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Bad Loans and Accounting Discretion[#]

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ABSTRACT

Why did Japan's non-performing loan problems and the banking crisis last more than a decade? We provide theoretical and empirical analyses that investigate whether a lax enforcement of capital adequacy requirements, accompanied with discretionary accounting practices, promoted Japanese banks to supply loans to almost insolvent firms and consequently prolonged the non-performing loan problem in Japan. Following the findings derived from the developed model, we construct a number of measures from accounting variables that are expected to be correlated with bad loans. Our proposed accounting measures, the difference between the risk-based capital ratio and the market-valued capital ratio, and the subordinated debt ratio, are found to be useful in uncovering evidence supporting that Japanese banks had the perverse incentive of extending bad loans in an attempt to inflate regulatory capital in the 1990s.

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Bad Loans and Accounting Discretion

1. Introduction

Why did Japan's non-performing loan problems and the banking crisis last more than a decade? According to Hutchison and McDill (1999), the average duration of a banking crisis is 3.9 years that is smaller than the Japan's case by 10 years ! Finland and Sweden went through more serious asset market collapses than Japan and yet needed only four years to solve the bad loan problems. Korea were hit by a serious Asian currency crisis but also solved the bad loan problem in four years.[1]

Our argument is that an inadequate enforcement of capital adequacy requirements was one of important sources of the long-lasting non-performing loan problem in Japan. Capital adequacy requirements constitute a core element of prudential regulation that is intended to induce sound risk management of bank asset portfolios. Nonetheless, the regulatory authorities allowed banks to engage in accounting discretion and to overstate bank capital. In response, banks had a strong incentive to conceal non-performing loans by extending additional loans to almost insolvent firms. It is obvious that the extended loans became further non-performing loans.

There are a number of studies that found the evidence of the accounting discretion under capital regulations by Japanese banks, including Shimizu and Horiuchi (1998), Ito and Sasaki (2002), Fukao (2002), and Shrieves and Dahl (2003).[2] There are also a number of studies that found the evidence of bad loans made by Japanese banks, including Sekine et al. (2002), Hori

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[1] In Sweden the crisis began in 1991 and ended in 1994. In Korea it began in 1997 and was almost over in 2000.

[2] Shimizu and Horiuchi (1998) found the evidence that Japanese banks issued subordinated debt in order to maintain the capital ratio above the minimum requirement. Fukao (2002) reports that Japanese banks issued subordinated debt for the purpose of cross-holding with life insurance companies within the same business group, *keiretsu* to overstate the "supplementary" Tier 2 regulatory capital. Ito and Sasaki (2002) found the evidence that Japanese banks issued subordinated debt in order to compensate for the latent losses of stocks, both of which constituted components of Tier 2 capital. Shrieves and Dahl (2003) found that banks sold stocks to realize capital gains when the increase in loan loss provisions decreased "core" Tier I regulatory capital, and argued that Japanese banks regarded Tier 1 regulatory capital as a crucial regulatory constraint.

and Osano (2002), Caballero et al. (2003), Peek and Rosengren (2005), and others.[3] The former literature revealed the evidence of accounting discretion that was rooted on capital requirements by Japanese banks, while the latter found the evidences of the continuation of bad loans. To our knowledge, however, there are few studies that investigated the relationship between accounting discretion and bad loans.

The purpose of this paper is to provide theoretical and empirical analyses that investigate whether a lax enforcement of capital adequacy requirements, accompanied with discretionary accounting practices, promoted banks to supply loans to almost insolvent firms and consequently prolonged the non-performing loan problem in Japan.

As stated above, bad loans are often associated with accounting discretion and difficult to detect because reliable data is limited. Data on accounting discretion is not available, either. In order to work out this difficulty, we construct a theoretical model in an attempt to derive testable implications from observable data on the relationship among bad loans, capital adequacy requirements, and accounting discretion.

The capital requirements, when it is subject to accounting discretion, provide banks with the perverse incentive to extend bad loans to almost insolvent firms. Continuing loans to bad firms becomes a tool for inflating regulatory capital although it finally makes damages to the bank. The market evaluation to the bank declines, while the bank has ample regulatory capital that is sufficient to meet the minimum capital requirements. Recapitalization to poorly-capitalized banks also provides them with the perverse incentive. Recapitalization by issuing subordinated debt, if it is issued to insiders, may not play a disciplinary role, but rather may work as a tool of softening bank's capital constraint. Consequently, subordinated debt and the continuation of bad

[3] Sekine et al. (2002) found the evidence that the loan supply grew more at firms with high bank debt to assets ratios after 1993, and that this tendency was pronounced among the construction and the real estate sectors. Using data on banks and firms for the 1998 year, Hori and Osano (2002) found the evidence that banks provided more (short-term) loans to borrowing firms with small Tobin's q when they were tied with banks under the main-bank relationship. Caballero et al. (2003) quantified the amount of subsidized lending for the publicly traded firms and found that the level of subsidized lending increased markedly during the 1990s, and that the subsidies were far more common for non-manufacturing firms than for manufacturing firms. Peek and Rosengren (2005), using the data on individual banks and firms over the 1993-1999 period, conduct the systematic analysis to detect the misallocation of credit in Japan, and found that banks supplied more loans to firms with low profitability and high debt-asset ratio.

loans can serve as complementary device for capital watering.

Following the theoretical findings, we construct a number of measures from accounting variables that are expected to be correlated with bad loans. The first measure is the market-valued capital as a proportion of bank assets that is expected to be correlated with the bank asset quality to the extent that the stock market incorporates the information on financial conditions of individual banks accurately. The second measure, which we believe to be most appropriate for account discretion, is the difference between the risk-based capital ratio (RBC) and the market-valued capital as a proportion of bank assets. The theoretical finding predicts that the divergence between the two ratios reflects the perverse incentive of banks to extend bad loans. The third measure is subordinated debt as a proportion to risk-weighted bank asset. The theoretical finding predicts that recapitalization by issuing subordinated debts to insiders works as a tool of softening the bank capital constraint. The fourth measure is the distance of the reported RBC ratio from the minimum requirement level that is motivated by the idea that more severely capital-constrained banks have a greater incentive of extending bad loans.

Using these measures of accounting discretion as explanatory variables, we estimate the share of bad loans in total loans, because we can safely regard that the share of bad loans is controlled by banks and thus we can work out the identification problem associated with the loan supply function. Given the assumption that accounting variables are "manipulated", banks choose the loan portfolio and accounting variables simultaneously [e.g., Shrieves and Dahl (2003)]. In order to avoid such an endogeneity problem, we estimate coefficients not only by OLS but also by GMM.

We find that the RBC ratio is not correlated with the banks' bad loans. Capital requirements do not seem to have worked well to discipline banks' behavior. On the other hand, the market-valued capital ratio is correlated with the banks' bad loans. The stock market seems to have incorporated the information on financial conditions of individual banks to some degree. Our proposed accounting measures, the difference between the risk-based capital ratio (RBC) and the market-valued capital ratio, and the subordinated debt ratio, are found to be useful in uncovering evidence supporting that banks had the perverse incentive of extending bad loans in an attempt to inflate regulatory capital. The estimation using the distance of the reported RBC ratio from the minimum requirement level suggests evidence that banks extended bad loans beyond the minimum requirement. Furthermore, we find a different result between major banks and regional banks, suggesting the too-big-to-fail policy with regard to the regulation and supervision in Japan [4].

The remainder of this paper is organized as follows. Section 2 reviews the banking problem in the 1990s. Section 3 sets up the model. Section 4 conducts the theoretical analysis. Section 5 reports our empirical method and results. Section 6 concludes.

2. Overviews of the Japanese banking system in the 1990s

2.1 Basel capital standards and the manipulation of regulatory capital

We briefly explain how the regulatory authorities helped Japanese banks to manipulate regulatory capital while requesting them to keep the Basel capital standards. The risk-based capital ratio (hereafter the RBC ratio) is defined as the regulatory capital divided by risk-adjusted bank assets. The regulatory capital consists of Tier 1 "core" capital and Tier 2 "supplementary" capital. Tier 1 capital is comprised mainly of stock issues and disclosed reserves, including share premiums and retained earnings, while Tier 2 capital is comprised of undisclosed reserves, including unrealized capital gains on securities, provisions for general loan losses, and subordinated debt with maturities exceeding five years. Tier 2 capital cannot exceed the amount of Tier 1 capital as a contribution to total capital. All the banks that operate internationally have to meet the minimum requirement level of 8 % of the RBC ratio. Otherwise they have to withdraw from international business.

Tier 1 capital is defined in a consistent manner for all countries, but Tier 2 capital, the definition of which depends on national discretion, is easier to manipulate than Tier 1 capital.[5] At the beginning of the 1990s, when the stock market bubble collapsed but stock prices were

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[4] As an evidence of a too-big-to-fail policy, we point out the fact that the government recapitalized all the major banks and only three regional banks in March 1998.

[5] It was true at least until 1998 when the value of deferred taxes was permitted to count as Tier 1 capital.

still relatively high, Japanese banks were allowed to count unrealized capital gains on securities as Tier 2 capital.[6] Japanese banks were also allowed to count subordinated debt as Tier 2 capital even though this was held by *keiretsu*-affiliated life insurance companies who also issued subordinated debt to these banks. Such mutual holding of subordinated debt has increased further since 1996 when the regulatory authorities started to impose risk-based capital adequacy requirements, the so-called "solvency margin" standards, on life insurance companies.[7] In 1997, when the financial crisis happened, regulatory authorities changed accounting standards concerning latent capital gains on securities, allowing Japanese banks that incurred unrealized capital losses on securities to count stocks at acquisition cost. In 1998, banks were allowed to count unrealized capital gains on land assets as capital base. Banks were able to inflate their capital base because a large proportion of the land they held had been acquired long before the price hike in the late 1980s. The value of deferred taxes was also permitted to count as Tier 1 capital.[8]

Figure I reports the RBC ratio for major banks as of March 1997. Almost all banks recorded RBC ratios above 8 %. Surprisingly, Hokkaido Takushoku Bank and Long-Term Credit Bank of Japan also recorded levels above 8 % although both of these banks eventually failed within two years of March 1997. Only Nippon Credit Bank, which failed in 1998, recorded the RBC ratio short of 8 %. Note that these three failed banks are placed at the first to the third left columns of Figures I and II.

Since accounting manipulations were allowed, regulatory capital considerably diverged from true economic capital, which is typically defined by the market-valued capital that is the number of stocks multiplied by end-of-fiscal-year stock prices. Figure I reports the market-valued capital ratio that is defined as the market-valued capital divided by the sum of the market-valued capital and total debt, denoted by MVC hereafter. Almost all the major banks

[6] The Ministry of Finance allowed Japanese banks to count 45 % of their latent capital gains as part of tier 2 capital in 1990. This is a special rule applied to Japanese banks, but not to banks in the United States or United Kingdom.

[7] Fukao (2002) points out that life insurance companies held 6,689.6 billion yens of subordinated debt issued by banks at the end of March 2002 while banks held 1,360.2 billion yens of subordinated debt issued by 14 life insurance companies at the same time.

[8] The deferred tax accounting plays a role in helping banks to inflate the regulatory capital since 2000 (e.g. Skinner(2005)).

displayed the MVC ratios that were smaller than RBC ratios. Notably, the MVC ratios of the three failed banks displayed even lower values than those of the other surviving banks. The stock market seemed to evaluate the bank risk despite the widespread belief that poor disclosure of banks prevented market participants from accurately assessing bank performance. There are a number of papers, including Yamori (1999), Peek and Rosengren (2001), Bremer and Pettway (2002), and Brewer et al. (2003), that found evidence suggesting that the Japanese stock market were able to price the riskiness of Japanese banks, despite poor disclosure requirements and regulatory distortions,

Let us now look at the components of the capital base in detail. Figure II reports the Tier 1 capital and the major components of Tier 2 capital as a proportion of risk-adjusted assets for the major banks as of March 1997. Almost all the major banks reported Tier 1 capital ratios above 4 %. Among the components of Tier 2 capital, subordinated debt accounted for a dominant portion. Subordinated debt constituted 2.3% of risk assets on average, about a quarter of total regulatory capital (see Table 1). The proportions of subordinated debt were high especially at Hokkaido Takushoku Bank and Long-Term Credit Bank of Japan.

Subordinated debt is, in case of bank insolvency, senior to equity but junior to any other debt including other bonds and insured deposits, and admitted as a component of Tier 2 capital under the special rule of the Basel Accord. Subordinated debt is, in principle, expected to play a disciplinary role on banks. Those banks that take on excessive risk will see the price of their subordinated debt falling, and hence will be forced to shrink their lending to satisfy capital adequacy requirements (e.g., Calomiris, 1999). Recently a number of papers have found statistically significant relationship between the subordinated debt spread and various measures of bank risk in the U.S. and European bond markets, including Flannery and Sorescu (1996), Jagtiani et al (1999), De Young et al (2001), Sironi (2003), and others.

The situation in Japan was at odds with this view. In the 1990s, Japanese banks issued subordinated debt to restore capital bases undermined by asset price deprecation and non-performing loans (e.g., Horiuchi and Shimizu, 1998; Ito and Sasaki, 2002). However, subordinated debt was not fairly priced to reflect banks’ default risk. The purchasers were associated life insurance companies and the government, who never sold it in the market.

Furthermore, the government often repaid subordinate-debt-holders on behalf of insolvent banks.[9] This observation suggests that subordinated debt did not play a disciplinary role, but was used as a tool of softening banks' capital constraints.

2.2 Perverse bank loan portfolios in the 1990s

Before formally analyzing the impact of the discretionary implementation of capital regulations on bank portfolios, we briefly review the trend of Japanese banks' portfolios in the 1990s. Although Japanese banks were burdened with huge amounts of non-performing loans, they did not shrink total loans outstanding until 1998. Figure III presents Japanese banks' corporate loans outstanding by industry. While Japanese banks shrank their lending to the manufacturing sector, the most profitable sector, they increased their lending to the real estate and the construction sector, which were suffering from the persistent falls in land prices.[10] [11].

To examine the financial health of these industries, we estimate how many years it would take borrowing companies to repay their debts by calculating the sum of total borrowing and corporate bonds outstanding divided by operating profits. Calculating and comparing the average estimated years of debt repayment in the 1990s with those in the 1980s by industry, we find that they rose sharply from 15 to 36 years for the real estate sector and from 8 to 14 years for the construction sector, while it rose moderately from 6 to 9 years for the manufacturing sector.[12]

This shift in bank loan portfolios is inconsistent with the behavior of profit-motivated banks, suggesting that Japanese banks continued to extend loans to unprofitable firms and industries even though it was unlikely that those loans would be recovered. Smith (2003) suggests the

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9 As a matter of fact, the case of Hyogo Bank, a regional bank that failed in 1995, is the last one when creditors of subordinated debt were not protected. Since then, creditors of subordinated debt of failed banks have been protected.

10 Hoshi (2000) first pointed out that Japanese banks increased the share of loans to the real estate industry after the collapse of the real estate bubble until 1997.

11 Accordingly, while the loan share to the manufacturing sector was almost constant about 15% over the 1990s, loan shares to the real estate sector and the construction sector rose from 11% to 13% and 5% to 6%, respectively. See Hosono and Sakuragawa (2002) in detail.

12 We construct these figures using the data from the Financial Statement Statistics of Corporations published by Ministry of Finance.

perverse behavior of Japanese banks by finding evidence that Japanese banks charged lower interest rates than did foreign banks on syndicated loans, and varied pricing to a less degree across risks than did foreign banks.

This tendency was especially pronounced among three major banks that later failed, i.e., Hokkaido Takushoku Bank, Long-Term Credit Bank of Japan, and Nippon Credit Bank. Figure IV reports the sum of loans to the real estate, the construction, and the finance sector, summarily referred to as "real estate-related bad loans" or simply "bad loans" hereafter, as a proportion of total loans. Long-Term Credit Bank of Japan and Nippon Credit Bank both sharply show higher bad loan shares than surviving banks. Notably, bad loan shares of these two banks rose sharply just before their failure.

3. Model

Following Rajan (1994), Berglof and Roland (1995), Aghion et al. (1999) and Mitchel (2001), we rely on a simple model of asymmetric information. There are two dates, date 0 and date 1, with one bank and many potential borrowers. At date 0, the bank is endowed with capital A and has access to insured deposits provided at zero interest rate.[13] Assume that depositors are repaid at date 1. The bank is run by a manager and in what follows we use the terms "bank" and "manager" interchangeably.

The bank potentially makes two types of loans. One type is a safe loan that needs I units of funds at date 0 and returns $X(>I)$ with certainty at date 1. The other is a risky loan that the bank inherited and initially (before date 0) needed I units of funds. The continuation of this loan additionally needs I units at date 0, and returns Y_H with probability p and $Y_L(<Y_H)$ with probability $1-p$ at date 1. When the bank does not make the additional loan, the investment terminates and the bank receives Z by liquidating the borrower's asset through a fire sale. The bank invests the other I units of funds in the government bond with zero interest rate. Assume that the bank's continuation/liquidation decision is public information, but

[13] Strictly, we assume risk-insensitive, flat-rate deposit insurance pricing, and normalize the deposit insurance premium to be zero.

that the liquidation is costly, such that $Z < I$. The bank collects deposits $2 \times I - A$ at date 0 and is obliged to repay the total deposits $3 \times I - A$ at date 1.

At date 0, the manager receives a signal about the return of the risky loan. Suppose for simplicity that the signal the manager receives is perfectly correlated with the performance of the risky loan. If the signal is "good", the final return is Y_H with certainty while if the signal is "bad", the return is Y_L with certainty.[14] On the basis of that signal, the manager decides whether to continue or terminate the risky loan. Importantly, the signal is observable but not verifiable to outsiders. Thus, even if the stock market detects the bank's bad loan, the regulator (the government) cannot punish the bank for extending the bad loan only on the basis of the stock market information. The court cannot verify the causal relationship between the bad loans and the stock market depreciation.

This situation is closely related to the accounting rule adopted here. First, the manager does not lose his job even if he is observed in the market to have chosen a loan portfolio that turned out to deteriorate the bank's final earnings. Second, the manager does not lose his job even if he is found not to have disclosed latent gains/ losses from loans in progress. In other words, the bank is not forced to disclose true earnings on the basis of market value accounting. The government forbearance policy takes the form of allowing banks to engage in the historic cost accounting.

We impose two restrictions on the parameters. First, we assume that $Y_L < I + Z < Y_H$. The first inequality says that when the signal is bad, the bank earns more by terminating the risky loan, while the second inequality says that when the signal is good, the bank earns more by continuing that loan. Second, we assume that $(X - I) + (Y_L - 2I) + A > 0$, which says that, conditional on the signal being bad, the bank's final equity value is positive even if the risky loan is continued. This assumption allows us to focus on the possibility of the bank's moral hazard behavior even when the bank never faces the risk of insolvency.

The bank manager does not only benefit from holding the stock of the bank but also enjoys a private benefit as a result of managing the bank. Formally, the manager maximizes the

[14] Although the assumption of perfect accuracy of signal may be a little restrictive, nothing essential changes even when the signal is imperfect and the extent of the accuracy is high.

expected date-1 value of

$$U = \alpha \times \max(E, -A) + (1-\alpha) \times \widetilde{B}, \text{ with } 0 < \alpha \le 1, \tag{1}$$

where E represents the bank's final earnings net of the cost of capital, and $\widetilde{B}$ stands for the private benefit that the manager enjoys by retaining his job.[15] The weight α may be related to the manager's share of the bank's stock, the degree of shareholding with affiliated firms, and the government's forbearance policy. The second term includes not only the manager's salary but also non-monetary benefits, such as perks or the satisfaction derived from controlling the bank. We assume that the manager receives the private benefit $\widetilde{B} = B(>0)$ when retaining his job until date 1 and receives $\widetilde{B} = 0$ when losing his job. This term is meant to capture a situation where the manager is not effectively disciplined to behave in the interest of outside shareholders and may have an incentive to extend bad loans and hence worsen the bank's profitability.

Finally, we assume that the manager is fired and loses private benefits at date 0 when the disclosed risk-based-capital (RBC) ratio is short of the target ratio of 100× k %, which may be equal to or greater than the level of the minimum capital requirement of 8% for internationally active banks. The bank's target ratio may be greater than the minimum requirement for a number of reasons. The regulator might request banks to hold more capital beyond the minimum requirement in fear of a possible bank panic, and banks also may have an incentive of obeying the regulator[16]. In addition, banks may take a buffer-stock behavior. Banks may have an incentive of holding capital beyond the minimum requirement against possible adverse shocks in the future. Actually, the fact that Hokkaido Takushoku Bank and Long-Term Credit Bank of Japan recorded levels above 9 % just when they went bankrupt suggest that at least these banks targeted more than 9 %.[17] Although the decision to fire the manager is formally made by the

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[15] The objective function that motivates non-profit maximizing banks is also used in Rajan (1994), Aghion et al (1999), and Mitchell (2001).

[16] Readers may wonder why there was a fear of bank panic when there was a government safety net. However, deposit insurance protected deposits only partially until 1995. Even after the introduction of a blanket guarantee in 1996, depositors chose banks sensitively according to bank risk (e.g., Murata and Hori, 2006; Hosono, 2006).

[17] Rigorously speaking, it may be better to assume that the manager faces double requirements of 8 % and 100× k %, but that assumption will complicate the analysis. One important implication of that extension is that there emerges a positive relationship between the RBC ratio and the bad loan

board of directors, the regulator may influence the decision indirectly through its pressure on banks.[18]

4. Theoretical analysis

In this section we conduct a formal analysis based on the model developed in Section III. We do this by first establishing a benchmark case and then introducing various aspects of the model.

4.1 Minimum capital requirements

As a benchmark, it is useful to examine a world in the absence of any capital requirement. The manager does not worry about losing his job and cares only about the bank's final earnings. When the signal is good, the manager continues the risky loan, and when the signal is bad, the manager terminates it.

Now we analyze the portfolio choice in the presence of the minimum capital requirement. Having received the signal at date 0, the manager has to take into account his private benefit from staying in that position in deciding whether to terminate or continue the risky loan.

When the bank follows the "termination strategy", the bank incurs the loss $I-Z$ as a result of liquidating the borrower's asset. The other I units are invested in the government bond. At date 0, the bank writes off the loan loss and reports the risk based capital (RBC) ratio as $(A+Z-I)/I$, where the numerator represents the sum of the initial capital and the disclosed loan loss and the denominator states that only I units of loans are outstanding.

On the other hand, when the bank follows the "continuation strategy", following the market value accounting, the bank would have to make provisions against the expected loan loss, and hence in the face of a bad signal, the bank would have to report $2I-Y_L$ as loan-loss

share across banks. The detailed argument regarding that relationship is made in the subsection C of the next section (empirical implications) and Appendix.

[18] Rajan (1994) develops a bank manager's preference under which the manager attempt to manipulate the disclosed earnings in order to raise his evaluation in the labor market. However, the observation that the stock market detected the performance of bad banks suggests that the Rajan's idea does not seem to fit the Japanese evidence.

provisions. However, the manager who feels that the truthful reporting may endanger his position attempts to behave as if the received signal is good. Additionally, the practice of historical cost accounting helps the bank to hide the bad loan. As a result, in continuing the risky loan, the bank reports the RBC ratio as $A/3I$. Note that we implicitly assume $Y_H > 2I$.

The RBC ratio under the continuation, $A/3I$, is greater than that under the termination $(A+Z-I)/I$ if $3(I-Z) > 2A$ holds. This inequality is likely to hold if either the bank capital A or the liquidation value Z is small.. We assume that this inequality holds throughout this paper. It follows that the manager is given the option of overstating the RBC ratio by extending the bad loan.

Since our goal is to analyze the mechanism underlying the continuation of bad loans, in what follows we concentrate on the conditions under which the bank continues the risky loan conditional on the signal being bad. Since the manager is expected to behave differently depending on the severity with which capital regulations are enforced, we continue the analysis by distinguishing banks in terms of their initial capital level.

First of all, we examine the behavior of a *well-capitalized* bank that can meet the target RBC ratio either by continuing or terminating the risky loan, so that $\min[\{A+(Z-I)\}/I\,, A/3I] \geq k$. This inequality is more likely to be met when either A or Z is relatively high. Since the capital regulation does not distort the portfolio choice, the manager cares only about the bank's final earnings in deciding whether or not to continue the risky loan. In the face of a good signal, the manager continues the risky loan, while in the face of a bad signal, the manager terminates it.

Proposition 0: If the signal is bad, the well-capitalized bank terminates the risky loan.

Next we examine the behavior of a bank that is still *fairly well-capitalized* but can meet the target only by continuing the risky loan, so that $(A+Z-I)/I < k \leq A/3I$. This inequality is likely to be met when either A or Z is relatively low. Having received a bad signal, the manager may face the trade-off between the bank's equity value and his private benefit in the decision. Conditional on the signal being bad, the manager obtains $\alpha(X+Z-2I)$ under the termination, and $\alpha(X+Y_L-3I)+(1-\alpha)B$ under the continuation. If the loan loss is written off by the termination and the RBC ratio falls below the target ratio k, the manager will lose his private benefits. We obtain the following.

Proposition 1: If the signal is bad, the fairly well-capitalized bank continues the risky loan if the following inequality is met:

(2) $$(1-\alpha)B > \alpha(Z+I-Y_L).$$

The L.H.S. of inequality (2) represents the private benefit from staying at the manager's position in the utility term, and the R.H.S. the cost of continuing the bad loan in the utility term. The cost of continuation $(Z+I-Y_L)$ is positive (by assumption), and only the non-profit-maximizing bank with α less than unity will extend the bad loan. The smaller α or Z, or the greater B, the manager is more likely to continue the risky loan although outside shareholders would want the manager to terminate it.

Proposition 1 is closely related to the fact that it is difficult to evaluate the true bank capital. In terms of the model, the bank can manipulate the regulatory capital by continuing the risky loan for two reasons. First, the regulator has no tool to verify the bank's loan quality. Second, the regulator allows the bank to engage in discretionary accounting. A forbearance policy on the part of the government will soften the bank's capital constraint, which in turn will soften the borrowing firm's budget constraint and ultimately result in a non-performing loan. Very often the government does not force banks to use market value accounting possibly because the government fears possible disastrous consequences of the disclosure of banks' true balance sheets.

Finally we examine the behavior of a *poorly-capitalized* bank that can attain the target RBC ratio neither by continuing nor terminating the risky loan, so that $\max[\{A+(Z-I)\}/I, A/3I] < k$. This inequality is most likely to apply when either A or Z is very low. If the signal is bad, the manager would obtain $\alpha(X+Z-2I)$ under the termination strategy and $\alpha(X+Y_L-3I)$ under the continuation strategy. Since the bank cannot meet the requirement either by continuing or terminating the risky loan, the manager has no incentive to continue the bad loan.

Proposition 2: If the signal is bad, the poorly-capitalized bank terminates the risky loan.

Propositions 0, 1, and 2 jointly imply a nonlinear relationship between the portfolio choice and levels of bank capital. At low or high levels of bank capital, the bank's profitability is more important to the manager than his private benefit. Only for intermediate levels of bank capital, the bank manager places more weight on his private benefit than on the bank's profitability.

4.2 Recapitalization by subordinated debt

We have thus far assumed that the bank can raise funds only by collecting deposits. However, as reviewed in Section II, Japanese banks typically relied heavily on subordinated debt to meet the minimum capital requirements. Accordingly we extend the basic model to allow the bank to issue subordinated debt as another means of raising funds.

Suppose that at date 0, having received the signal, the bank decides whether to issue subordinated debt to outside investors at date 0. Let p denote the date-0 price of subordinated debt and D the amount issued. The bank raises the fund pD, promising to repay D at date 1. Note that the date-1 price is normalized to be unity. Assume that D is fixed. Assume finally that the bank invests the raised cash in the government bond.

Under the assumption that the bank is solvent even when the risky loan fails, given by $(X-I)+(Y_L-2I)+A>0$, it is easy to see that $p=1$.[19] The subordinated debt does not influence the bank's final earnings and works only as a buffer to relax the original minimum capital requirement. By issuing subordinated debt, the bank can raise the RBC ratio up to

[19] The bank is always solvent to the creditors of subordinated debt under the assumed parameter space $(X-I)+(Y_L-2I)+A\geq 0$. This can be proved as follows. At date 1 the bank is obliged to repay $(3I-A)$ to the depositors. Creditors of subordinated debt are senior to equityholders, but junior to depositors, and so only if $A+2X+Y_L+D_0\geq 3I+D$ creditors of subordinated debt are fully repaid. If $A+2X+Y_L\geq 3I$, $A+2X+Y_L+D_0\geq 3I+D$ automatically holds because creditors are satisfied with $D_0=D$.

$\{A+(Z-I)+D\}/I$ under the termination strategy, and up to $(A+D)/3I$ under the continuation strategy.

Let us now consider the role of subordinated debt in the strategy of the fairly well-capitalized bank. The manager determines the portfolio according to whether $\{A+(Z-I)+D\}/I$ exceeds the target ratio of k. If $\{A+(Z-I)+D\}/I < k$, the manager does not have any incentive to issue subordinated debt. As Proposition 1 suggests, the manager continues the bad loan. If, conversely, the amount of subordinated debt D is large enough to meet $\{A+(Z-I)+D\}/I \geq k$, the manager may have an incentive to issue subordinated debt because this may provide the bank with the opportunity to meet the target capital requirement. In the face of a bad signal, the manager obviously prefers to terminate the loan.

Proposition 3: Suppose that $\{A+(Z-I)+D\}/I \geq k$ holds. If the signal is bad, the fairly well-capitalized bank issues subordinated debt and terminates the risky loan.

The fairly well-capitalized bank, when allowed to issue subordinated debt, is likely to terminate the bad loan, which is in sharp contrast with Proposition 1. The option to issue subordinated debt diminishes the managerial incentive to continue the bad loan and rectifies the perverse effect of capital requirements on the loan portfolio.

We next turn to the case of the poorly-capitalized bank. Unlike when the bank can raise funds only by collecting deposits, now the bank may be able to attain the target RBC ratio by issuing subordinated debt. The poorly-capitalized bank can attain the target RBC ratio if the amount thus raised is large enough to satisfy $\max[\{A+(Z-I)+D\}/I,\ (A+D)/3I] > k$.

Since it is tedious to analyze all possible cases, we focus on the interesting case when the bank can meet the target only by a combination of issuing subordinated debt and continuing the risky loan, such that $(A+Z-I+D)/I < k \leq (A+D)/3I$. When the signal is bad, the manager would obtain the utility $\alpha(X+Z-2I)$ under the termination and $\alpha(X+Y_L-3I)+(1-\alpha)B$ under the continuation. We obtain the following:

Proposition 4: Suppose that $(A+Z-I+D)/I < k \leq (A+D)/3I$. If the signal is bad, the poorly-capitalized bank issues subordinated debt and continues the risky loan if $(1-\alpha)B > \alpha(Z + I - Y_L)$ {equation (2)}.

Comparing Propositions 2 and 4, we see that even the poorly-capitalized bank is likely to extend the bad loan when allowed to issue subordinated debt. Since the inequality $(A+Z-I+D)/I < k \leq (A+D)/3I$ needs $2(A+D) < 3(I-Z)$ to be met, Proposition 4 is likely to hold when A, Z and D are small. It is plausible to think that D is small if A is small since by regulation Tier 2 capital should be less than Tier 1 capital. Interestingly, when banks are allowed to recapitalize by subordinated debt, banks that are initially fairly-capitalized tend to terminate the bad loan, whereas those that are initially poorly-capitalized tend to continue it.

Recapitalization by subordinated debt, together with the continuation of the bad loan, provides the manager with room to meet the target RBC ratio, which may strengthen the perverse incentive to continue the bad loan. When the accounting discretion is allowed, subordinate debt and the continuation of bad loans can serve as complementary devices for capital watering rather than substitutes.

We briefly discuss the case when the bank becomes insolvent when the risky loan fails, that is, $X - 3I + Y_L + A < 0$. In this case, unless subordinated debt is government guaranteed, the market value of subordinated debt will reflect the insolvency risk, and the decline in the price of the subordinated debt p may contribute to diminishing the managerial incentive to continue the bad loan.

4.3 Empirical implications

The theoretical analyses above suggest a number of testable implications on the relationship between bad loans (as a proportion of total loans) and suitable measures of accounting discretion. To derive definitive empirical implications between them, we need to argue on the signal that the bank received and the type of the bank. First, given that land prices declined and the quality of loans deteriorated during the 1990s, we assume that Japanese banks received the bad signal. Next, from the overview in the Section II, we also assume that Japanese banks were a poorly-capitalized bank.

It is useful to define the RBC ratio by

(3) $$\{A+(1-d)(Z-I)+D\}/(1+2d)I,$$

where d is a dummy taking on zero when the risky loan is liquidated, and one when continued. The RBC ratio depends on the initial capital A, the continuation/termination decision of the bad loan, and the amount of subordinated debt D. The bad loan share is defined by $2d/(1+2d)$, which takes zero when the risky loan is liquidated, and 2/3 when continued.

We first examine the relation between the bad loan share and the market-valued capital ratio. Letting Q denote the bank's stock price per unit of capital evaluated at date 0, the market-valued capital-asset ratio is $\dfrac{AQ}{AQ+(3I-A)+D}$, where the bank asset, the denominator, is the sum of the loan asset funded by bank equity, AQ, deposits, $3I-A$, and subordinated debt D. If the market evaluates the continued risky project at the average, the stock price will be quoted by $Q=\dfrac{Y_a+X-3I+A}{A}$, and the market-valued capital-asset ratio becomes $\dfrac{Y_a+X-3I+A}{Y_a+X+D}$, where note that $Y_a \equiv pY_H+(1-p)Y_L$. If the market detects the continued risky project to be a bad loan almost completely, the market-valued capital ratio will fall and be close to $\dfrac{Y_L+X-3I+A}{Y_L+X+D}$. On the other hand, if the bank liquidates the bad loan, its market-valued capital ratio will be $\dfrac{Z+X-2I+A}{Z+X+I+D}$, which should be smaller than $\dfrac{Y_L+X-3I+A}{Y_L+X+D}$ under the assumption of $Y_L<Z+I$. We obtain the following.

Proposition 5: The bank's market-valued capital ratio is larger under termination than under continuation, given that the banks' continuation of the bad loan is revealed to the stock market.

If either A or Z is small, and D is also small, satisfying $2(A+D)<3(I-Z)$, the RBC ratio is larger under continuation than under termination. Together with this, Proposition 5 directly leads to the following.

Proposition 6: If either A or Z is small, and D is also small, the divergence between the RBC ratio and the market-valued capital ratio is larger under continuation than under termination, given that the bank's continuation of the bad loan is revealed to the stock market.

Importantly, the bad loan and the related accounting discretion leads to the divergence between the RBC ratio and the market-valued capital ratio.[20]

The relationship between the bad loan share and the RBC ratio may not be monotone. The model's direct implication is that the bad loan share is zero at less than k, but jumps to some positive level at k, and stays at that value at more than k. If the effect of the minimum requirement is also taken into account, the relationship will be more complicated and need detailed investigation. If the bank's target is close to the minimum requirement level of 8 %, as Figure V1 illustrates, the bad loan share will be highest just above 8 %, and tends to decline as the RBC ratio rises since banks that achieve more than 8 % can afford to decrease bad loans.

(Figure V1, V2, V3 should be placed around here.)

However, the bank may target a greater RBC ratio than the minimum requirement for some reasons stated in Section III. Actually, the RBC ratios of many samples seem to fall into the interval of $[0.08, k]$. Although the target RBC ratio is not in general observable, the following figures will justify the importance of this argument.[21] As for major banks, the share of the bank-year samples that display the RBC ratio more than 8% but less than 9% is 30.2% as a fraction of the total samples examined in the empirical analysis (172, Table I), those of the RBC

[20] Strictly speaking, even in the absence of accounting discretion, the RBC ratio and the market-valued capital ratio do not in general coincide with each other. Both ratios coincide only when (i) the risk weight for bank assets is equal to the market price of each asset, and (ii) all the items in assets and liabilities are evaluated in market terms. However, Proposition 5 never loses its generality because the divergence is greater when there is accounting discretion than not. We are thankful to Tsutomu Watanabe for pointing out this.

[21] For example, Watanabe (2005) regarded the average of the realized RBC ratios for the 1992-1994 period as the target RBC ratio on the ground that Japanese banks did not find great difficulty in meeting the capital requirements over that interval.

ratio that is more than 9% but less than 10% constitute 38.4% and those of the RBC ratio that is over 10% constitute 30.8%, respectively. Then, as Figure V2 illustrates, the relation may not be monotone. In particular, we derive the positively sloped portion by extending the basic model. See Appendix for the detailed analysis.

The relation between the RBC ratio and the bad loan share is mixed, depending on where *target* RBC ratios lie. Furthermore, the negative correlation, even if it would be observed, does not necessarily support the cosmetic hypothesis. The negative correlation is expected to arise also when capital requirements work well. If banks are well disciplined by capital requirements, as Figure V3 illustrates, banks with greater RBC ratios tend to display smaller bad loan shares (e.g. Gerard and Pyle (1991), Giammarino et al (1993), and others). Unfortunately, there are few data of banks whose RBC ratio is less than 8 % (only 0.5% in our sample) and the result would make interpretation difficult. Overall, it follows that, without any other measures added, the correlation between the bad loan share and the RBC ratio is suggestive of the evidence of accounting discretion only if it is positive.

The above argument allows us to posit the following three hypotheses in order to test our "accounting discretion hypothesis". The first hypothesis, based on Proposition 5, is that the correlation between the market-valued capital ratio and the bad loan share is negative, given that the banks' behavior of rolling over bad loans is revealed to the stock market (Hypothesis 1). The second one, based on Proposition 6, is that the correlation between the difference between the RBC ratio and the market-valued capital ratio and the bad loan share is positive (Hypothesis 2). The third one, based on Proposition 4, is that the correlation between subordinated debt and the bad loan share is positive (Hypothesis 3).

We derive other testable implications from the theoretical findings. The theoretical analysis, as a whole, implies that the bank is more likely to extend the bad loan to the extent that the bank capital A or the liquidation value of the bad loan Z is small. The bank capital A plays a disciplinary role of prudential management. The forth hypothesis is that the correlation between the bank's capital and the bad loan share is negative (Hypothesis 4). A change in the liquidation value Z may be closely associated with changes in land prices, implying that banks has more perverse incentive of extending bad loans as land prices decline. The fifth hypothesis is that the correlation between land prices and the bad loan share is negative (Hypothesis 5).

5. Empirical Analysis

5.1 Data

Our main source for banks' balance sheet data is the *Nikkei Financial Statement Data of Banks (CD-ROM version, 2000)*. This data set covers all Japanese banks, including city banks, long-term credit banks, trust banks, and regional banks. Our sample consists of those banks that were subject to the Basel capital standards. Banks are divided into major banks (city banks, long-term credit banks and trust banks) which operate nation-wide and regional banks which operate in and around the prefecture where their head office is located.

The sample period is from March 1991 to March 1999, i.e. the period following the collapse of the bubble in land prices. When two or more banks are involved in a merger or acquisition, we exclude these banks for that year and the following year from our sample because of the lag structure in the estimated equation.

Data on the RBC ratio and its components are collected from each bank's financial statements. For stock price data, we use the *Kabuka* (*Stock Price*) CD-ROM, 2002, and *Kabuka Soran* (*List of Stock Prices*), both published by Toyo Keizai Shimposha. For land prices, we use the posted price index for land for commercial use for the prefecture where a bank's head-office is located. This land price index is published by the Ministry of Land, Infrastructure and Transport.

5.2 Estimation methods

We test the empirical implications of the theoretical hypotheses by estimating the relationships between the bad loan share and measures relevant to the discretionary accounting controlling for possible other determinants including bank characteristics variables, the recovery rate of bad loans, and macroeconomic shocks.

The accounting discretion hypothesis implies that accounting variables are "manipulated", and as the theoretical model suggests, it is natural to think that banks choose the loan portfolio and accounting variables simultaneously.[22] We try to avoid such an endogeneity problem by using the following two methods. First, we apply OLS to the following equation:

$$(4) \qquad Bad\ Loan_{i,t} = \beta_1 Fundamentals_{i,t-1} + \beta_2 Account_{i,t-1} + f_i + Year_t + \varepsilon_{i,t},$$

where one-year lagged values of the explanatory variables are used. Secondly we apply a dynamic panel GMM to the following Equation:

$$(5) \qquad Bad\ Loan_{i,t} = \beta_0 Bad\ Loan_{i,t-1} + \beta_1 Fundamentals_{i,t-1} + \beta_2 Account_{i,t} + f_i + Year_t + \varepsilon_{i,t},$$

where the current values of the accounting discretion measures are used as explanatory variables and their one-year lagged values as well as two- and more- year lagged values of the dependent variables are used as instrumental variables (e.g., Arellano and Bond, 1991).

We explain variables used in the estimation. As a dependent variable, we use loans to the real estate, the construction, and the finance sector as a proportion of total loans, as a measure of bad loans, denoted by $Bad\ Loan$.[23] Several reasons justify our choice of bad loans. First, real estate loans are inherently risky because real estate prices tend to move in the same direction and it is therefore difficult for banks to diversify away the credit risk associated with changes in real estate prices. Second, the profitability of real estate loans declined after the collapse of the asset bubble in the early 1990s. Third, as recent bank disclosure reports have shown, these three sectors accounted for a major fraction of disclosed non-performing loans.[24] Fourth, as Caballero et al. (2003) point out, during the 1990s the amount of subsidized lending increased markedly for the real estate and the construction sector. Finally, we include loans to the finance sector because Japanese banks often used their financial subsidiaries as dummy companies to lend to

[22] Watanabe(2005) , in estimating the effects of tightening capital regulation on the loan growth, proposes an approach using appropriate instruments in order to avoid the simultaneity that will happen between the loan growth and accounting variables

[23] We do not use the growth rate of bad loans as the dependent variable in order to avoid the identification problem associated typically with the loan supply function.

[24] According to the Nihon Keizai Shinbun (June 13, 2001), among the total of non-performing loans, real estate accounted for 32.8 %, construction for 9.6 %, and finance for 7.1 %.

real estate companies and these subsidiaries belonged to the finance sector. In addition, this choice of the dependent variable has an advantage that we work out the identification problem associated with the loan supply function because the bad loan share is controlled only by banks. We have access to the data for disclosed non-performing loans by individual banks but do not use it because of its low reliability. It was widely recognized that, over the sample period, the weak bank governance by the financial authority allowed banks to understate the amount of non-performing loans.

We next turn to the explanatory variables. *Fundamentals* consist of the bank characteristics variables including ROA, the operating profit as a proportion of total assets, and $ASSET$, the logarithm of total assets as well as $PLAND$, the rate of change in prefectural land price indexes.

Since the bank's true capital is likely to be positively related to the past bank's earnings and that the bank's earnings is likely to be correlated over time, Hypothesis 4 predicts that the coefficient on *ROA* is expected to be negative. Bank size measured by $ASSET$ may affect the share of bad loans via several routes. Large banks can diversify their loan portfolios and avoid the concentration of loans to particular industries, and particularly real estate-related industries. On the other hand, larger banks that are tempted to anticipate the government's "too-big-to-fail" policy may be more inclined to extend bad loans. The coefficient on $ASSET$ is ambiguous. To control for other unobserved bank characteristics, we estimate a fixed bank effect model by including a bank dummy, f_i.[25]

As the definition of bad loans implies, $PLAND$ should capture the profitability (including the recovery rate) of bad loans. Thus profit-motivated banks are supposed to shift away from real estate-related loans as land prices decline. On the other hand, as Hypothesis 5 suggests, banks may be more likely to extend bad loans as land prices fall. Therefore, the coefficient on *PLAND* is expected to be negative to the extent that banks deviate from the profit motive.

Finally, macroeconomic variables that may affect a bank's loan portfolio are all captured by a year dummy, $Year$.

[25] We have tested the null hypothesis that bank dummies are jointly zero and have obtained results that reject the null in most of the equations.

5.3 Measures of accounting discretion

$Account$ represents variables relevant to accounting discretion. Following the theoretical findings, we construct several measures of accounting discretion. The first variable is the RBC ratio, denoted by RBC. If there is no accounting discretion and capital requirements work well to discipline bank managers, the coefficient of RBC is expected to be negative. The literature on the empirical analysis of capital requirements typically uses the RBC ratio as a fundamental explanatory variable, including Hall (1993), Peek and Rosengren (1995), Montgomery(2005), Watanabe(2005), and others.

The second variable is the market-valued capital ratio, denoted by MVC,. Though this variable is not a measure of accounting discretion, we include it to test Hypothesis 1, positing that the coefficient of MVC is expected to be negative as long as the stock market can see through the bank asset quality.

The third variable relevant to accounting discretion is the difference between the market-valued capital ratio and the risk-based capital ratio, denoted by $DISCRET$, which we believe to be a most appropriate measure of account discretion. As Proposition 6 predicts, the divergence between these two variables can be a proxy to the degree of accounting discretion. Hypothesis 2 predicts that the coefficient of $DISCRET$ is expected to be positive.

The fourth variable is subordinated debt as a proportion to risk-adjusted assets, denoted by *SD*. Because almost all subordinated debts were issued for double-gearing in Japan, as we stated above, this is a direct measure of accounting discretion. Hypothesis 3 predicts that the coefficient on *SD* is expected to be positive.

With the above four variables, we can test whether banks tried to manipulate the total RBC ratio or its Tier 2 capital. We test also to what extent banks were constrained by Tier 1 capital requirement. In doing so, we utilize the following three variables. The first variable is Tier 1 divided by risk-adjusted assets, denoted by *TIER1*. Liquidation of bad loans reduces Tier 1 capital by decreasing earnings. Because banks that are more constrained by Tier 1 capital are more likely to extend bad loans, the coefficient on *TIER1* is expected to be negative. The second variable is general loan loss provisions divided by risk-adjusted assets, denoted by *LOANLOSS*.

General loan loss provisions reduce Tier 1 capital by decreasing earnings, while they increase Tier 2 capital. Banks that are more severely constrained by Tier 1 capital requirement are likely to understate *LOANLOSS* and at the same time to extend bad loans. The coefficient on *LOANLOSS* is expected to be negative. The third variable is unrealized capital gains on securities divided by risk-adjusted assets, denoted by *GAIN*. A realization of capital gains on securities improves Tier 1 capital by increasing earnings, while it reduces Tier 2 capital under the Japan-specific rule that allows banks to count 45% of unrealized capital gains on securities as a part of Tier 2 capital. Banks with a larger *GAIN* are less constrained by Tier 1 capital, but may be more constrained by Tier 2 capital. The coefficient on *GAIN* is expected to be negative (positive) to the extent that banks that are more constrained by Tier 1 (Tier 2) capital extend bad loans.

Finally, we use dummy variables for the minimum capital requirements: *REQ0* for the RBC ratios less than 8%, *REQ1* for those equal to or more than 8% but less than 9%, *REQ2* for those equal to or more than 9% but less than 10%.We set the benchmark as the RBC ratios of 10% or more. The coefficient on each of dummy variables measure the average difference of *Bad Loan* from those banks with RBC ratios equal to or more than 10% .The construction of those dummies was basically intended to capture the notion that the closer the bank's RBC ratio relative to the minimum requirement was, the more likely the bank would extend bad loans in order to mitigate their capital constraint. This idea is based on the premise that the bank's target RBC ratio is close to the minimum requirement level of 8%. If that was the case, the coefficients of the dummy variables are expected to be positive, as Peek and Rosengren (2005) point out. However, if the banks' targets were on average greater than 10%, in terms of Figure V2, they are expected to be negative. The coefficients on those dummy variables provide some valuable information on banks' target RBC ratio as long as the accounting discretion hypothesis was valid.

Table I reports descriptive statistics of bank characteristics. For all banks, the average value of *Bad Loan* is over a quarter of the total loans. The average value of *RBC* is over 9%, while that of *MVC* is less than the average value of *RBC*. The difference between the two ratios, *DISCRET* , results in 2.55%, which suggests that the degree of accounting discretions were substantial. Turning to the components of regulatory capital, we see that the average value of *TIER2* is about a third of *RBC*. The average values of *SD* and *GAIN* suggest that these items occupy a substantial portion (about 15% for each item) of the RBC ratio. On the other hand, *LOANLOSS* is very small.

Table 1 also shows descriptive statistics by bank type. The assets of major banks were about ten times as large as those of the regional banks. The averages of *ROA* were almost the same across the bank type. However, *Badloan*, was higher for major banks: that was about a third for major banks and a quarter for regional banks.

The levels of *RBC* were almost the same, but its compositions were substantially different across the bank type. Notably, major banks displayed a lower *TIER1* and a higher *TIER2*, and in particular a higher *SD* than regional banks did. For major banks, *SD* accounts for a dominant share of Tier 2 capital, but not for regional banks. On the other hand, regional banks displayed a lower *MVC*, resulting in a higher *DISCRET*.

(Table I should be placed around here.)

Table II reports the pair-wise correlations. For all banks, *MVC* is positively but only weakly correlated with *RBC*. Note that the correlation should be strongly positive if there were no discretionary accounting practices. *MVC* is negatively correlated with *DISCRET* and with *SD*, which is consistent with our accounting discretion hypothesis. *RBC* is positively correlated with *DISCRET*, suggesting that *RBC* is a disguised measure of bank capital. Finally, *DISCRET* is positively correlated with *SD*.

For major banks, *MVC* is negatively correlated with *RBC*, suggesting that discretionary accounting practices were prevailing. *MVC* is strongly and negatively correlated with *DISCRET* and with *SD*, while *RBC* is positively correlated with *DISCRET* and *SD*. Finally, *DISCRET* is strongly and positively correlated with *SD*, suggesting that subordinated debt was a major tool for accounting dressing for major banks.

For regional banks, *MVC* is, unlike major banks, positively correlated with RBC. MVC is negatively correlated with *DISCRET* and *SD*. *RBC* is positively correlated with *DISCRET* but not as strongly as for major banks. *RBC* is negatively correlated with *SD*, unlike major banks. The correlation between *DISCRET* and *SD* is positive but the coefficient is smaller than major banks. Though regional banks also seem to have engaged in discretionary accounting (given a sizable *DISCRET*), the accounting tools available for them seem to have been limited relative to major banks. Overall, these statistics suggest that regulatory authorities have exercised greater forbearance toward major banks than regional banks by allowing the former to recapitalize using subordinated debt.

(Table II should be placed around here.)

5.4 Baseline Results

Table III presents the estimation results for all banks. For OLS estimates, White's heteroskedasticity-consistent standard errors are reported in parentheses. For GMM estimates, we use DPD package for OX (Doornik, et al., 2002) and report finite sample corrected standard errors.

(Table III should be placed around here.)

Columns 1 to 4 show OLS estimation results. In all of the specifications, the coefficients on *ROA* are negative and significant, which is consistent with Hypothesis 4. The coefficients on *PLAND* are also negative and significant, which is consistent with Hypothesis 5. These results suggest that banks had the perverse incentive of extending unprofitable loans.

In Column 1, the coefficient on *RBC* is negative but not significant, which seems to show that capital requirements did not work well. The coefficient on *MVC* is negative and significant, which is consistent with Hypothesis 1, suggesting that stock market participants saw through the market value of bank assets. In Column 2, the coefficient on *DISCRET* is positive and significant, which is consistent with Hypothesis 2. In Column 3, the coefficient on *SD* is positive and significant, which is consistent with Hypothesis 3. Looking at the other components, *TIER1* is negative and significant, while neither *GAIN* nor *LOANLOSS* is significant. In Column 4, none of the RBC dummies (*REQ0*, *REQ1*, and *REQ2*) are significant. The OLS estimations are consistent with all of the five hypotheses, supporting the accounting discretion hypothesis. The coefficient on *TIER1* suggests that banks were constrained by Tier 1 capital requirement, but the coefficient on *GAIN* or *LOANLOSS* does not.

Columns 5 to 8 show GMM estimations. The coefficients on *PLAND* are again negative, though the coefficient of only one specification (Column 7) is significant. The coefficients on *ROA* are insignificant. In Column 5, the coefficient on *RBC* is not significant. The coefficient on *MVC* is negative but not significant. In Column 6, the coefficient on *DISCRET* is positive and significant. In Column 7, the coefficient on *SD* is positive but only marginally significant (the p-value is 10.3%). The coefficient on *GAIN* is positive and significant, while the coefficients on *LOANLOSS* and *TIER1*are insignificant. The GMM estimations are consistent with three of the five accounting discretion hypotheses. No result shows that banks were constrained by Tier 1 capital requirement, but rather the coefficient on *GAIN* shows that banks that extended more bad loan chose to account for unrealized capital gains of securities rather than to sell them, suggesting that they were constrained more by Tier 2 capital than Tier 1 capital. This finding is somewhat different from Shrieves and Dahl (2003) who reported that Japanese banks conducted accounting manipulation in order to meet Tier 1 capital requirement. In Column 8, the coefficients on *REQ1* and *REQ2* are negative and significant, showing that banks extended bad loans as their RBC ratios rose beyond the capital requirement. This result contradicts with the argument for a disciplinary role of capital requirements. Our result suggests that banks set their targets at 10% or more and tried to inflate regulatory capital by extending bad loans toward their targets. [26]

5.5 Estimation Results by Bank Type

[26] Our result contradicts also with the findings of Peek and Rosengren (2005). The difference of estimated results might come from the difference of the data sets. Our sample includes only banks that were subject to the minimum capita requirements, but Peek and Rosengren (2005)'s sample includes domestically-operated banks, who were subject to the minimum capital regulations of 4%.

Descriptive statistics presented in Table II suggest that the government exercised greater forbearance toward major banks than regional banks. In order to deal with the possible heterogeneity between major and regional banks, we conduct estimations by dividing the full sample into major banks and regional banks.

Table IV represents estimations for major banks. The coefficients on *ROA* are negative and significant for OLS, while they are insignificant for GMM. The coefficients on *PLAND* are negative and significant both for OLS and GMM, which is consistent with Hypothesis 5. The coefficients on *RBC* are positive for both OLS and GMM and significant for OLS, suggesting the perverse response of major banks to capital requirements. The coefficients on *MVC* are negative and significant only for OLS, which is consistent with Hypothesis 1. The coefficients on *DISCRET* are positive and significant for both OLS and GMM, which is consistent with Hypothesis 2. The coefficients on *SD* are positive and significant for both OLS and GMM, which is consistent with Hypothesis 3. The estimation results as a whole suggest that the accounting discretion has been made particularly by major banks. RBC dummies are negative and insignificant for OLS, but negative and significant for GMM. This result is consistent with our hypothesis that major banks set their targets at a higher level than the minimum requirement (Figure V2).

The result on *LOANLOSS* for OLS suggests that major banks were constrained by Tier 1 capital, but any other results on *LOANLOSS* (for GMM), *TIER1* and *GAIN* (for OLS and GMM) do not. The coefficients on *GAIN* suggest that major banks tried to overstate Tier 2 capital rather than Tier 1 capital.

Table V represents estimations for regional banks. The coefficients on *ROA* are positive for all specifications, and significant for only two specifications of the GMM estimations. The positive coefficient is inconsistent with Hypothesis 4. The coefficients on *PLAND* are mixed and not significant for any specification, which is inconsistent with Hypothesis 5. The coefficients on *RBC* are not significant for OLS or GMM. The coefficients on *MVC* are negative for both, and significant only for OLS, which is consistent with Hypothesis 1. The coefficients on *DISCRET* are positive for OLS and GMM, and significant only for OLS. The coefficients on *SD* are positive and significant for OLS, but negative and significant for GMM. The estimations for regional banks as a whole do not seem to support the accounting discretion hypothesis. The contrasting results between major and regional banks suggest that the Japanese regulatory authorities pursued a "too-big-to-fail." The coefficients on RBC dummies are insignificant for any specification. No coefficient on *LOANLOSS*, *TIER1* and *GAIN* suggest that regional banks were constrained by Tier 1 capital.

6. Conclusions

In this paper we provide a theoretical and empirical analysis to explain the hypothesis that a lax enforcement of capital adequacy requirements, accompanied with discretionary accounting practices, promoted banks to supply loans to almost insolvent firms and consequently prolonged the non-performing loan problem in Japan. We found empirical evidence to support that the government responded to the perverse behavior of banks by allowing the discretionary enforcement of minimum capital requirements, which softened the banks' capital constraints and contributed to the increase in bad loans.

How the accounting problem was crucial was revealed by the financial reform, so-called, "Takenaka Plan", that started in the end of 2002 and was made to accelerate the disposal of non-performing loans. Takenaka Plan was remarkable in that it was the first one in Japan that attempted to restore the confidence in the Japanese banking sector by requesting banks to improve bank governance. Particularly, Takenaka Plan strongly requested banks to improve the transparency of financial information by stopping accounting discretion in meeting minimum capital requirements. By 2005, non-performing loans drastically declined and the financial reform was successful.[27] Findings of this study and the financial reform taken by the Japanese government tell us how the lax accounting practice weakens bank governance and leads to

[27] Sakuragawa and Watanabe (2007a) (2007b), using event study methodology, study how the stock market evaluates the Japanese financial reform, so-called, "Takenaka Plan". Their estimates show that market participants seem to perceive that the supervisory policy and the bank governance gradually improved over time.

serious consequences of the banking problem.

Appendix: The positive relationship between the RBC ratio and the bad loan share

We extend the original model in two respects in order to derive the above relationship. First, the bank potentially makes one safe loan and two risky loans, each of which needs I units of funds at date 0. Second, the manager is fired and loses private benefits with 100 % when the disclosed risk-based-capital (RBC) ratio is short of the minimum capital requirement of 8% , and with $100\times q$ % when it is short of the target ratio of $100\times k$ % $(k > 0.08)$.

Focus on the case when $\frac{A+2(Z-I)}{I} < 0.08 < \frac{A+Z-I}{3I} < \frac{A}{5I}$, where $\frac{A+2(Z-I)}{I}$ is the disclosed RBC ratio when the bank terminates the both of the risky loans, $\frac{A+Z-I}{I}$ is the one when the bank terminates only one of the risky loan, and $\frac{A}{5I}$ is the one when the bank continues both risky loans. Accordingly, the bank manager receives the expected utility of $\alpha(X+2Z-3I)$, $\alpha(X+Z+Y_L-4I)+p(1-\alpha)B$, and $\alpha(X+2Y_L-5I)+(1-\alpha)B$, respectively. The following is established.

Proposition 2': If the signal is bad, the poorly-capitalized bank continues both of the risky loans if

$$\min\{p,1-p\}\times(1-\alpha)B > \alpha(Z+I-Y_L)\,, \tag{2'}$$

while it continues only one of the risk loan if

$$p(1-\alpha)B > \alpha(Z+I-Y_L) > (1-p)(1-\alpha)B\,. \tag{2''}$$

When B is high, the inequality (2') is likely to be met, and when B is low, inequalities (2") are likely to be met. There may be a case when some banks with low B terminate only one risky loan, having the RBC ratio that is more than 8% but less than $100\times k$ % and the bad loan ratio of 2/3, and the other banks continue both risky loans, having the RBC ratio that is more than $100\times k$ % and the bad loan ratio of 4/5. When B differs among banks, there emerges a positive relationship between the RBC ratio and the bad loan share across banks.

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Figure1

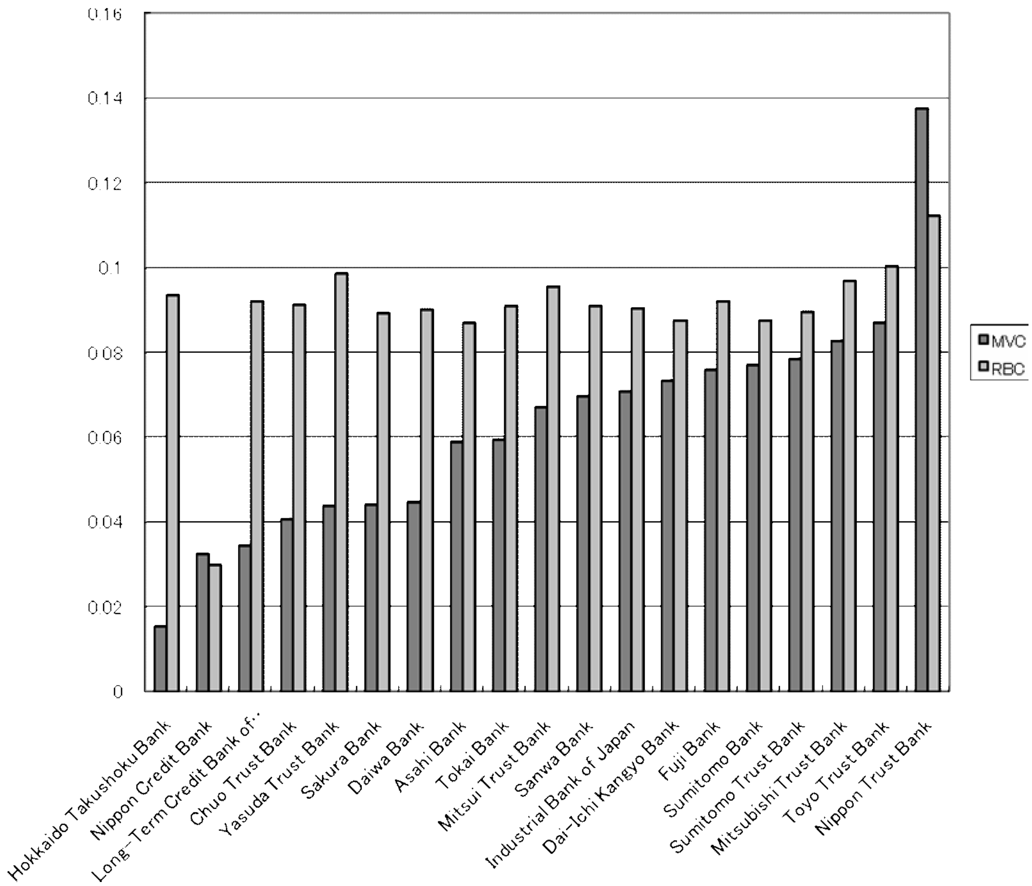

Figure I

The risk-based capital ratio (RBC) and the market-valued capital ratio (MVC) for Japan's major banks as of March 1997. Market-valued capital is the number of stocks multiplied by the end-of-fiscal-year stock price. MVC is its ratio of the market-valued capital to the sum of the market-valued capital and total debt. Source: Financial statement of banks and Kabuka [Stock Price] CD-ROM 2002 published by Toyo Keizai Shimposha.

Figure2

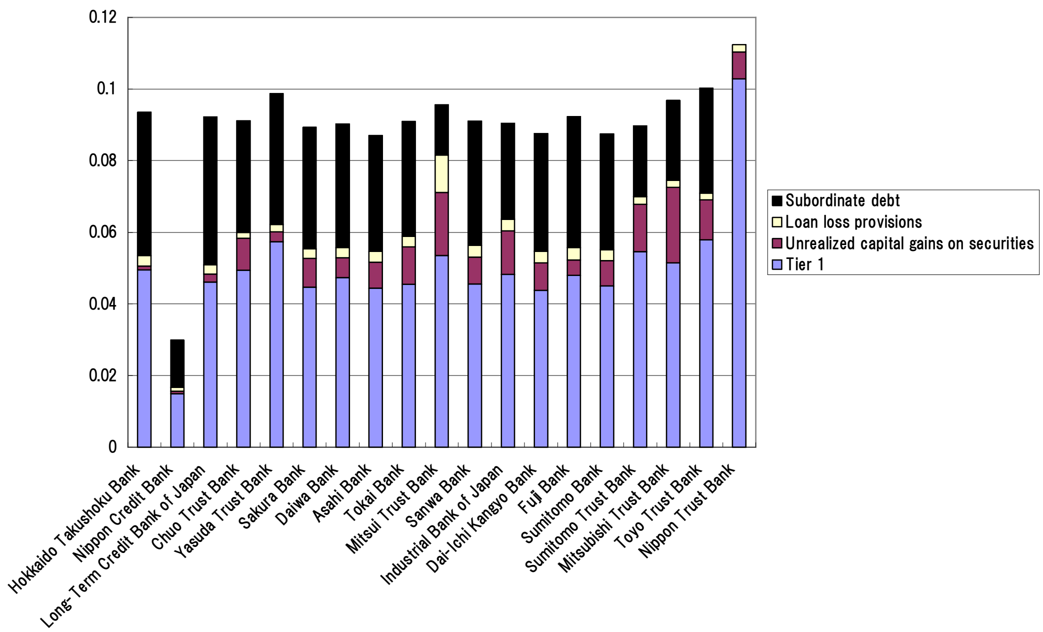

Figure II

Components of the risk based capital (RBC) ratio of Japan's major banks as of March 1997. The major components of capital as defined by the Basel capital standards as a proportion of risk-adjusted asset are depicted. Source: Financial statements of banks.

Figure3

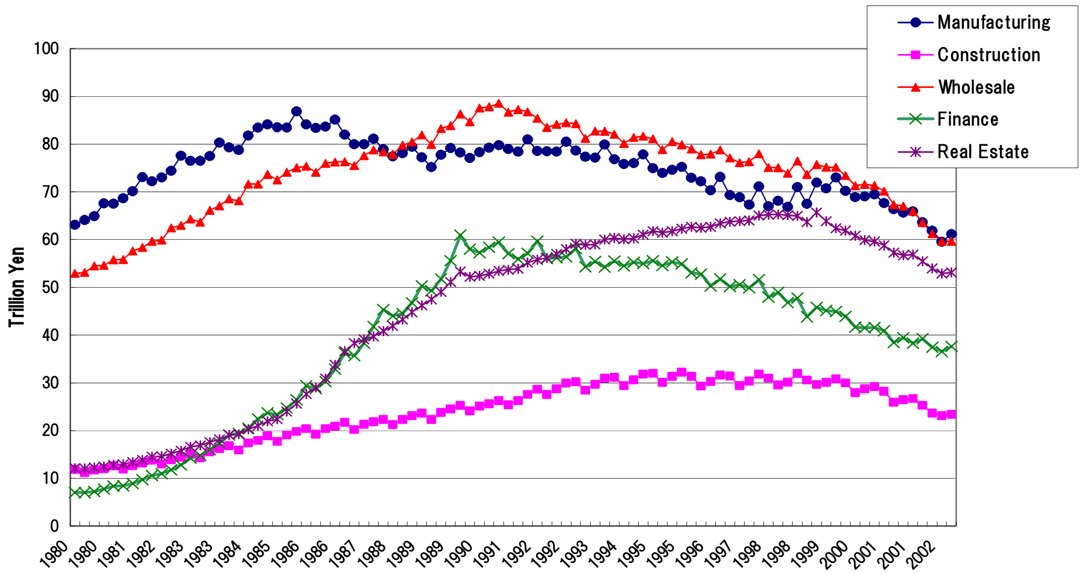

Figure III

Loans outstanding of domestically-licensed Japanese banks, by industry of borrowing firms. Overdrafts before March 1993 were not included in the original data source and hence estimated by the authors to obtain consistent time series data. Source: Bank of Japan, www.boj.or.jp

Figure4

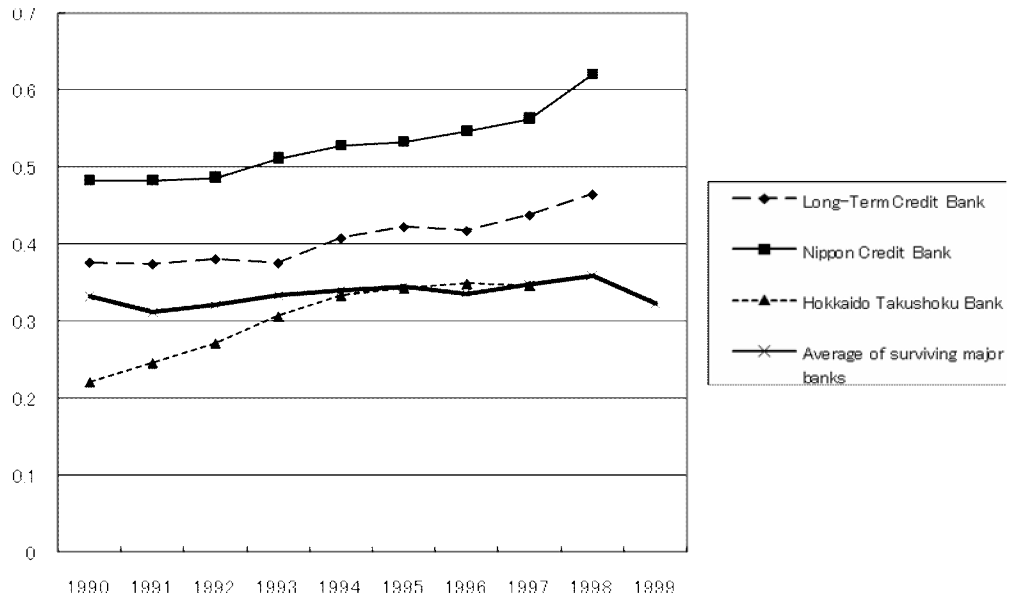

Figure IV

Share of bad loans in total loans: failed major banks and the average of surviving major banks. Bad loans are defined as the sum of loans outstanding to the real estate, construction, and financial industries. Source: Financial statements of banks.

Figure5

Figure V 1: Target is near 8%

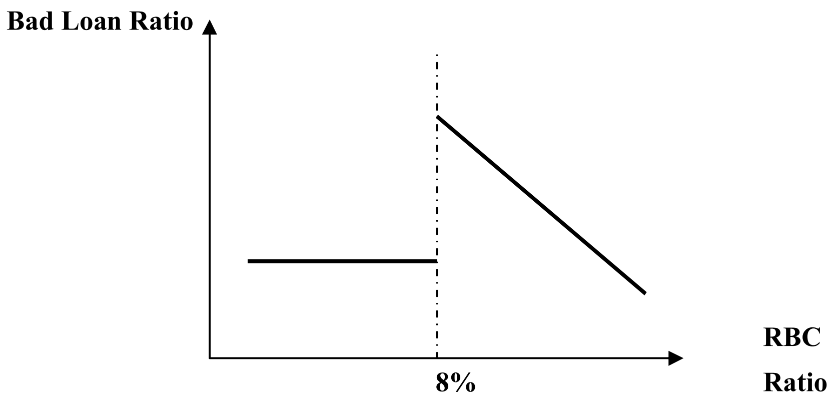

Figure V 2   Target exceeds   8%

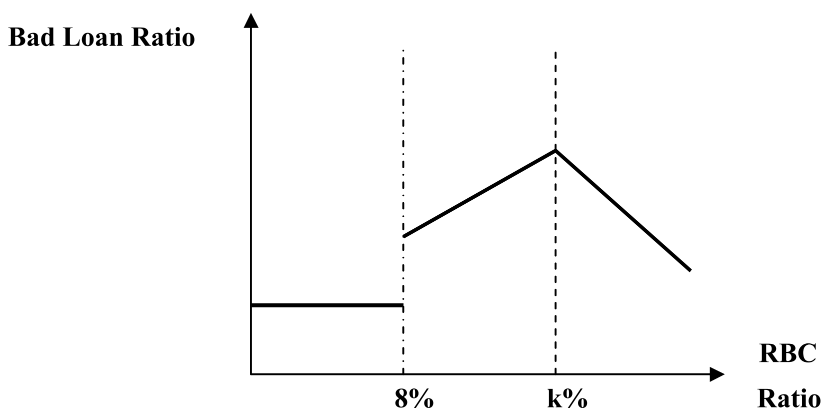

Figure V 3   Discipline Hypothesis

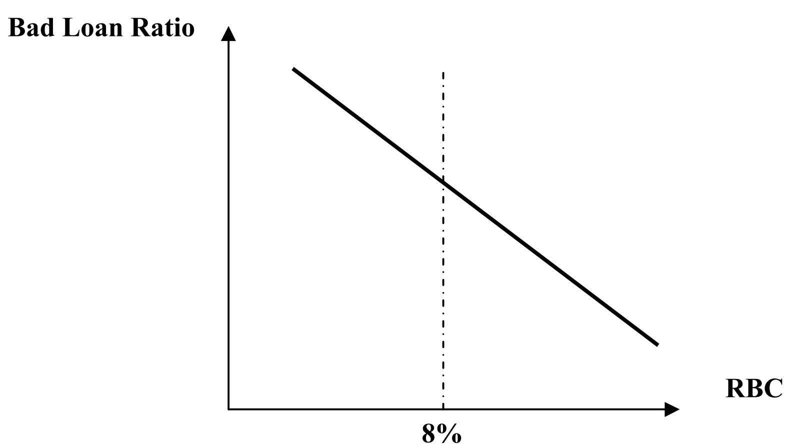

TABLE I
Descriptive statistics: 1991-1999

	All banks		Major banks		Regional banks	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std.Dev.
Bad loan share (Bad Loan)	0.2590	0.0785	0.3450	0.0904	0.2294	0.0453
Return on assets (ROA)	0.0058	0.0026	0.0058	0.0039	0.0058	0.0020
Logarithm of assets(ASSET)	15.3559	1.1055	16.8584	0.9127	14.8390	0.5587
RBC ratio(RBC)	0.0939	0.0103	0.0961	0.0130	0.0932	0.0090
RBC<8% Dummy (REQ0)	0.0104	0.1016	0.0058	0.0762	0.0120	0.1090
8%<=RBC<9% Dummy (REQ1)	0.3601	0.4804	0.3023	0.4606	0.3800	0.4859
9%<=RBC<10% Dummy (REQ2)	0.4137	0.4929	0.3837	0.4877	0.4240	0.4947
Market-valued capital ratio(MVC)	0.0684	0.0235	0.0817	0.0304	0.0638	0.0186
RBC ratio - Market-valued capital ratio(DISCRET)	0.0255	0.0240	0.0143	0.0343	0.0294	0.0176
Tier1	0.0608	0.0120	0.0548	0.0119	0.0629	0.0114
Tier2	0.0332	0.0096	0.0413	0.0095	0.0304	0.0079
Unrealized capital gains on securities(GAIN)	0.0148	0.0090	0.0140	0.0107	0.0151	0.0083
Loan loss provisions (LOANLOSS)	0.0034	0.0013	0.0036	0.0017	0.0034	0.0010
Subordinate debt(SD)	0.0146	0.0112	0.0233	0.0139	0.0116	0.0082
No. of obs.	672		172		500	

TABLE II
Correlation Matrices

A.All Banks

	MVC	RBC	REQ0	REQ1	REQ2	DISCRET	TIER1	TIER2	GAIN	LOANLOSS	SD
MVC	1.000										
RBC	0.178	1.000									
REQ0	-0.082	-0.253	1.000								
REQ1	-0.087	-0.608	-0.077	1.000							
REQ2	-0.040	0.018	-0.086	-0.630	1.000						
DISCRET	-0.907	0.254	-0.028	-0.175	0.048	1.000					
TIER1	0.109	0.638	-0.113	-0.369	-0.040	0.166	1.000				
TIER2	0.053	0.271	-0.129	-0.188	0.069	0.064	-0.568	1.000			
GAIN	0.402	0.213	-0.102	-0.256	0.140	-0.304	0.019	0.204	1.000		
LOANLOSS	-0.055	0.249	-0.040	-0.111	-0.064	0.161	0.093	0.149	-0.156	1.000	
SD	-0.252	0.011	-0.022	0.072	-0.041	0.253	-0.521	0.663	-0.579	0.108	1.000

B.Major Banks

	MVC	RBC	REQ0	REQ1	REQ2	DISCRET	TIER1	TIER2	GAIN	LOANLOSS	SD
MVC	1.000										
RBC	-0.105	1.000									
REQ0	-0.125	-0.390	1.000								
REQ1	0.039	-0.520	-0.050	1.000							
REQ2	0.031	-0.155	-0.060	-0.519	1.000						
DISCRET	-0.926	0.473	-0.037	-0.232	-0.086	1.000					
TIER1	0.072	0.709	-0.258	-0.271	-0.296	0.205	1.000				
TIER2	-0.234	0.481	-0.211	-0.372	0.158	0.390	-0.277	1.000			
GAIN	0.579	-0.094	-0.096	-0.060	0.101	-0.549	-0.039	-0.080	1.000		
LOANLOSS	-0.071	0.270	-0.114	-0.087	-0.071	0.165	0.040	0.317	-0.178	1.000	
SD	-0.574	0.349	-0.056	-0.181	0.038	0.641	-0.167	0.684	-0.767	0.206	1.000

C.Regional Banks

	MVC	RBC	REQ0	REQ1	REQ2	DISCRET	TIER1	TIER2	GAIN	LOANLOSS	SD
MVC	1.000										
RBC	0.350	1.000									
REQ0	-0.067	-0.221	1.000								
REQ1	-0.127	-0.662	-0.086	1.000							
REQ2	-0.065	0.110	-0.095	-0.672	1.000						
DISCRET	-0.877	0.142	-0.043	-0.205	0.125	1.000					
TIER1	0.329	0.722	-0.096	-0.456	0.033	0.022	1.000				
TIER2	-0.073	0.104	-0.116	-0.101	0.077	0.131	-0.613	1.000			
GAIN	0.356	0.424	-0.111	-0.348	0.156	-0.160	0.023	0.451	1.000		
LOANLOSS	-0.101	0.220	-0.012	-0.123	-0.060	0.219	0.175	-0.003	-0.135	1.000	
SD	-0.395	-0.383	0.006	0.287	-0.067	0.221	-0.648	0.495	-0.527	-0.039	1.000

TABLE III
The determinants of bad loans for all banks

Estimation	OLS				GMM			
Equation No.	1	2	3	4	5	6	7	8
Badloan					0.548 **	0.546 **	0.509 **	0.555 **
					(0.078)	(0.077)	(0.091)	(0.079)
Return on assets(ROA)	-0.773 *	-0.802 *	-1.100 **	-0.812 *	-0.175	-0.122	-0.060	0.051
	(0.469)	(0.464)	(0.463)	(0.458)	(0.422)	(0.396)	(0.516)	(0.466)
Rate of increase in land prices(PLAND)	-0.025 **	-0.025 **	-0.027 **	-0.023 **	-0.014	-0.012	-0.021 *	-0.017
	(0.011)	(0.011)	(0.011)	(0.011)	(0.013)	(0.011)	(0.011)	(0.011)
Logarithm of assets(ASSET)	-0.052 **	-0.054 **	-0.017	-0.052 **	-0.034 **	-0.028	-0.051 **	-0.038 **
	(0.013)	(0.013)	(0.013)	(0.013)	(0.017)	(0.017)	(0.017)	(0.019)
RBC ratio(RBC)	-0.028				0.340			
	(0.124)				(0.230)			
RBC<8% Dummy (REQ0)				-0.001				-0.013
				(0.004)				(0.012)
8%<=RBC<9% Dummy (REQ1)				0.002				-0.012 **
				(0.003)				(0.006)
9%<=RBC<10% Dummy (REQ2)				0.001				-0.008 **
				(0.002)				(0.004)
Market-valued capital ratio(MVC)	-0.134 **				-0.116			
	(0.052)				(0.108)			
RBC ratio - Market-valued capital ratio(DISCRET)		0.119 **				0.181 **		
		(0.050)				(0.090)		
Tier1			-0.301 **				-0.012	
			(0.144)				(0.195)	
Unrealized capital gains on securities(GAIN)			-0.297				1.054 **	
			(0.217)				(0.461)	
Loan loss provisions(LOANLOSS)			-1.864				0.079	
			(1.188)				(1.402)	
			0.509 **				0.507	

Subordinate debt(SD)			(0.178)				(0.311)	
No. of obs.	676	676	676	676	649	649	649	649
No. of banks	93	93	93	93	92	92	92	92
Adjusted R^2	0.969	0.969	0.971	0.969				
AR(2) test					-0.030	-0.171	-0.008	-0.142
Sargan test					54.44	52.97	49.58	53.89

White's heteroskedasticity-consistent standard errors are reported in parentheses.
**, * significant at 5 percent and 10 percent, respectively.
Instrumental variables are two-year and more lagged values of Badloan and one-year lagged values of the explanatory variables.

TABLE IV
The determinants of bad loans for major banks

Estimation	OLS				GMM			
Equation No.	1	2	3	4	5	6	7	8
Badloan					0.397 *	0.434 **	0.175	-0.137
					(0.239)	(0.177)	(0.284)	(0.433)
Return on assets(ROA)	-1.380 *	-1.322 *	-1.778 **	-1.258 *	0.806	0.940	-0.144	-0.569
	(0.702)	(0.689)	(0.669)	(0.705)	(0.780)	(0.761)	(0.520)	(0.712)
Rate of increase in land prices(PLAND)	-0.064 **	-0.068 **	-0.070 **	-0.064 **	-0.036 **	-0.038 **	-0.040 **	-0.043 **
	(0.026)	(0.027)	(0.025)	(0.028)	(0.011)	(0.012)	(0.016)	(0.017)
Logarithm of assets(ASSET)	0.047	0.043	0.057 *	0.049	0.027	0.031	-0.012	0.013
	(0.030)	(0.028)	(0.030)	(0.030)	(0.022)	(0.021)	(0.026)	(0.025)
RBC ratio(RBC)	0.523 *				0.570			
	(0.278)				(0.359)			
RBC<8% Dummy (REQ0)				-0.004				-0.037
				(0.009)				(0.031)
8%<=RBC<9% Dummy (REQ1)				-0.008				-0.016 **
				(0.006)				(0.007)
9%<=RBC<10% Dummy (REQ2)				-0.003				-0.008 **
				(0.004)				(0.003)
Market-valued capital ratio(MVC)	-0.186 *				-0.316			
	(0.109)				(0.258)			
RBC ratio - Market-valued capital ratio(DISCRET)		0.218 **				0.394 **		
		(0.110)				(0.188)		
Tier1			-0.084				-0.798	
			(0.451)				(0.998)	
Unrealized capital gains on securities(GAIN)			-0.250				1.235 **	
			(0.457)				(0.550)	
			-3.495 **				2.803	

Loan loss provisions(LOANLOSS)			(1.451)				(3.549)	
			0.949 **				0.755 *	
			(0.390)				(0.440)	
Subordinate debt(SD)								
No. of obs.	172	172	172	172	163	163	163	163
No. of banks	23	23	23	23	22	22	22	22
Adjusted R^2	0.963	0.963	0.964	0.961				
AR(2) test					-0.280	-0.727	0.170	1.581
Sargan test					2.74	3.58	2.81	4.79

White's heteroskedasticity-consistent standard errors are reported in parentheses.
**, * significant at 5 percent and 10 percent, respectively.
Instrumental variables are two-year and more lagged values of Badloan and one-year lagged values of the explanatory variables.

TABLE V
The determinants of bad loans for regional banks

Estimation			OLS				GMM	
Equation No.	1	2	3	4	5	6	7	8
Badloan					0.495 **	0.487 **	0.444 **	0.497 **
					(0.086)	(0.088)	(0.102)	(0.083)
Return on assets(ROA)	0.232	0.163	0.022	0.008	1.057 *	1.107 *	0.816	0.845
	(0.551)	(0.543)	(0.546)	(0.559)	(0.608)	(0.613)	(0.789)	(0.629)
Rate of increase in land prices(PLAND)	-0.010	-0.011	-0.006	-0.010	0.004	0.007	-0.005	0.006
	(0.008)	(0.008)	(0.009)	(0.008)	(0.012)	(0.012)	(0.015)	(0.012)
Logarithm of assets(ASSET)	-0.016	-0.015	-0.007	-0.017	-0.020	-0.026	-0.052 **	-0.027
	(0.017)	(0.017)	(0.018)	(0.018)	(0.025)	(0.023)	(0.026)	(0.024)
RBC ratio(RBC)	0.031				-0.078			
	(0.128)				(0.374)			
RBC<8% Dummy (REQ0)				-0.003				0.005
				(0.004)				(0.009)
8%<=RBC<9% Dummy (REQ1)				0.003				-0.003
				(0.003)				(0.006)
9%<=RBC<10% Dummy (REQ2)				0.001				-0.005
				(0.002)				(0.003)
Market-valued capital ratio(MVC)	-0.161 **				-0.208			
	(0.051)				(0.136)			
RBC ratio - Market-valued capital ratio(DISCRET)		0.150 **				0.166		
		(0.049)				(0.148)		
Tier1			-0.196				-0.060	
			(0.153)				(0.362)	
Unrealized capital gains on securities(GAIN)			-0.297				0.597	

			(0.215)				(0.533)	
Loan loss provisions(LOANLOSS)			2.923				-1.397	
			(1.878)				(1.103)	
Subordinate debt(SD)			0.403 **				-1.371 **	
			(0.181)				(0.664)	
No. of obs.	504	504	504	504	486	486	486	486
No. of banks	70	70	70	70	70	70	70	70
Adjusted R^2	0.943	0.943	0.943	0.942				
AR(2) test					-0.246	-0.181	0.718	0.362
Sargan test					49.42	49.58	47.17	51.34

White's heteroskedasticity-consistent standard errors are reported in parentheses.
**, * significant at 5 percent and 10 percent, respectively.
Instrumental variables are two-year and more lagged values of Badloan and one-year lagged values of the explanatory variables.