan Earthquake in the model. The results show that the larger the loan amount and the longer the maturity, the lower the lending rate. The fact that guarantee_Dum is positive and significant with respect to the interest rate indicates that riskier firms may borrow funds under the credit guarantee scheme. Again, Capital_Asset_Firm is positive and significant. The borrower's balance sheet channel, which reduces the lending rate when Capital_Asset_Firm is high, is also valid here, and the Bernanke and Gertler model is strongly supported.

Model B2 is a model that takes into account firm-specific damage variables as control variables, but the firm-specific damage variables are not significant. The other variables are significant as in model B1, and the borrower's balance sheet channel is effective.

Model B3 is a model that takes into account subsidies and aid measures for firms as control variables. When subsidies and aid measures for firms are taken into account, the firm-specific damage variables, Nuclear_Dum, change negatively and significantly. Interest_Subsidy_Dum of subsidies and aid measures for firms is negative and significant. The Interest_Subsidy_Dum for subsidies and aid measures for firms is negative and significant, the Lease_Subsidy_Dum that was significant in Table 4 is no longer significant, and the Interest_Reduce_Dum that was not significant in Table 4 is significant. The inclusion of dummy variables representing the various subsidies and aid measures for firms may have caused multicollinearity problems, making the analysis results unstable. However, the dummy variables in the model, including the subsidies and aid measures for firms and the time dummy introduced in models B4 and B5, are significantly effective and have high explanatory power. The borrower's balance sheet channel is also effective in Model B3.

Model B4 is a model in which macro variables are added to the explanatory variables of model B3. Model B5 is a model that adds time-dummy variables to the explanatory variables of model B3. Since the period of interest subsidies and interest exemptions is three years, we can see that the lending rate increased by 1.15 percentage points in 2015 when the period ended. Comparing the degree of freedom-adjusted coefficients of determination of Models B1-B5 in Table 5, the explanatory power of the B4-B5 model including the subsidies and aid measures for firms and the time dummy is the highest. As variables explaining the NIM in the Tohoku region after the Great East Japan Earthquake, the subsidies and aid measures for firms and time dummy are important variables.

P3. Model C (Table 6) Pooled regression results

New loans made by other banks only. — In Table 6, we examine whether the borrower's balance sheet channel is effective on the interest rate of new loans made by banks other than PBs. As a result, the borrower's balance sheet channel is effective in Models C1-C5, and the Bernanke and Gertler model is strongly supported.

In Model C1, it is shown that the loan interest rate is lowered when the size of the loan is large or when the credit guarantee system is not used.

Model C2 is a model that takes into account firm-specific damage variables as a control variable; although it is a control variable, we try to interpret it. The fact that Supplierdamage_Dum is negative and significant indicates that banks other than PB may have been motivated to lend to the firm by offering lower interest rates than PB, judging the damage to the firm's suppliers as temporary damage.

Model C3 is estimated by including dummy variables representing subsidies and aid measures for firms as control variables. Although these dummy variables are not significant, the coefficient of determination adjusted for degrees of freedom, which was 0.02 in model C2, increases to 0.035 in model C3.

In Model C4, macro variables were added to the explanatory variables in Model C3. The estimation with macro variables shows the same coefficient as the estimation with time dummy in Model C5, which shows the timing of interest subsidies and interest exemptions. The estimation with macro variables shows the same coefficient as the estimation with time dummy in Model C5, which shows the timing of interest subsidies and exemptions.

Comparing the coefficient of determination with the degree of freedom adjusted for Model C1-C5 in Table 6, the explanatory power of the C4-C5 model including the subsidies and aid measures for firms and its timing dummy is the highest.

P4. Model D (Table 7) Pooled regression results

The new loans in Table 7 are from primary banks to firms that have not suffered earthquake damage. We examine the factors that determine the NIM of new loans from PB for firms that were not directly affected or forced to relocate from Tsunami or the nuclear power plant accident. The results show that the borrower's balance sheet channel is effective for all models, and the Bernanke and Gertler model is strongly supported.

Model D1 shows that longer loan maturities and larger bank assets reduce the NIM. Capital_Asset_Firm is significant at the 5% level and Capital_Asset_Bank is significant at the 10% level.

Model D5 is a model that adds macro variables to the explanatory variables of model D1. in model D5, Capital_Asset_Firm is significant at the 5% level, and the borrower's balance sheet channel is significant.

In Model D6, we perform estimation with a time dummy indicating the timing of interest subsidies and exemptions. D2015 is positive and significant, indicating that firms that were not directly affected or forced to relocate due to the tsunami or nuclear power plant accident also received benefits such as interest subsidies and exemptions.

Comparing the degree of freedom adjusted coefficients of determination for Models D1, D5-D6 in Table 7, the explanatory power of the D5-D6 model including the subsidies and aid measures for firms and the time dummy is the highest.

P5. Panel regression results: Pooled regression is better than fixed-effect or random-effect model

In Table 8, we present the Panel Regression Results. Panel data analysis is performed using the variables in Table 4 - Table 7. The pooling model is adopted in all estimation results.

Model A_FE and model A_RE are the results estimated by the fixed effects model and the variable effects model using the explanatory variables of model A5. The pooling model is supported by the F test, the random effects model by the Hausman test, and the pooling model by the Breusch-Pagan Test. We use four years of unbalanced panel data, which ultimately supports the pooling model. Unlike the Pooled regression estimation results in Tables 4-7, the Capital_Asset_Firm is not significant in either the fixed effects model or the random effects model.

Model B_FE and model B_RE use the explanatory variables of model B4, Model C_FE and model C_RE use the explanatory variables of model C4, Model D_FE and model D_RE use the explanatory variables of model D5, and we estimate with the fixed effects model and the random effects model. In the random effects model, the borrower's balance sheet channel was effective and supported the Bernanke and Gertler model, but the fixed effects model could not show it. Even in the above model, the pooling model is supported by the F test and Breusch-Pagan Test.

In the pooling estimation of Table 4-Table 7, the existence of the lender's balance sheet channel cannot be shown stably. On the other hand, the borrower's balance sheet channel is effective and results in support for the Bernanke and Gertler model. We also show that subsidies and aid measures for firms and the time dummy indicating their duration and end are important variables that are indispensable when explaining NIM in the Tohoku region after the Great East Japan Earthquake. This means that the heavily damaged Tohoku region firms received policy considerations when they received new loans for restoration and reconstruction, which had a significant impact on NIM.

6. Conclusion

In this paper, we identify the determinants of NIM that have a significant impact on bank profits. We show that in the era of low interest rates in Japan from FY 2012 to FY 2015, the firm's balance sheet is an important determinant of the NIM when implementing new loans. Even if firms and banks are damaged by the Great East Japan Earthquake, and even if government subsidy policies such as the SME Loan Program, the Credit Guarantee Program, the Interest Subsidy Program, and the Interest Reduction and Exemption Program are taken into account, the agency cost, the funding cost of equity and debt, and the liquidity cost on the part of banks do not affect the NIM. We find that the agency costs of firms are the main determinant of NIM, and the borrower's balance sheet channel is stable and effective. In other words, financial institutions can obtain higher NIMs when they lend to firms that have relatively small net worth and are dependent on banks for financing. Financial institutions in the Tohoku region of Japan can earn higher profits from lending when they face the agency problem between borrowers (firms) and lenders (banks).

References

Angbazo, L. (1997), "Commercial bank net interest margins, default risk, interest-rate risk, and off-balance sheet banking", *Journal of Banking & Finance*, 21(1), 55-87.

Aysun, G, and Hepp, R (2013), "Identifying the balance sheet and the lending channels of monetary transmission: A loan-level analysis", *Journal of Banking & Finance* 37(8): 2812-2822.

Bemanke, B., & Gertler, M. (1989), "Agency costs, net worth, and business fluctuations", *American Economic Review*, 79(1), 14-31.

Berger, A., Udell, G. (1995), "Relationship lending and lines of credit in small firm finance", *Journal of Business*, 68, 351– 381.

Bernanke, B.S., Gertler, M., and Gilchrist, S., (1999), "The financial accelerator in a quantitative business cycle framework" in J.B. Taylor and M. Woodford (ed.), *Handbook of Macroeconomics*, vol.1, ch.21, pp.1341-1393.

Gertler, M. and Kiyotaki, N., (2010), "Financial Intermediation and Credit Policy in Business Cycle Analysis" in B.M. Friedman and M. Woodford (ed.), *Handbook of Macroeconomics*, vol.3, ch.11, pp. 547-599.

Hamadi, Hassan and Awdeh, Ali, (2012), "The Determinants of Bank Net Interest Margin: Evidence from the Lebanese Banking Sector", *Journal of Money, Investment and Banking*, vol.23, pp.85-98.

Ho, T. S., & Saunders, A. (1981), "The determinants of bank interest margins: theory and empirical evidence", *Journal of Financial and Quantitative analysis*, 581-600.

Hosono, K. and D. Miyakawa (2014), "Business Cycles, Monetary Policy, and Bank Lending: Identifying the Bank Balance Sheet Channel with Firm-Bank Match-Level Loan Data," *RIETI Discussion Paper Series* 14-E-026.

Islam, M.S. and Nishiyama, S.I., (2016), "The determinants of bank net interest margins: A panel evidence from South Asian countries," *Research in International Business and Finance*, vol.37, pp.501-514.

Isoda, Y., Masuda, S., and Nishiyama, S.I., (2019), "Effects of Post-Disaster Aid Measures to Firms: Evidence from Tohoku University Earthquake Recovery Firm Survey 2012–2015," *Journal of Disaster Research*, vol.14, pp.1030-1046.

Kashyap, A. K., & Stein, J. C. (2000), "What do a million observations on banks say about the transmission of monetary policy?", *American Economic Review*, 407-428.

Kasman, A., Tunc, G., Vardar, G., & Okan, B. (2010), "Consolidation and commercial bank net interest margins Evidence from the old and new European Union members and candidate countries," *Economic Modelling*, 27(3), 648-655.

Kiyotaki, N., and J. Moore (1997), "Credit cycles", *Journal of Political Economy* 105:211-248.

Kuttner, K. N., & Mosser, P. C. (2002), "The monetary transmission mechanism: some answers and further questions", *Economic Policy Review*, 8(1).

McShane, R. W., & Sharpe, I. G. (1985), "A time series/cross section analysis of the determinants of Australian trading bank loan/deposit interest margins: 1962–1981", *Journal of Banking & Finance*, 9(1), 115-136.

Mishkin, F. S. (1995), "Symposium on the monetary transmission mechanism", *Journal of Economic perspectives*, 9(4), 3-10.

Ortiz-Molina, H., & Penas, M. F. (2008), "Lending to small businesses The role of loan maturity in addressing information problems", *Small Business Economics*, 30(4), 361-383.

Petersen, M., & Rajan, R. (1994). The benefits of lending relationships: Evidence from small business data. Journal of Finance, 49, 3–37.

Petersen, M., & Rajan, R. (1995). The effect of credit market competition on lending relationships. The Quarterly Journal of Economics, 1109, 407–443.

Figure 1

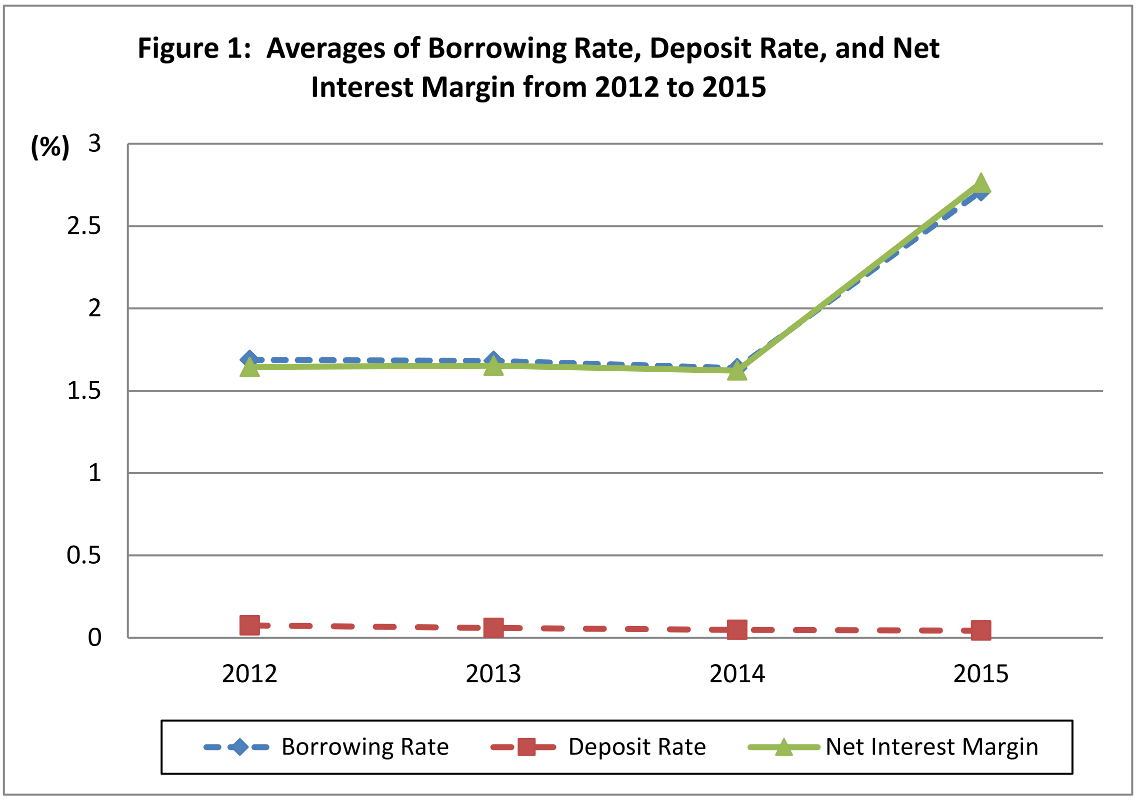

Figure 2

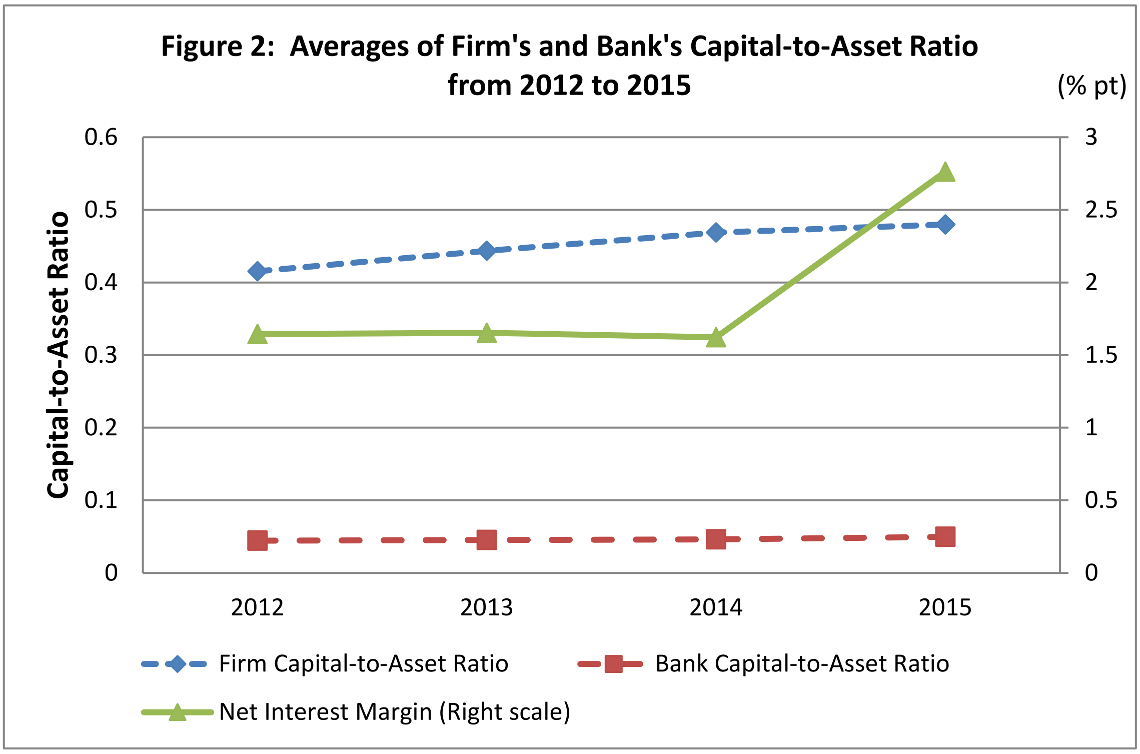

Figure 3

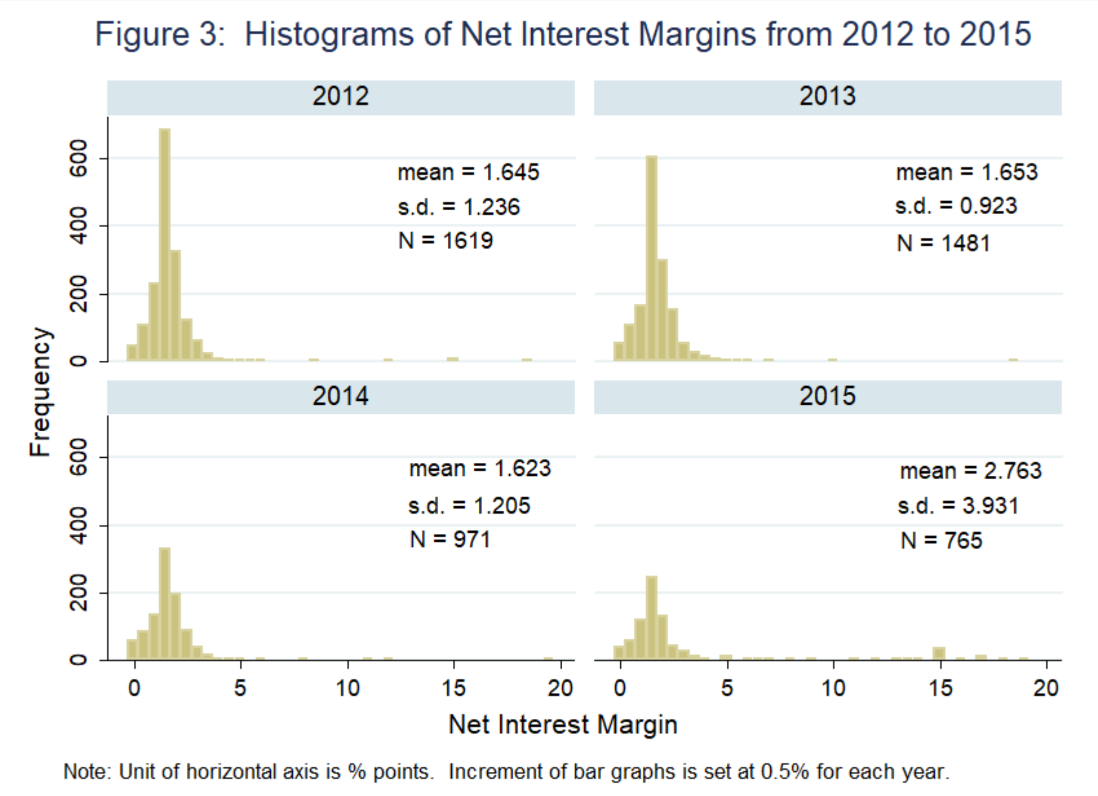

Figure 4

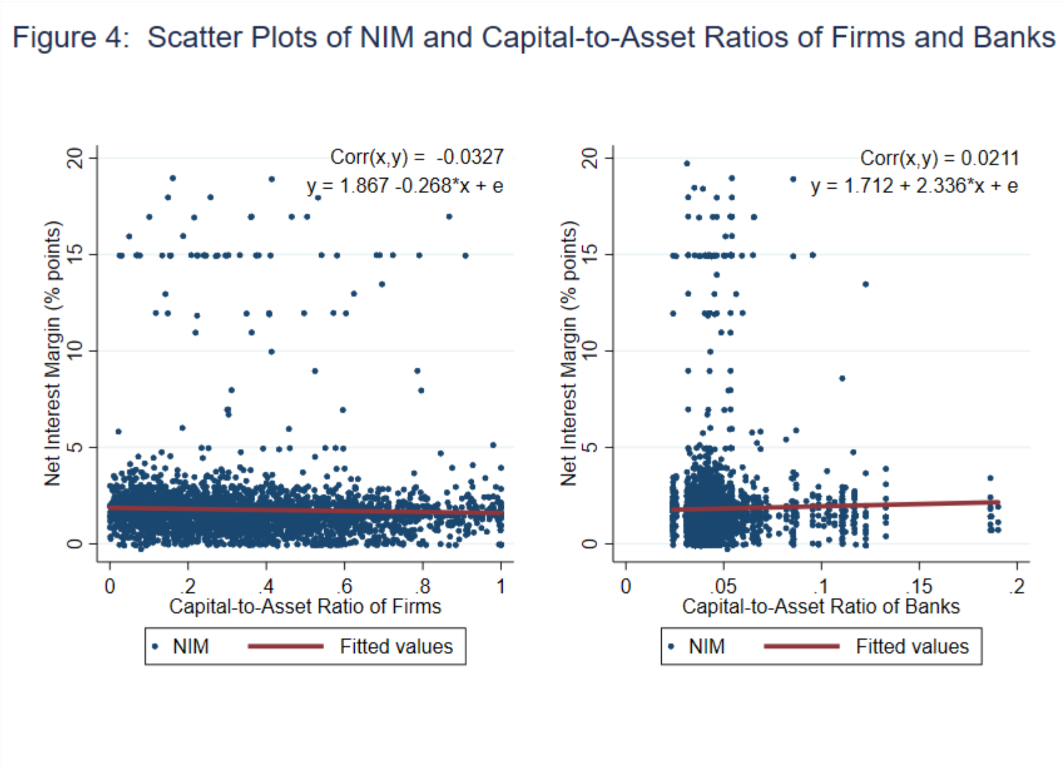

Table 1: Variable Description

Variable	Source	Description
Loan-specific variables		
INT	TERFS	Contracted interest rate for the new loan after the earthquake disaster
DEP	FFS	Deposit interest rate = Interest payment on deposits / Total deposit
NIM	TERFS, FFS	NIM = INT - DEP
Log_Loan	TERFS	Logarithm of the firm's new loan
Maturity	TERFS	Borrowing period of new loan (in terms of months)
Primary_Vintage	TERFS	Years of dealing with the primary bank at the time a firm borrowed a new loan
Primary_Share	TERFS	Primary bank share = the firm's total debt from the bank that borrowed a new loan / the firm's total debt
Physical_Inv_Dum	TERFS	1: New loan is used for capital investment, and 0: otherwise
Guarantee_Dum	TERFS	1: New loan is guaranteed by the Credit Guarantee Institute, and 0: otherwise
Collateral_Dum	TERFS	1: New loan is secured by collateral or personal guarantee, and 0: otherwise
Firm-specific variables		
Capital_Asset_Firm	TERFS	Firm's capital-to-asset ratio = (Total assets - Labilities) / Total assets
Log_Asset_Firm	TERFS	Logarithm of the firm's total assets
Number_Bank	TERFS	Total number of banks (including government financial institutions, non-banks, etc.) that the firm has borrowed at the time of the Great East Japan Earthquake (as of March 11, 2011)
Bank-specific variables		
Capital_Asset_Bank	FFS	Bank's capital-to-asset ratio = (Total assets - Labilities) / Total assets
Liquidity_Bank	FFS	Bank's liquidity-to-asset ratio = (Cash holding + Government bond holding + Local government bonds + Commodity bonds + Commodity municipal bonds + Call loan) / Total assets
Log_Asset_Bank	FFS	Logarithm of the bank's total assets
ROA_Bank	FFS	Bank's ROA = Net business profit / Total assets
Firm-specific damage variables		
Earthquake_Dum	TERFS	1: the firm was damaged by the earthquake, and 0: otherwise
Tsunami_Dum	TERFS	1: the firm was hit by the tsunami, and 0: otherwise
Nuclear_Dum	TERFS	1: the firm was directly damaged by the nuclear accident, and 0: otherwise
Nuclear_Ind_Dum	TERFS	1: the firm suffered reputational damage from the nuclear accident, and 0: otherwise
Supplierdamage_Dum	TERFS	1: the firm was indirectly damaged by the damage to its suppliers, and 0: otherwise
Clientdamage_Dum	TERFS	1: the firm was indirectly damaged by the damage to its clients, and 0: otherwise
Relocation_Dum	TERFS	1: the firm was forced to relocate due to tsunami damage or nuclear accident, and 0:
Damage_Ratio	TERFS	Damage ratio = Damage to tangible fixed assets / Total assets before earthquake
Bank-specific damage variables		
Branch_NotOpened_Dum	TERFS	1: Bank branch could not operate (or not at present) due to earthquake, tsunami and nuclear accident, and 0: otherwise
Branch_Changed_Dum	TERFS	1: the bank's branch changed to another branch after an earthquake, tsunami, and a nuclear accident, and 0: otherwise
Bank_StaffChanged_Dum	TERFS	1: the person in charge of the bank has changed since the earthquake, tsunami and nuclear accident, and 0: otherwise
Bank_VisitFrequencyDecreased_Dum	TERFS	1: Frequency of bank staff visits has decreased due to the situation of the bank since the earthquake, tsunami and nuclear accident, and 0: otherwise
Subsidy and aid measure variables		
Insurance_Dum	TERFS	1: the firm had subscribed to earthquake insurance or earthquake risk security contract before the earthquake, and 0: otherwise
Lease_Subsidy_Dum	TERFS	1: the firm has received subsidies for rents and leases from local governments (prefecture, municipalities) since the earthquake, and 0: otherwise
Lumpsum_Subsidy_Dum	TERFS	1: the firm received a lump-sum or subsidy from the local government after the earthquake, and 0: otherwise
Taxexemption_Dum	TERFS	1: the firm received tax reduction from local governments after the earthquake, and 0:
Interest_Subsidy_Dum	TERFS	1: the firm has received interest or guarantee fees from the local government since the earthquake, and 0: otherwise
Groupsubsidy_Dum	TERFS	1: the firm used group subsidy (small and medium-sized enterprise group facilities restoration maintenance assistance business, maintenance business to temporary store or temporary construction plant), and 0: otherwise
Repay_Allowance_Dum	TERFS	1: the firm was suspended by the bank to repay the bank loan it had borrowed before the earthquake (hereinafter referred to as past debt), and 0: otherwise
Reschedule_Dum	TERFS	1: the firm has been extended its past debt repayment period by the bank, and 0: otherwise
Interest_Reduce_Dum	TERFS	1: the firm received interest reductions from the bank for past debt, and 0: otherwise
Debt_Reduce_Dum	TERFS	1: the firm has been reduced (exempt, amortize) its past debt by the bank, and 0: otherwise
Collateral_Cancel_Dum	TERFS	1: the firm has been reset or reduced by the bank the setting of collateral and personal guarantee that had been set in the past debt, and 0: otherwise
Debt_Subordinate_Dum	TERFS	1: the firm has been subordinated to its past debt by the bank, and 0: otherwise
Time dummies		
D2013		1: In the case of Fiscal Year 2013, and 0: otherwise
D2014		1: In the case of Fiscal Year 2014, and 0: otherwise
D2015		1: In the case of Fiscal Year 2015, and 0: otherwise
TERFS: Tohoku University Earthquake Recovery Firm Survey		
FFS : Financial institutions' "Financial Statements" and "disclosure magazines"		

Table 2: Time-varying variables

Variables	Obs.	Mean	Std.Dev.	Min.	25%	Median	75%	Max.
Loan-specific variables								
INT	6,761	1.85	1.92	0.00	1.20	1.50	2.00	19.75
DEP	6,366	0.06	0.03	0.03	0.04	0.05	0.07	0.79
NIM	4,798	1.82	1.91	-0.28	1.24	1.46	1.96	19.72
Log_Loan	8,519	7.67	1.39	0.00	6.91	7.60	8.52	16.52
Maturity	8,160	76.62	53.09	0.00	58.00	60.00	120.00	720.00
Primary_Vintage	7,693	17.27	18.57	0.00	0.00	11.00	30.00	100.00
Primary_Share	7,201	0.75	1.45	0.00	0.47	0.70	100.00	100.00
Physical_Inv_Dum	9,352	0.42	0.49	0	0	0	1	1
Guarantee_Dum	8,421	0.50	0.50	0	0	1	1	1
Collateral_Dum	8,284	0.54	0.50	0	0	1	1	1
Firm-specific variables								
Capital_Asset_Firm	6,015	0.35	0.24	0.00	0.15	0.31	0.50	1.00
Log_Asset_Firm	7,591	9.90	1.67	0.00	8.89	9.89	10.93	19.76
Number_Bank	8,353	2.46	1.69	0.00	1.00	2.00	3.00	24.00
Bank-specific variables								
Capital_Asset_Bank	6,366	0.05	0.02	0.02	0.04	0.04	0.05	0.19
Liquidity_Bank	6,083	0.32	0.09	0.12	0.26	0.34	0.37	0.63
Log_Asset_Bank	6,366	14.37	1.54	10.42	13.45	14.71	15.59	19.09
ROA_Bank	5,760	0.00	0.00	0.00	0.00	0.00	0.00	0.01

Table 3: Time-Invariant variables

Variables			Freq.	%
Firm-specific damage variables				
	Earthquake_Dum	No	13133	51.41
		Yes	12411	48.59
		Total	25544	100
	Tsunami_Dum	No	19219	75.24
		Yes	6325	24.76
		Total	25544	100
	Nuclear_Dum	No	23495	91.98
		Yes	2049	8.02
		Total	25544	100
	Nuclear_Ind_Dum	No	20960	82.05
		Yes	4584	17.95
		Total	25544	100
	Supplierdamage_Dum	No	18604	72.83
		Yes	6940	27.17
		Total	25544	100
	Clientdamage_Dum	No	17213	67.39
		Yes	8331	32.61
		Total	25544	100
	Relocation_Dum	No	24919	97.55
		Yes	625	2.45
		Total	25544	100
	Damage_Ratio	0-0.25	11759	85.58
		0.26-0.5	838	6.1
		0.51-0.75	367	2.67
		0.76-1	777	5.65
		Total	13741	100
Bank-specific damage variables				
	Branch_NotOpened_Dum	No	8368	94.61
		Yes	477	5.39
		Total	8845	100
	Branch_Changed_Dum	No	8733	98.73
		Yes	112	1.27
		Total	8845	100
	Bank_StaffChanged_Dum	No	8198	92.69
		Yes	647	7.31
		Total	8845	100
	Bank_VisitFrequencyDecreased_Dum	No	8599	97.22
		Yes	246	2.78
		Total	8845	100
Subsidy and aid measure variables				
	Insurance_Dum	No	17465	70.05
		Yes	7468	29.95
		Total	24933	100
	Lease_Subsidy_Dum	No	24940	98.39
		Yes	407	1.61
		Total	25347	100
	Lumpsum_Subsidy_Dum	No	21525	84.92
		Yes	3822	15.08
		Total	25347	100
	Taxexemption_Dum	No	20423	80.57
		Yes	4924	19.43
		Total	25347	100
	Interest_Subsidy_Dum	No	5302	64
		Yes	2983	36
		Total	8285	100
	Groupsubsidy_Dum	No	23005	89.07
		Yes	2822	10.93
		Total	25827	100
	Repay_Allowance_Dum	No	16688	93.33
		Yes	1192	6.67
		Total	17880	100
	Reschedule_Dum	No	16972	94.92
		Yes	908	5.08
		Total	17880	100
	Interest_Reduce_Dum	No	16571	92.69
		Yes	1307	7.31
		Total	17878	100
	Debt_Reduce_Dum	No	17807	99.61
		Yes	70	0.39
		Total	17877	100
	Collateral_Cancel_Dum	No	17792	99.52
		Yes	85	0.48
		Total	17877	100
	Debt_Subordinate_Dum	No	17793	99.53
		Yes	84	0.47
		Total	17877	100

Table 4: New loan is made by primary bank

Model type	A1	A2	A3	A4	A5	A6
Dependent variable	NIM	NIM	NIM	NIM	NIM	NIM
Estimation method	Robust reg.	Robust reg.	Robust reg.	Pooled	Pooled	Pooled
Log_Loan	-0.099*	-0.101*	-0.100*	-0.125*	-0.143**	-0.143**
	(0.059)	(0.060)	(0.061)	(0.069)	(0.068)	(0.068)
Maturity	-0.002**	-0.002**	-0.002**	-0.002	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Primary_Vintage	-0.002	-0.002	-0.003	-0.002	-0.003	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Primary_Share	-0.048	-0.063	-0.082	-0.092	-0.092	-0.092
	(0.079)	(0.081)	(0.081)	(0.085)	(0.084)	(0.084)
Physical_Inv_Dum	0.022	0.013	0.024	-0.017	-0.011	-0.011
	(0.094)	(0.098)	(0.097)	(0.107)	(0.104)	(0.104)
Guarantee_Dum	0.098	0.089	0.107	0.267**	0.258**	0.258**
	(0.103)	(0.103)	(0.102)	(0.120)	(0.118)	(0.118)
Collateral_Dum	-0.033	-0.039	-0.015	-0.026	0.048	0.048
	(0.099)	(0.101)	(0.099)	(0.105)	(0.098)	(0.098)
Capital_Asset_Firm	-0.480**	-0.456**	-0.426**	-0.344**	-0.336**	-0.336**
	(0.155)	(0.155)	(0.154)	(0.161)	(0.162)	(0.162)
Log_Asset_Firm	0.028	0.027	0.024	0.021	0.030	0.030
	(0.039)	(0.038)	(0.038)	(0.043)	(0.043)	(0.043)
Number_Bank	-0.019	-0.012	-0.009	-0.008	-0.009	-0.009
	(0.021)	(0.021)	(0.021)	(0.020)	(0.021)	(0.021)
Capital_Asset_Bank	15.040**	14.801**	15.811**	13.710**	2.714	2.714
	(5.345)	(5.571)	(5.470)	(5.548)	(5.194)	(5.194)
Liquidity_Bank	-0.784	-0.770	-0.934	-0.818	0.075	0.075
	(0.840)	(0.858)	(0.849)	(0.871)	(0.811)	(0.811)
Log_Asset_Bank	-0.090**	-0.098**	-0.104**	-0.108**	-0.120**	-0.120**
	(0.040)	(0.041)	(0.042)	(0.044)	(0.044)	(0.044)
ROA_Bank	-42.640	-48.059	-44.841	-33.888	-15.046	-15.046
	(32.698)	(34.167)	(33.999)	(34.095)	(32.575)	(32.575)
Earthquake_Dum		-0.110	-0.130	-0.135	-0.117	-0.117
		(0.094)	(0.092)	(0.100)	(0.098)	(0.098)
Tsunami_Dum		-0.046	-0.042	-0.028	0.006	0.006
		(0.132)	(0.128)	(0.145)	(0.142)	(0.142)
Nuclear_Dum		-0.394**	-0.391**	-0.334**	-0.348**	-0.348**
		(0.126)	(0.128)	(0.125)	(0.123)	(0.123)
Nuclear_Ind_Dum		-0.036	-0.025	-0.025	-0.064	-0.064
		(0.107)	(0.108)	(0.109)	(0.109)	(0.109)
Supplierdamage_Dum		0.346**	0.349**	0.374**	0.341**	0.341**
		(0.120)	(0.122)	(0.126)	(0.122)	(0.122)
Clientdamage_Dum		-0.042	-0.028	-0.029	-0.024	-0.024
		(0.110)	(0.110)	(0.112)	(0.110)	(0.110)
Relocation_Dum		0.496	0.527	0.627	0.612	0.612
		(0.477)	(0.470)	(0.484)	(0.465)	(0.465)
Branch_NotOpened_Dum			0.185	0.158	0.186	0.186
			(0.223)	(0.251)	(0.245)	(0.245)
Branch_Changed_Dum			-0.362**	-0.268	-0.242	-0.242
			(0.182)	(0.207)	(0.226)	(0.226)
Bank_StaffChanged_Dum			-0.003	0.006	0.038	0.038
			(0.113)	(0.118)	(0.118)	(0.118)
Bank_VisitFrequencyDecreased_Dum			-0.299**	-0.303*	-0.258	-0.258
			(0.141)	(0.165)	(0.167)	(0.167)
Insurance_Dum				0.140	0.148	0.148
				(0.130)	(0.127)	(0.127)
Lease_Subsidy_Dum				-0.419**	-0.460**	-0.460**
				(0.177)	(0.192)	(0.192)
Lumpsum_Subsidy_Dum				0.103	0.127	0.127
				(0.170)	(0.168)	(0.168)
Taxexemption_Dum				-0.101	-0.087	-0.087
				(0.143)	(0.140)	(0.140)
Interest_Subsidy_Dum				-0.436**	-0.337**	-0.337**
				(0.110)	(0.105)	(0.105)
Groupsubsidy_Dum				0.075	-0.004	-0.004
				(0.187)	(0.181)	(0.181)
Repay_Allowance_Dum				0.469	0.485	0.485
				(0.326)	(0.315)	(0.315)
Reschedule_Dum				0.163	0.200	0.200
				(0.277)	(0.268)	(0.268)
Interest_Reduce_Dum				-0.033	-0.069	-0.069
				(0.188)	(0.181)	(0.181)
Debt_Reduce_Dum				-0.050	0.135	0.135
				(0.185)	(0.231)	(0.231)
Collateral_Cancel_Dum				-0.204	-0.665	-0.665
				(0.388)	(0.427)	(0.427)
Debt_Subordinate_Dum				-0.047	0.138	0.138
				(0.346)	(0.358)	(0.358)
GDP_Growth					-4.906*	
					(2.880)	
Inflation					-30.440**	
					(7.143)	
Log_MB					1.086**	
					(0.275)	
D2013						-0.004
						(0.068)
D2014						-0.084
						(0.076)
D2015						0.966**
						(0.250)
Constant	3.802**	3.983**	4.059**	4.320**	-10.813**	4.461**
	(0.659)	(0.675)	(0.687)	(0.748)	(3.693)	(0.740)
N	1578	1576	1569	1474	1474	1474
R-sq	0.017	0.025	0.027	0.039	0.074	0.074

Standard errors in parentheses. * p<0.1, ** p<0.05

Table 5: New loan made by primary or other banks

Model type	B1	B2	B3	B4	B5
Dependent variable	INT	INT	INT	INT	INT
Estimation method	Pooled	Pooled	Pooled	Pooled	Pooled
Log_Loan	-0.110**	-0.110**	-0.126**	-0.120**	-0.120**
	(0.043)	(0.044)	(0.048)	(0.047)	(0.047)
Maturity	-0.001**	-0.001**	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Physical_Inv_Dum	-0.088	-0.073	-0.072	-0.081	-0.081
	(0.064)	(0.068)	(0.074)	(0.072)	(0.072)
Guarantee_Dum	0.177**	0.175**	0.277**	0.294**	0.294**
	(0.064)	(0.063)	(0.077)	(0.075)	(0.075)
Collateral_Dum	0.022	0.020	0.019	0.054	0.054
	(0.061)	(0.061)	(0.063)	(0.061)	(0.061)
Capital_Asset_Firm	-0.384**	-0.386**	-0.377**	-0.426**	-0.426**
	(0.124)	(0.126)	(0.131)	(0.130)	(0.130)
Log_Asset_Firm	0.015	0.019	0.028	0.024	0.024
	(0.026)	(0.026)	(0.028)	(0.028)	(0.028)
Number_Bank	0.010	0.012	0.009	0.003	0.003
	(0.017)	(0.017)	(0.018)	(0.018)	(0.018)
Earthquake_Dum		-0.047	-0.055	-0.030	-0.030
		(0.062)	(0.066)	(0.064)	(0.064)
Tsunami_Dum		-0.064	-0.063	-0.041	-0.041
		(0.079)	(0.089)	(0.087)	(0.087)
Nuclear_Dum		-0.171	-0.233**	-0.213**	-0.213**
		(0.108)	(0.090)	(0.088)	(0.088)
Nuclear_Ind_Dum		-0.074	-0.111	-0.131*	-0.131*
		(0.075)	(0.076)	(0.076)	(0.076)
Supplierdamage_Dum		0.038	0.031	0.014	0.014
		(0.069)	(0.072)	(0.070)	(0.070)
Clientdamage_Dum		0.020	0.049	0.047	0.047
		(0.066)	(0.069)	(0.067)	(0.067)
Relocation_Dum		0.254	0.302	0.329	0.329
		(0.275)	(0.283)	(0.271)	(0.271)
Insurance_Dum			0.035	0.030	0.030
			(0.076)	(0.074)	(0.074)
Lease_Subsidy_Dum			-0.208	-0.261	-0.261
			(0.225)	(0.217)	(0.217)
Lumpsum_Subsidy_Dum			-0.004	0.034	0.034
			(0.109)	(0.106)	(0.106)
Taxexemption_Dum			-0.068	-0.063	-0.063
			(0.093)	(0.090)	(0.090)
Interest_Subsidy_Dum			-0.286**	-0.162**	-0.162**
			(0.078)	(0.075)	(0.075)
Groupsubsidy_Dum			0.171	0.030	0.030
			(0.129)	(0.121)	(0.121)
Repay_Allowance_Dum			0.215	0.277	0.277
			(0.186)	(0.179)	(0.179)
Reschedule_Dum			0.254	0.273	0.273
			(0.222)	(0.215)	(0.215)
Interest_Reduce_Dum			-0.197**	-0.254**	-0.254**
			(0.097)	(0.096)	(0.096)
Debt_Reduce_Dum			2.423	2.364	2.364
			(2.608)	(2.419)	(2.419)
Collateral_Cancel_Dum			-0.015	-0.250	-0.250
			(0.235)	(0.277)	(0.277)
Debt_Subordinate_Dum			0.071	0.263	0.263
			(0.190)	(0.196)	(0.196)
GDP_Growth				-5.776**	
				(1.929)	
Inflation				-35.869**	
				(4.847)	
Log_MB				1.296**	
				(0.186)	
D2013					0.001
					(0.042)
D2014					-0.088*
					(0.047)
D2015					1.154**
					(0.167)
Constant	2.669**	2.664**	2.701**	-15.753**	2.468**
	(0.220)	(0.223)	(0.246)	(2.663)	(0.252)
N	4034	4018	3706	3706	3706
R-sq	0.010	0.010	0.018	0.067	0.067

Standard errors in parentheses. * p<0.1, ** p<0.05

Table 6: New loan made by other banks

Model type	C1	C2	C3	C4	C5
Dependent variable	INT	INT	INT	INT	INT
Estimation method	Pooled	Pooled	Pooled	Pooled	Pooled
Log_Loan	-0.120**	-0.119**	-0.125**	-0.110*	-0.110*
	(0.051)	(0.053)	(0.057)	(0.058)	(0.058)
Maturity	0.000	0.000	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Physical_Inv_Dum	-0.150	-0.120	-0.036	-0.053	-0.053
	(0.103)	(0.112)	(0.115)	(0.111)	(0.111)
Guarantee_Dum	0.362**	0.342**	0.344**	0.346**	0.346**
	(0.110)	(0.106)	(0.125)	(0.124)	(0.124)
Collateral_Dum	0.067	0.061	0.032	0.040	0.040
	(0.092)	(0.092)	(0.091)	(0.088)	(0.088)
Capital_Asset_Firm	-0.470**	-0.500**	-0.555**	-0.601**	-0.601**
	(0.213)	(0.219)	(0.236)	(0.235)	(0.235)
Log_Asset_Firm	-0.004	0.000	0.021	0.013	0.013
	(0.033)	(0.033)	(0.038)	(0.039)	(0.039)
Number_Bank	0.036	0.036	0.035	0.020	0.020
	(0.029)	(0.029)	(0.030)	(0.030)	(0.030)
Earthquake_Dum		-0.015	-0.056	-0.036	-0.036
		(0.102)	(0.106)	(0.103)	(0.103)
Tsunami_Dum		-0.068	0.053	0.052	0.052
		(0.119)	(0.129)	(0.124)	(0.124)
Nuclear_Dum		-0.022	-0.219	-0.220*	-0.220*
		(0.223)	(0.133)	(0.128)	(0.128)
Nuclear_Ind_Dum		0.120	0.104	0.126	0.126
		(0.150)	(0.138)	(0.135)	(0.135)
Supplierdamage_Dum		-0.210**	-0.274**	-0.282**	-0.282**
		(0.093)	(0.093)	(0.092)	(0.092)
Clientdamage_Dum		0.008	0.077	0.103	0.103
		(0.092)	(0.095)	(0.094)	(0.094)
Relocation_Dum		-0.027	0.074	0.118	0.118
		(0.394)	(0.421)	(0.405)	(0.405)
Insurance_Dum			-0.051	-0.042	-0.042
			(0.103)	(0.101)	(0.101)
Lease_Subsidy_Dum			-0.201	-0.191	-0.191
			(0.232)	(0.213)	(0.213)
Lumpsum_Subsidy_Dum			-0.112	-0.085	-0.085
			(0.132)	(0.130)	(0.130)
Taxexemption_Dum			-0.119	-0.136	-0.136
			(0.126)	(0.123)	(0.123)
Interest_Subsidy_Dum			-0.140	-0.051	-0.051
			(0.122)	(0.118)	(0.118)
Groupsubsidy_Dum			-0.160	-0.296**	-0.296**
			(0.130)	(0.135)	(0.135)
Repay_Allowance_Dum			0.065	0.126	0.126
			(0.292)	(0.282)	(0.282)
Reschedule_Dum			-0.146	-0.141	-0.141
			(0.412)	(0.394)	(0.394)
Interest_Reduce_Dum			-0.102	-0.163	-0.163
			(0.145)	(0.146)	(0.146)
Debt_Reduce_Dum			4.330	4.101	4.101
			(4.022)	(3.775)	(3.775)
Collateral_Cancel_Dum			-0.302	-0.089	-0.089
			(0.322)	(0.355)	(0.355)
Debt_Subordinate_Dum			0.341	0.661	0.661
			(0.405)	(0.471)	(0.471)
GDP_Growth				-3.188	
				(3.686)	
Inflation				-30.887**	
				(7.644)	
Log_MB				1.087**	
				(0.297)	
D2013					0.022
					(0.079)
D2014					-0.116
					(0.074)
D2015					0.976**
					(0.266)
Constant	2.578**	2.613**	2.478**	-12.968**	2.331**
	(0.279)	(0.298)	(0.334)	(4.195)	(0.337)
N	1395	1388	1266	1266	1266
R-sq	0.021	0.020	0.035	0.077	0.077

Standard errors in parentheses. * p<0.1, ** p<0.05

Table 7: New loan is made by primary bank, firms without serious damage

Model type	D1	D5	D6
Dependent variable	NIM	NIM	NIM
Estimation method	Pooled	Pooled	Pooled
Log_Loan	-0.033	-0.049	-0.049
	(0.038)	(0.037)	(0.037)
Maturity	-0.003**	-0.002**	-0.002**
	(0.001)	(0.001)	(0.001)
Primary_Vintage	0.000	0.000	0.000
	(0.004)	(0.003)	(0.003)
Primary_Share	0.009	0.025	0.025
	(0.124)	(0.121)	(0.121)
Physical_Inv_Dum	0.124	0.120	0.120
	(0.121)	(0.119)	(0.119)
Guarantee_Dum	0.031	0.070	0.070
	(0.115)	(0.113)	(0.113)
Collateral_Dum	-0.023	0.041	0.041
	(0.119)	(0.111)	(0.111)
Capital_Asset_Firm	-0.547**	-0.528**	-0.528**
	(0.181)	(0.181)	(0.181)
Log_Asset_Firm	-0.010	-0.003	-0.003
	(0.038)	(0.040)	(0.040)
Number_Bank	-0.024	-0.022	-0.022
	(0.021)	(0.022)	(0.022)
Capital_Asset_Bank	11.152*	-0.738	-0.738
	(6.723)	(6.637)	(6.637)
Liquidity_Bank	-0.869	-0.138	-0.138
	(1.002)	(0.953)	(0.953)
Log_Asset_Bank	-0.086*	-0.096**	-0.096**
	(0.048)	(0.048)	(0.048)
ROA_Bank	-34.143	-11.083	-11.083
	(43.361)	(41.253)	(41.253)
GDP_Growth		-5.329*	
		(3.151)	
Inflation		-26.662**	
		(7.852)	
Log_MB		1.052**	
		(0.299)	
D2013			0.015
			(0.072)
D2014			0.009
			(0.092)
D2015			0.939**
			(0.269)
Constant	3.755**	-10.889**	3.899**
	(0.780)	(4.028)	(0.778)
N	1098	1098	1098
R-sq	0.009	0.043	0.043

Standard errors in parentheses. * p<0.1, ** p<0.05

Table 8: Unbalanced panel data estimation results

Model type	A_FE	A_RE	B_FE	B_RE	C_FE	C_RE	D_FE	D_RE
Dependent variable	NIM	NIM	INT	INT	INT	INT	NIM	NIM
Estimation method	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
Log_Loan	0.055	-0.135**	-0.163**	-0.120**	-0.063	-0.110**	0.070	-0.048
	(0.109)	(0.049)	(0.060)	(0.032)	(0.132)	(0.052)	(0.128)	(0.055)
Maturity	-0.010**	-0.001	-0.002	-0.000	-0.005*	0.001	-0.010**	-0.002**
	(0.003)	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.004)	(0.001)
Primary_Share	-0.055	-0.102					-0.144	0.024
	(0.312)	(0.099)					(0.324)	(0.132)
Physical_Inv_Dum	0.194	0.009	-0.105	-0.081	-0.009	-0.052	0.381	0.122
	(0.245)	(0.101)	(0.136)	(0.066)	(0.278)	(0.100)	(0.289)	(0.113)
Guarantee_Dum	0.302	0.263**	0.155	0.294**	0.648**	0.345**	-0.358	0.068
	(0.264)	(0.113)	(0.139)	(0.070)	(0.300)	(0.109)	(0.302)	(0.120)
Collateral_Dum	0.165	0.021	-0.051	0.054	-0.574**	0.039	0.361	0.039
	(0.250)	(0.097)	(0.130)	(0.063)	(0.277)	(0.095)	(0.295)	(0.108)
Capital_Asset_Firm	-0.285	-0.317	-0.009	-0.426**	-0.746	-0.601**	-0.535	-0.528**
	(0.907)	(0.223)	(0.466)	(0.142)	(0.846)	(0.213)	(1.001)	(0.242)
Log_Asset_Firm	0.131	0.039	-0.139	0.024	-0.410**	0.013	0.194	-0.003
	(0.209)	(0.049)	(0.106)	(0.030)	(0.200)	(0.045)	(0.224)	(0.052)
Capital_Asset_Bank	-19.982	2.036					83.319	-0.825
	(67.097)	(6.037)					(76.616)	(7.077)
Liquidity_Bank	-0.645	-0.069					5.628	-0.143
	(7.734)	(0.784)					(8.873)	(0.819)
Log_Asset_Bank	-6.001	-0.123**					-2.815	-0.097**
	(4.331)	(0.042)					(5.184)	(0.045)
ROA_Bank	133.924	-4.900					388.652**	-10.035
	(160.796)	(51.425)					(191.412)	(60.499)
GDP_Growth	10.074	-3.508	-2.556	-5.776*	-9.794	-3.177	-2.486	-5.202
	(11.171)	(4.871)	(5.030)	(3.322)	(9.842)	(5.066)	(13.127)	(5.548)
Inflation	-16.353*	-28.127**	-29.679**	-35.869**	-35.083**	-30.885**	-19.358*	-26.522**
	(9.354)	(5.108)	(4.971)	(3.466)	(9.811)	(5.298)	(10.898)	(5.860)
Log_MB	2.314**	1.085**	1.227**	1.296**	1.160**	1.086**	0.954	1.054**
	(1.035)	(0.162)	(0.148)	(0.102)	(0.307)	(0.160)	(1.233)	(0.178)
Primary_Vintage		-0.002						0.000
		(0.003)						(0.003)
Number_Bank		-0.009		0.003		0.020		-0.022
		(0.030)		(0.019)		(0.030)		(0.030)
Earthquake_Dum		-0.125		-0.030		-0.036		
		(0.104)		(0.066)		(0.099)		
Tsunami_Dum		0.033		-0.041		0.052		
		(0.133)		(0.080)		(0.118)		
Nuclear_Dum		-0.343*		-0.213*		-0.220		
		(0.195)		(0.120)		(0.187)		
Nuclear_Ind_Dum		-0.062		-0.131		0.126		
		(0.127)		(0.081)		(0.130)		
Supplierdamage_Dum		0.362**		0.014		-0.282**		
		(0.112)		(0.070)		(0.105)		
Clientdamage_Dum		-0.043		0.047		0.103		
		(0.109)		(0.069)		(0.103)		
Relocation_Dum		0.640*		0.329		0.119		
		(0.369)		(0.205)		(0.306)		
Branch_NotOpened_Dum		0.189						
		(0.194)						
Branch_Changed_Dum		-0.252						
		(0.427)						
Bank_StaffChanged_Dum		0.020						
		(0.147)						
Bank_VisitFrequencyDecreased_Dum		-0.244						
		(0.285)						
Insurance_Dum		0.143		0.030		-0.043		
		(0.114)		(0.069)		(0.104)		
Lease_Subsidy_Dum		-0.457		-0.261		-0.191		
		(0.322)		(0.219)		(0.333)		
Lumpsum_Subsidy_Dum		0.149		0.034		-0.085		
		(0.149)		(0.093)		(0.146)		
Taxexemption_Dum		-0.093		-0.063		-0.136		
		(0.143)		(0.088)		(0.137)		
Interest_Subsidy_Dum		-0.319**		-0.162**		-0.051		
		(0.113)		(0.073)		(0.115)		
Groupsubsidy_Dum		-0.054		0.030		-0.296*		
		(0.169)		(0.103)		(0.155)		
Repay_Allowance_Dum		0.404		0.277*		0.125		
		(0.249)		(0.151)		(0.223)		
Reschedule_Dum		0.244		0.273*		-0.143		
		(0.244)		(0.164)		(0.282)		
Interest_Reduce_Dum		-0.034		-0.254**		-0.162		
		(0.159)		(0.106)		(0.172)		
Debt_Reduce_Dum		0.258		2.364**		4.101**		
		(1.242)		(0.838)		(0.965)		
Collateral_Cancel_Dum		-0.653		-0.250		-0.087		
		(0.553)		(0.436)		(0.847)		
Debt_Subordinate_Dum		0.208		0.263		0.660		
		(0.708)		(0.503)		(1.177)		
Constant	56.562	-10.892**	-12.814**	-15.753**	-9.341**	-12.961**	21.762	-10.908**
	(51.050)	(2.376)	(2.263)	(1.491)	(4.628)	(2.339)	(60.783)	(2.613)
N	1681	1474	4390	3706	1595	1266	1164	1098
R-sq (Within)	0.117	-	0.074	-	0.135	-	0.128	-
F test that all u_i=0	1.035	-	0.948	-	1.043	-	1.103	-
Prob > F	0.342	-	0.878	-	0.340	-	0.169	-
Hausman Test	12.032	-	15.098	-	21.791	-	13.545	-
Prob > chi2	0.604	-	0.129	-	0.016	-	0.484	-
Breusch-Pagan Test	-	1.942	-	0.000	-	0.246	-	2.228
Prob > chibar2	-	0.082	-	1.000	-	0.310	-	0.068
Most reliable estimation method:	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled	Pooled

Standard errors in parentheses. * p<0.1, ** p<0.05