Equity Investment Regulation and Bank Risk: Evidence from Japanese Commercial Banks

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Abstract

Using data from Japanese banks, this paper empirically investigates the relation between equity investment and bank risk during the period of banking crisis. Empirical evidence suggests that bank risk is positively associated with the ratio of shareholding to equity capital, suggesting that limiting shareholding can reduce commercial banks' exposure to market risk. However, regulators should not expect that restricting banks from shareholding automatically leads to less bank failures in a financial system. This is because unhealthy banks voluntarily refrain from holding a large amount of firms' shares relative to their equity capital, and bank risk is less sensitive to shareholding at unhealthy banks than at healthy banks.

Keywords: Bank risk; Bank shareholding; Separation of banking and commerce
JEL Classification: G21; G28; G30

1. Introduction

The decade of the 1990s and early 2000s has been the most difficult period experienced by the Japanese financial system. Due to the nonperforming loans problem, the bank stock price index declined from the historical high of 1324 in year-end 1990 to 207 in year-end 2001. Japanese regulatory authorities have imposed various remedies throughout the 1990s to overcome the financial crisis, including the implementation of capital adequacy requirements in 1993, prompt corrective action rules in 1998, and a capital injection of 7.5 trillion yen of taxpayers' money to 15 major banks in 1998. The Bank Shareholding Law was also legislated in 2001 in the course of these developments. The law required commercial banks to limit shareholding to within a level equal in value to their core equity capital by September 2004 to make their financial conditions less vulnerable to stock price fluctuations. Fearing a plunge in the stock market due to the selling of shares owned by banks, the Japanese government established the Banks' Shareholding Purchase Corporation in January 2002. Furthermore, in December 2002, the Bank of Japan also implemented a stock-buying program for shares owned by banks to reduce selling pressure from banks, which could have an unfavorable impact on the stability of the financial system. These developments raise many questions concerning the relation between shareholding and the risk level at commercial banks during the period of banking crisis. Do equity investment regulations have a risk-reducing impact on a bank's exposure to market risk? Can banks that hold equities reduce exposure to the risk related with stock price fluctuations by using derivative instruments? Does a drop in share prices offset bond price gains at commercial banks?

The purpose of this paper is to address these questions and shed some light on the debate

over the separation of banking and commerce.[1] We empirically investigate the relation between shareholding and bank risk using stock price data of Japanese commercial banks from 1998 through 2000. First, we investigate the relation between shareholding and the level of bank risk to determine whether equity investment regulations are necessary to make banks less susceptible to stock price fluctuations. Second, we examine whether the usage of equity derivatives mitigates banks' exposure to stock price fluctuations. Although the growing understanding and development of derivatives has contributed to the increased acceptance of these instruments over the last decade, whether, and how much, the usage of derivatives reduces bank risk still remains unanswered. This paper attempts to quantify the impact of derivative usage on the risk level at commercial banks that hold equities. Third, we examine whether banks can adequately offset losses in stocks by gains in bonds when they hold a portfolio of shares and bonds. The conventional view is that when an economy has weak future prospects, share price losses are likely to be accompanied with a drop in interest rates, hence a rise in bond prices. We examine whether the evidence is consistent with the conventional argument.

This paper demonstrates that bank risk is positively associated with the amount of shareholding, indicating that equity investment regulations can reduce banks' exposure to market risk as desired by regulators. However, regulators should not expect that restricting banks from shareholding automatically leads to less bank failures in a financial system. The evidence suggests that the risk level at banks with weak financial conditions is less sensitive to their level of shareholding relative to their equity capital than that of banks with strong financial conditions. Furthermore, banks with weak financial conditions voluntarily refrain

[1] See Santos (1998) and Saunders (1994) for the review of literature on the separation of banking and commerce.

from holding a large amount of equities in nonfinancial firms relative to their equity capital. Therefore, limiting banks from holding shares may inadvertently reduce the risk level of banks with strong financial conditions (i.e., those that would be capable of managing additional risk), thereby possibly restricting their optimal choices in light of their risk-return profile. This paper also shows that the usage of equity derivatives for hedging purposes mitigates banks' exposure to the risk related with stock price fluctuations at banks that hold equities. The evidence also suggests that bondholding reduces the sensitivity of bank risk to shareholding.

There are two strands of literature related to the current analysis, one of which is the literature on the determinants of the level of bank risk. Saunders, Strock, Travlos (1990) show that managerial ownership is positively associated with bank risk, and that the positive relation is more pronounced during periods of deregulation. Andersen and Fraser (2000) also show that bank risk increases with managerial ownership in periods of relative deregulation, but that managerial ownership was adversely related to bank risk in the 1990s when banks were more regulated. Chen, Steiner, and Whyte (1998), however, find a negative relation between managerial ownership and bank risk. Gorton and Rosen (1995) show that bank risk has a nonlinear relation with managerial ownership. Demsetz and Strahan (1997) find that larger bank holding companies are better diversified, and that they use the diversification advantage to pursue riskier lending. Using Japanese data, Konishi and Yasuda (2004) show that the implementation of capital adequacy requirement reduced bank risk, and the decline of franchise value increases bank risk. Using cross country data, Gonzalez (2005) demonstrates that regulatory restrictions increase banks' incentive to take risks by reducing their charter value.

The other strand of literature related to this paper is on the affiliation of banking and commerce. Flath (1993) and Prowse (1990) present evidence from Japan that conflicts between

shareholders and debtholders can be mitigated when a bank holds both equity and debt of a firm. Hoshi, Kashyap, and Scharfstein (1990) show that if a firm borrows a large amount from a bank, the bank's ownership in the firm has little impact on the costs of financial distress. In theory, Berlin, John, and Saunders (1996) demonstrate that commercial banks that hold equity claims in firms play a constructive role in mitigating the conflicts of interest among stakeholders when the firms are in financial distress. John, John, and Saunders (1994) and Park (2000) demonstrate that bank shareholding helps resolve conflicts between shareholders and debtholders, but increases bank risk. Santos (1999) demonstrates that a regulation that limits bank investments in nonfinancial firms does not improve banks' stability.[2]

This paper contributes to the literature by investigating an additional factor, bank shareholding, that can affect the level of risk at commercial banks. It is important to investigate the impact of bank shareholding on bank risk; restrictions on banks holding equities can prevent them from making sensible decisions in the corporate governance of firms to which they lend by mitigating conflicts between those with an excessive appetite for risk (i.e., shareholders), and those with an excessive aversion to risk (i.e., debtholders), thereby hindering the optimal allocation of credit in an economy. It is also important for regulators to assess the impact of shareholding on bank risk since increased risk may result in more bank failures, which in turn imposes greater costs on the deposit insurance system. Consideration about the costs imposed on the deposit insurance system is of particular importance in countries such as Japan where deposit insurance premia are not fairly priced on an acturarial

[2] Haubrich and Santos (2005) look at the advantage of mixing banking and commerce differently from other existing models. In the liquidity approach they developed, a mix of banking and commerce does not require a bank to hold equities in a firm to which they lend. They demonstrate that a link between banking and commerce is advantageous since it facilitates the disposal of assets seized by banks in a loan default through internal market.

basis. Japan provides a natural testing ground for investigating the relation between shareholding and bank risk since Japanese banks have been major shareholders of nonfinancial companies.

The remainder of this paper is organized as follows. Section 2 provides some background concerning bank shareholding in Japan, and develops the hypotheses. Section 3 describes the sample selection procedure and the empirical methodology. Section 4 demonstrates the descriptive statistics of our sample and empirical findings. Section 5 examines alternative interpretations of the results and provides discussion about the necessity of limiting bank shareholding. Section 6 summarizes the findings of this paper and concludes.

2. Background and Hypotheses

Japanese banks are allowed to hold equity claims on firms directly in their balance sheets, which is in sharp contrast to the U.S. where, in principle, banks cannot hold shares. The Banking Law of Japan restricts banks from holding more than 5% of a domestic company's outstanding shares with voting rights in order to ensure the soundness of banks' financial conditions. The Antimonopoly Law of Japan also limits banks from holding more than 5% of the outstanding shares with voting rights of any single nonfinancial company to promote competition.[3]

In April 2001, the Japanese government stated in the Government's Economic Measures that it is necessary to further limit bank shareholding within the risk management capacities of

[3] The Fair Trading Commission can grant exemptions provided that the acquisition of more than 5% equity in a firm does not impair fair trading in the light of their regulatory guidelines. For example, bank holding companies and their subsidiaries can collectively hold up to 15% of the outstanding shares issued by a nonfinancial company.

banks to make banks less susceptible to stock price fluctuations and to establish a sound banking system. Following the statement, the Bank Shareholding Law was legislated in November 2001 and enacted in January 2002. The law restricted banks' shareholding to a level equal in value to their core equity capital (Tier 1) by September 2004. The Banks' Shareholding Purchase Corporation (BSPC) was also established in January 2002 in order to reduce the selling pressure from the liquidation of banks' holdings and prevent a plunge in the stock market. The BSPC was authorized by the government to purchase up to 2 trillion yen of shares owned by banks, with the capital to make the purchases raised from financial institutions with a repayment guarantee from the government.

In the December 2002 revision of the law, the BSPC was authorized to purchase not only shares owned by banks, but also bank shares owned by nonfinancial firms, in order to absorb shares sold by banks and their customer firms due to the unwinding of cross-shareholdings.[4] The August 2003 revision of the law substantially relaxed the rules that constrained the BSPC's stock purchasing activities. The revision removed the requirement that banks pay contributions equivalent to 8% of the value of shares sold to the BSPC, thereby enabling banks to subtract the corresponding amount of risk assets when calculating their capital adequacy ratio set by the Bank of International Settlement (BIS). The revision also extended the life of the BSPC from 2012 to 2017.

In November 2002, the Bank of Japan (BOJ) also started to purchase shares owned by banks in excess of Tier 1 capital standards set by the BIS in order to stabilize the financial system. Initially, the BOJ planed to purchase as much as 2 trillion yen in shares held by banks

[4] Cross-shareholdings have been a common feature of the bank-centered "keiretsu" relationship in Japan. Firms and banks in a keiretsu relationship hold one another's shares to maintain control over their management and to keep close lending relationships. See Hoshi and Kashyap (2001) for details of keiretsu relationships and cross-shareholdings.

by September 2003. However, the BOJ raised the maximum amount of shares it would purchase from 2 trillion yen to 3 trillion yen in March 2003. The BOJ also extended the deadline of purchase period by one year from September 2003 to September 2004. Since there were concerns that the purchase of shares could deteriorate the quality of the BOJ's assets, the BOJ purchased only shares of listed companies with an investment grade credit rating.

Figure 1 shows the cumulative amount of shares purchased by the BSPC. It demonstrates that the BSPC did not buy as many shares as policymakers would expect from the onset of share-purchasing from February 2002 until October 2003. However, it increased purchases significantly after the 2003 revision of the law that eliminated the requirement that banks contribute capital equivalent to 8% of the price of shares sold to the BSPC. Also responsible for the significant increase in the pace of share purchases by the BSPC is the easing of internal rules that constrained the BSPC's purchasing operations. Prior to September 2003, the BSPC limited its monthly purchases of a particular stock from any bank to within the average monthly trading volume of that stock over the past six months. It also set a ceiling on total purchases of a firm's stock at five times the yen value of average monthly trading volume. These internal rules were either abolished or relaxed in September 2003, encouraging banks to sell shares to the BSPC. As of October 2005, the BSPC has purchased approximately 1.57 trillion yen worth of shares.

Figure 2 shows that the BOJ's share-purchasing program also helped banks unload their excess shareholdings to meet the regulatory requirement that limits banks' shareholding to within their core equity capital. The BOJ's purchases increased rapidly from November 2002 to September 2003, but the amount of purchases has declined since then partly due to the ascent of share prices. The BOJ's purchases reached 2,018 billion yen in September 2004, at which point the program was terminated as scheduled. The BOJ plans to hold the shares until

September 2007 unless there is a request for share repurchase by issuers of the shares, and will sell them in the open market from October 2007 and September 2017.

Figure 3 shows the amount of securities owned by all Japanese banks from 1993 through 2004. It demonstrates that banks started to reduce shareholdings in 1998, and reduced them significantly from 2000 through 2003, partly due to the two share-purchasing schemes available during the period. The figure also shows that in aggregate, the composition of banks' securities portfolios started to change significantly since the late 1990s. As of year-end 1993, shares comprised 38% of total securities owned by banks and government bonds comprised 29%, whereas at year-end 2004, shares comprised 14% of total securities owned by banks and government bonds comprised 64%. Share-purchasing by the BSPC and the BOJ is undoubtedly responsible for the change in composition of the securities portfolios. More importantly, bond-purchasing by banks is also responsible for the significant increase in the proportion of government bonds in the portfolio. The conventional argument is that after the collapse of major Japanese banks in 1997 and 1998, banks had become cautious about extending loans to relatively risky companies, and placed their funds in government bonds to increase their capital ratio.

In the following analyses, we empirically investigate the relation between shareholding and the level of bank risk to determine whether limiting shareholding is necessary to make banks less susceptible to stock price fluctuations. It has been well documented that Japanese banks hold a substantial amount of equities relative to their equity capital, hence they are excessively exposed to stock market risk.[5] However, since limiting shareholding can restrict

[5] For example, the Bank of International Settlement's 2002 annual report says that due to "relatively large amount of equities holdings by banks," they are excessively exposed to stock market risk, which is "unusual by international standards."

the risk-return frontier of a bank, the forced reduction in shareholding may induce the bank to reconfigure the composition of its portfolio of risk assets; thus, possibly leading to an increase in the risk level. Therefore, the impact of shareholding on bank risk is an empirical problem.

We also examine whether the usage of equity derivatives mitigates banks' exposure to stock price fluctuations. Although the growing understanding and development of derivatives has contributed to the increased acceptance of these instruments over the last decade, whether, and how much, the usage of derivatives reduces bank risk still remains unanswered. Hentschel and Kothari (2001) examine the relation between the usage of derivative contracts and the risk of both financial and nonfinancial firms, and find no significant relation. Guay (1999) focuses on new derivative users, and examines the relation between derivatives use and changes in firm risk over time. He provides evidence that firm risk declines following the commencement of derivatives usage, which indicates that firms use derivatives primarily to hedge. Therefore, whether the usage of derivatives increases or decreases bank risk is also an empirical issue.

Furthermore, we examine whether banks can adequately offset losses in stocks by gains in bonds when they hold a portfolio of shares and bonds. When an economy has weak future prospects, share price losses are likely to be accompanied by a drop in interest rates, hence a rise in bond prices. The conventional argument is that major Japanese banks could offset losses in stocks by gains on Japanese government bonds since they hold substantial amounts of both shares and government bonds. We examine whether the evidence is consistent with the conventional argument.

3. Empirical Analyses

3.1. Sample selection and data

We use panel data of Japanese commercial banks covering the period from fiscal 1998 to 2000. We use 1998-2000 as the test period since some information that is necessary for the following analyses are only available during this period. Firstly, detailed data about derivatives use is publicly available in the notes of financial statements only during that period.[6] Secondly, the data on banks' nonperforming loans is available only from 1998. The 1998-2000 period is also an interesting time frame to study the market assessment of bank risk since the Japanese financial system weathered extremely adverse conditions during this period. The conventional argument is that investors became more concerned about bank financial conditions and assessed bank risk more rationally after the collapse of three major banks (Hokkaido Takushoku Bank, Japan Credit Bank, and Long-term Credit Bank of Japan) in late 1997 and 1998 than in the preceding period.[7] Therefore, we can expect that markets priced bank risk more accurately during our sample period than the preceding period.

The initial list of our sample includes 3 long-term credit banks, 9 city banks, 58 regional banks, and 7 trust banks.[8] During the sample period, there were two major bank failures and

[6] The Ministry of Finance introduced a mandate of financial statement regulations in July 1996, which improved the disclosure of derivatives use from 1998. However, due to the implementation of the Accounting Standards for Financial Instruments established by the Business Accounting Deliberation Council of Japan in January 1999, we are unable to separate derivatives usage for hedging purposes from trading purposes from fiscal 2001 onwards.

[7] Yasuda, Okuda, and Konishi (2004) show empirically that investors started to anticipate potential manipulation of financial reports by bank managers more rationally after the major bank failures during the financial crisis in the late 1990s in Japan.

[8] Konishi and Yasuda (2004) investigate the determinants of bank risk using data from Japanese regional banks, whereas this paper uses the entire sample of banks that are listed on a stock exchange. City banks are ordinary banks that operate nation-wide, with headquarters in major cities. Regional banks are also ordinary banks, but they conduct the majority of their operations within a local area. Long-term credit banks are banks that were established in accordance with the Long Term Credit Bank

three mega-mergers. These banks are excluded from our sample subsequent to the failures or mergers, but included prior to these events. Therefore, our panel data set is unbalanced through time. Furthermore, since we use capital market risk measures that require stock price data to estimate, sample banks must be listed on the Tokyo Stock Exchange (TSE). By this criterion, one bank was discarded from our sample. We also exclude banks whose equities were traded infrequently on the TSE during the sample period. In particular, following Andersen and Fraser (2000), we excluded banks whose equities are not traded for 75 days or more in any year during the sample period. We exclude 4 banks owing to this criterion, which leaves us with 209 bank year observations.

The data are from various sources. The data on managerial ownership are from the "Kaisha Shikiho (Quarterly Report on Listed Firms)" published by Toyo Keizai Inc.. Data on derivative positions are disclosed in the footnote of financial statements. Data on banks' financial conditions (the amount of nonperforming loans and capital ratio) are from "Analysis of Banks' Financial Statements" published annually by Japanese Bankers Association. We collect this data from the website of each bank and, if not available, from the hard copies of banks' annual reports. The rest of the data necessary for the following analyses are from the NIKKEI QUICK electronic database.

3.2. Methodology

Law, whose main business is long-term lending.

We estimate the following equation using a fixed effects model:

$$\begin{aligned} RISK_{i,t} = {} & \alpha_1 \, STOCK_{i,t} + \alpha_2 \, BOND_{i,t} + \alpha_3 \, SIZE_{i,t} \\ & + \alpha_4 \, FRANCHISE_{i,t} + \alpha_5 \, FREQUENCY_{i,t} \\ & + \alpha_6 \, OWNERSHIP_{i,t} + \mu_i + \eta_t + \varepsilon_{i,t} \end{aligned} \tag{1}$$

where μ_i stands for bank specific or fixed effects, and η_t stands for time effects to control for macroeconomic factors that are common across banks.

The dependent variable is the measure for the level of bank risk. We use five alternative capital market risk measures: total risk, bank-specific risk, systematic risk, market risk, and interest rate risk. The total risk is defined as the standard deviation of a bank's daily stock returns for each fiscal year measured in percentage points. To estimate the rest of the risk measures, we use the following two-index model as a return generating process

$$R_{i,t} = \beta_0 + \beta_1 \, R_{M,t} + \beta_2 \, R_{I,t} + e_{i,t} \tag{2}$$

where $R_{i,t}$ is the daily stock return of bank i at date t; $R_{M,t}$ is the daily stock return of TOPIX at date t; $R_{I,t}$ is the daily change in the yield of ten-year government bonds at date t; and $e_{i,t}$ is the residual of the two-index model.[9] With this, the bank-specific risk is defined as the standard deviation of the residual of Eq.(2) for each bank, and the systematic risk is measured as the difference between the total risk and the bank-specific risk. The market risk and the interest rate risk are given by the coefficient estimates of β_1 and β_2 respectively.[10]

The independent variables of Eq.(1) are defined as follows:

[9] We did not orthogonalize the interest rate and market return series since such adjustments can bias results (Giliberto, 1985).

[10] Saunders, Strock, and Travlos (1990), Anderson and Fraser (2000), and Konishi and Yasuda (2004) also define bank risks using the two index model, whereas Hentschel and Kothari (2001) and Gonzalez (2005) define bank risk by the standard deviation of daily stock returns.

STOCK: The book value of shares owned by a bank scaled by the bank's equity capital.

BOND: The book value of bonds (national government bonds, local government bonds, and corporate bonds) held by a bank scaled by the bank's equity capital.

SIZE: The natural log of the book value of total assets (millions of yen).

FRANCHISE: Franchise value as measured by Keeley's Q (Keeley, 1990); the sum of the market value of equity plus the book value of liabilities divided by the book value of assets.

FREQUENCY: The average daily volume of shares divided by the total number of outstanding shares.

OWNERSHIP: The fraction of the bank's shares owned by bank managers.

STOCK is the variable of our primary interest. The positive relation between STOCK and RISK would indicate that bank shareholding increases the level of bank risk, thereby supporting the restriction of bank shareholding within the risk management capacities of banks as legislated by the Bank Shareholding Law of Japan.

The remainder of the variables are used to control for other factors that can affect the level of bank risk. Bondholding can also be a risk factor since bond trading profits, which are one of the major sources of Japanese banks' earnings, are susceptible to interest rate fluctuations.[11] Since larger banks have better access to capital markets, they can have more flexibility to cope with unexpected liquidity shortfalls. Furthermore, larger banks are more capable of diversifying risk. Thus, bank size can be negatively associated with bank risk. However, the diversification benefit can induce banks to pursue riskier lending (Demsetz and Strahan, 1997). Therefore, bank risk can be negatively associated with bank size. As in Anderson and Fraser (2000), we use the frequency of trading, FREQUENCY, as a proxy for

[11] For example, bond trading profits accounted for about 20% of banks' core operating profits in fiscal 2002. (January 22, 2003 edition of Nihon Keizai Shim'bun newspaper).

the speed at which new information is reflected in stock prices. Since the speed can be positively associated with the variance of assets, liabilities and off-balance sheet portfolios (Demsetz and Strahan, 1997), we expect the coefficient of FREQUENCY to be positive. FRANCHISE represents the value that would be foregone in the event of a closure. In banking, the franchise value arises from regulatory restrictions on entry and competition. Since bank owners have much to lose if the bank becomes insolvent (Keeley, 1990; Demsetz, Saidenberg, and Strahan, 1996), a bank with high franchise value can have an incentive to avoid risks. Therefore, we expect that FRANCHISE is negatively associated with the level of bank risk. Since ownership by bank managers can adversely affect the disciplinary role of the capital market, it can enhance managerial entrenchment; that is, bank managers may become more risk averse than investors expect them to be in order to protect their bank-specific human capital ("managerial entrenchment effect"). If so, managerial ownership should be negatively associated with bank risk. To the contrary, if a bank manager's preference is aligned with the interest of the shareholders of the bank, the manager can have incentives to take risks to maximize the value of the shareholders' equity call options ("asset substitution effect"). Then, the ownership by bank managers may be positively associated with the level of bank risk taking.

We also estimate Eq.(2) adding three interaction terms: BOND*STOCK, DERIV1*STOCK and DERIV2*BOND, where DERIV1 (DERIV2, respectively) is the notional amount of reported equity-related (interest rate, respectively) derivative contracts held for hedging purposes scaled by total assets. BOND*STOCK tells us whether bondholding increases or decreases the sensitivity of bank risk to shareholding. DERIV1*STOCK and DERIV2*BOND tell us whether the usage of derivatives mitigates banks' exposure to market risks caused by bank shareholding and bondholding respectively.

4. Empirical Results

4.1. Descriptive statistics

Panel A of Table 1 provides descriptive statistics for bank risk measures. It shows that bank-specific risk accounts for approximately 83-95% of total risk. As for total risk and bank-specific risk, trust banks are the most risky and regional banks are the least risky among the three bank categories. Total risk and bank-specific risk of city and long-term credit banks are also larger than those of regional banks. Systematic and market risks of city and long-term credit banks and trust banks are also larger than those of regional banks, suggesting that larger banks are more exposed to these risks.

Panel B of Table 2 provides descriptive statistics for bank characteristics. It shows that the average book value of shares owned by a bank scaled by the bank's equity capital is 1.0, indicating that on average, the value of shares owned by banks is equal to the limit of shareholding legislated by the Bank Shareholding Law. The median shareholding ratio is 0.7, suggesting that the distribution of shareholding ratio is skewed to the lower end (not reported in the table). The table also shows that the shareholding ratios of city banks and long-term credit banks, and trust banks by far exceed the required level, while that of regional banks is much less than the required level on average. On the other hand, the amount of both national and local government bonds held by regional banks relative to their equity capital is much larger than that of city banks and long-term credit banks, and trust banks. In our sample, government bonds comprise 47% of the securities owned by regional banks, while at city and long-term credit banks, government bonds comprise 30% (not reported in the table). These figures are consistent with the conventional argument that during 1990s, regional banks had

very few places to put their funds except for government bonds, since they did not want to increase loans as it would decrease the capital ratio. We can also see from the table that regional banks hold a much larger proportion of corporate bonds in their securities portfolio than other bank categories.

As for the usage of equity and interest rate derivatives for hedging purposes, the table shows that city banks, long-term credit banks, and trust banks are more active than regional banks. It suggests that most of the derivative transactions are concentrated to some active long-term credit banks and city banks. These statistics are consistent with the Bank of Japan's report issued in April 2001, which says that top 10 active financial institutions in derivative transactions account for 73%, and top 20 active financial institutions account for 91% of total derivative transactions in 2000. Furthermore, Panel B shows that long-term credit banks and city banks are 4.6 times as large as trust banks, and 16.6 times as large as trust banks in terms of the market value of equity. The frequency of trading is higher for long-term credit banks and city banks than for trust banks and regional banks. Managerial ownership is very small (less than 1%) in all bank categories. Managerial ownership in Japan is much smaller than the comparable figure for commercial banks in the U.S.. For instance, Andersen and Fraser (2000) report that average managerial holdings in the U.S. were approximately 10% during the 1987-1994 period.

Panel C presents descriptive statistics for the banks' financial conditions. The average capital ratio (BIS) ranges from 9.73% at regional banks to 11.49% at trust banks, while the difference between the capital ratio and the regulatory minimum capital requirement ranges from 3.40% at city and long-term credit banks to 4.31% at regional banks. Regional banks have the lowest capital ratio and the largest difference between their own capital ratio and the minimum capital requirement, since 101 out of 162 regional banks in our sample engaged only

in domestic operations, while 26 out of 27 city and long-term credit banks and 16 out of 20 trust banks engaged in international operations. (The minimum capital requirements for domestic banks and international banks are 4% and 8% respectively.) Panel C also shows that the ratio of bad loans to total lending is much larger at trust banks than other bank categories, and that the average ROA for all banks is around 0.6% reflecting the economic downturn of 1990s in Japan, which is in sharp contrast to the U.S. commercial banks in the same period where the average ROA was about 1.3% due to the economic expansion. (Source: FDIC, Quarterly Banking Profile)

4.2. Regression results

Table 2 presents the regression results of Eq.(1). Adjusted R^2s vary between 58% and 73% except for the interest rate risk. The adjusted R^2 for the interest rate risk is -3%, hence the interest rate risk regression has a low explanatory power. The table shows that the coefficients of STOCK for the total risk, market risk and systematic risk are positive and significant.[12] The estimated coefficients are also significant economically. Other things being equal, a 10% reduction in the ratio of shareholding to core equity capital decreases the total risk at the average bank (2.51%) by 1.5% (=(0.38/2.51)*10). Therefore, if a bank's shareholding ratio is 1.91, or 191% (the average ratio plus one standard deviation), limiting the bank's shareholding to within its core capital will decrease its total risk by 13.7% (=1.5*9.1). If this bank is prohibited to hold more than 60% of its own capital as legislated by the EC's Second Banking Directive, the total risk will be decreased by 19.7% (=1.5*(1.91-0.6)).[13] If banks are

[12] When we use the term "significant" or "insignificant", we mean statistical significance unless we mention that it means economic significance.

[13] The EC's Second Banking Directive limits a bank's qualifying investments in any single firm up to 15% of the firm's outstanding shares, where the qualifying investments are defined as equity stakes in a

prohibited to hold shares as in the U.S., the total risk of the same bank will be decreased by 28.7% (=1.5*1.91).[14][15] A similar argument holds for market risk and systematic risk, except that the magnitude of the impact of shareholding on these risk measures is larger than the impact on total risk. The results of columns (2) and (3) regressions suggest that bank shareholding ratio provides relevant information to well-diversified investors since the shareholding ratio is positively associated with our undiversifiable risk measures.

Column (4) of table 2 shows that the coefficient of shareholding ratio is negative and significant, suggesting that bank shareholding is negatively associated with bank-specific risk. Presumably, banks hold equities in firms to which they lend to build up a lending relationship and to have control over the firms' management. Therefore, shareholder banks have access to borrowing firms' inside information and exercise a greater monitoring power to reduce the probability of insolvency, which can in turn reduce the level of bank-specific risk.

With regard to the rest of the independent variables, the coefficient of BOND is negative and significant for all risk measures except for the interest rate risk, which is contrary to the conventional argument that bondholding increases risk. In table 3 regressions, we attempt to determine the factors that are responsible for this result. The coefficient of SIZE is positive and

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firm in excess of 10%. It also limits the bank's total qualifying investments within 60% of its equity capital. See Santos (1998) for the details about regulations on banks' ownership of nonfinancial firms in the U.S. and other countries.

[14] See Haubrich and Santos (2003) for an extensive discussion of the regulation on the mix of banking and commerce throughout American history.

[15] Although commercial banks are prohibited to hold equities in the U.S., there are some exceptions. Banks can hold equity claims in firms in financial distress. Bank holding companies can take non-controlling equity positions in startup companies through small business investment corporations. Bank holding companies can also take temporary non-controlling equity positions through investment bank subsidiaries. Furthermore, Santos and Rumble (2005) argue that banks can effectively own equities and have voting rights through their trust business. See James (1995) and Berlin (2000) for details about U.S. regulations.

significant for market risk, systematic risk and interest rate risk, suggesting that the diversification benefit of large banks is more than offset by other risk taking businesses conducted by large banks. The coefficient of FRANCHISE is positive and significant for interest rate risk, but insignificant for the rest of risk measures. The coefficient of FREQUENCY is positive and significant for total risk, suggesting that the faster the reflection of new information regarding share prices, the more volatile stock returns are. This coefficient is also positive and significant for bank-specific risk, but contrary to our prediction, is negative and significant for market risk and systematic risk. The coefficient of OWNERSHIP is insignificant for all risk measures.

Table 3 presents the regression results of Eq.(1) with interaction terms. Here, we are particularly interested in the coefficients of the interaction terms. The coefficient of BOND*STOCK is negative and significant for total risk, market risk, and systematic risk, suggesting that bondholding reduces the sensitivity of bank risk to shareholding ratio. As for the total risk, the estimated coefficient is -0.04, indicating that a 10% increase in the bondholding ratio (BOND) decreases the sensitivity of STOCK by 0.4%, or alternatively 16% of the average total risk (=(0.4/2.51)*100), at the average bank where STOCK is equal to 1. The evidence is consistent with the argument that banks can adequately offset losses in stocks by gains in bonds.

The coefficient of DERIV1*STOCK is negative and significant for total risk, suggesting that the usage of equity derivatives for hedging purposes mitigates the sensitivity of bank risk to shareholding ratio. The coefficient is negative and significant for bank-specific risk, but positive and significant for market risk and systematic risk. The negative impact of derivatives usage on bank-specific risk dominates the positive impact on systematic risk, resulting in the negative impact on total risk. The coefficient of DERIV2*BOND is negative and significant

for total risk, bank-specific risk, and interest rate risk, suggesting that the usage of interest rate derivatives mitigates the sensitivity of bank risk to shareholding ratio. However, again, the coefficient is positive and significant for market risk and systematic risk.

Pertaining to the rest of independent variables, the coefficient of STOCK is positive and significant, and larger than the estimated coefficient of Table 2 regressions for total risk, market risk, and systematic risk. The estimated coefficients are larger because the coefficient of STOCK in the current regression represents the direct effect of shareholding ratio on bank risk: that is, the total effect minus the negative effect by the bondholding and derivatives use.

When the interaction terms are included in the regression equations, the coefficient of BOND shifts from being negative in Table 2 regressions to being positive and significant for total risk, bank-specific risk, and interest rate risk, suggesting that bondholding increases bank risk. The coefficient of BOND is insignificant for market risk and systematic risk, hence investors can diversify away the increased bank risk caused by bondholding.

Qualitatively similar results hold for the estimates of SIZE, FRANCHISE, and FREQUENCY. Namely, the coefficient of SIZE is positive and significant for market risk, systematic risk, and interest rate risk, while it is negative and significant for the bank-specific risk. The coefficient of FRANCHISE is positive and significant for total risk and interest rate risk. FREQUENCY has a significant negative impact on STOCK for market risk and systematic risk, and a significant positive impact on bank-specific risk. As for OWNERSHIP, the coefficient is negative and significant for systematic risk, suggesting that the evidence is consistent with the managerial entrenchment effect. However, the coefficient is positive and significant for bank-specific risk, which is consistent with the asset substitution effect. Further research is necessary to determine the factor(s) that is responsible for the difference in results between the systematic risk and bank-specific risk regressions.

5. Discussion

We have shown in the previous section that bank shareholding has a significant impact on the risk level at commercial banks, thereby suggesting that shareholding increases banks' exposure to market risk. We concluded that equity investment regulations can reduce banks' exposure to market risk as expected by regulators. This interpretation, however, is not without ambiguity; restricting bank shareholding may reduce the risk level of financially healthy banks, rather than that of unhealthy banks, that are capable of taking risks by holding a large amount of equities, thereby preventing healthy banks from choosing their optimal risk-return profile. Furthermore, if unhealthy banks voluntarily refrain from holding a large amount of equities in nonfinancial firms relative to their equity capital to reduce their exposure to stock price fluctuations, restricting bank shareholding may be unnecessary.

To examine whether restricting bank shareholding does or does not play a significant role in recovering financial health of risky banks, we present two pieces of evidence. First, we examine the relation between banks' financial health and the sensitivity of bank risk to shareholding. To do so, we estimate Eq.(1) with an interaction term, BADLOAN*STOCK. BADLOAN is the ratio of nonperforming loans to total lending, where nonperforming loans is defined as the sum of loans to borrowers in legal bankruptcy, past-due loans, 3 months past-due loans, and restructured loans.[16] There is reason to believe that the coefficient of the

[16] These nonperforming loans are called risk management loans, and banks have been obliged to disclose them since 1998. Past-due loans are loans on which there has been no payment of interest or principal for more than or equal to 6 months. Three months past-due loans are loans on which there has been no payment of interest or principal for more than or equal to 3 months and less than 6 months. Restructured loans are loans on which contracted interest or maturity have been eased. These classifications are equivalent to the U.S. Securities and Exchange Commission standards.

interaction term will be negative. Presumably, the primary objective of bank shareholding is to build up close ties with their customer firms to which they lend and to have control over the firms' management. Banks also obtain shares through debt-equity swaps in the process of restructuring distressed firms. However, banks should also be concerned about the risk of holding firms' equities in their asset portfolio since a plunge in the stock market would deteriorate the banks' financial conditions. Financially unhealthy banks should be more concerned about the impact of stock price fluctuations on their financial conditions than healthy banks, since an extreme downward fluctuation of stock prices can be a vital blow to their existence. Thus, risky banks may be more concerned about the diversification of their equity portfolio than healthy banks are, hence we predict that bank risk is more sensitive to shareholding at healthy banks than at unhealthy banks. Panel A of table 5 establishes that the coefficient of BADLOAN*STOCK have predicted negative sign, and significant at the 1% level for the market risk, systematic risk, and interest rate risk.

We also estimate Eq.(2) with an interaction term using alternative proxies for banks' financial conditions; capital ratio (BIS), the difference between a bank's capital ratio and the minimum regulatory capital ratio (DIFFERENCE), and return on assets (ROA). BIS is the Basel I risk-based capital ratio defined as the sum of core capital (Tier I) and supplementary capital (Tier II) minus deductions scaled by credit-risk adjusted on and off balance sheet assets. The minimum regulatory capital ratio is 8% for banks that engage in international operations, and 4% for those that engage only in domestic operations. Since the values of these variables are positively associated with banks' financial health, we predict positive signs for the coefficients of the interaction terms. Panel B of table 5 shows that the coefficient of BIS*STOCK has the expected positive sign for total risk, market risk, systematic risk, and interest rate risk. In Panels C and D, the coefficients of interaction terms have the expected

positive sign for market risk and systematic risk. Overall, the results indicate that bank risk is more sensitive to shareholding ratio at healthy banks than at unhealthy banks, suggesting that risky banks may be more concerned about the diversification of their equity portfolio than healthy banks are.

We next present evidence that risky banks reduce their shareholding ratio to recover their financial health regardless of regulatory restrictions on bank shareholding. Table 5 shows the percentage change of the ratio of shareholding to equity capital for bank financial conditions and performance quartiles of 65 banks that have consecutive data for the 1998-2000 period. The ratio of nonperforming loans to lending, difference between a bank's capital ratio and the regulatory minimum capital ratio, and capital ratio are used as measures of bank financial conditions. In each panel of table 5, 16 banks are allocated to the 1st (weak) to 3rd quartiles, and 17 banks are allocated to the 4th (strong) quartile. The table shows that for all the quartiles in all three panels, banks on average reduced their shareholding ratio during the 1998-2000 period. The reduction could be the banks' response to the financial crisis in late 1990s. Presumably, after the collapse of three major banks in 1997 and 1998, bank managers became more concerned about bank financial conditions than ever before since they interpreted these bank failures as being a sign that the regulators had lost control, and that even large banks could fail; hence they reduced their shareholding ratio to reduce their risk exposure.

In Panel A, we sort the 65 banks by their ratio of bad loans to total lending in 1998. Bad loans ratio decreases from an average of 8.6% in the weak quartile to 1.7% in the strong quartile. The highest bad loans ratio is 17.7% and the lowest is 1%. Comparing the average change in shareholding ratio for the strong and the weak quartiles demonstrates that banks in weak financial condition reduced their shareholding ratio more rapidly than banks in strong financial condition; banks in the weak quartile reduced the ratio of shareholding to equity

capital by 20.2%, while banks in the strong quartile reduced the ratio by 11.8%. The difference in means is statistically significant at the 1% level. Note that in Japan, the idea of restricting banks from holding a substantial amount of shares by law first appeared in the Government's Economic Measure revealed to the public in April 2001. Therefore, bank managers did not know that any legal measure would take place during our test period, indicating that the implementation of the Bank Shareholding Law is not responsible for the decrease in the shareholding ratio. Rather, the current results suggest that banks reduced their shareholding ratio voluntarily to reduce their risk exposure to stock price fluctuations.

In Panel B, we sort the sample banks by the difference between their capital ratio and the regulatory minimum capital ratio. The difference increases from an average of 1.3% in the weak quartile to 6.4% in the strong quartile. The largest difference is 9.5%, while the smallest difference is 0.5%. Once again, significant differences are apparent between the weak and the strong quartiles. Comparing average change in shareholding ratio for the weak and the strong quartiles demonstrates that banks in weak financial condition reduced their shareholding ratio more rapidly than banks in strong financial condition; banks in the weak quartile reduced the shareholding ratio by 21.7%, while banks in the strong quartile reduced the ratio by 13.2%. Again, the difference in means is statistically significant at the 1% level.

In Panel C, banks are sorted into capital ratio quartiles. The capital ratio increases from an average of 8.5% in the weak quartile to 11.4% in the strong quartile. The highest capital ratio is 13.6%, while the lowest is 5.7%. The difference in the change of shareholding ratio between banks in weak financial condition and those in strong financial condition in Panel C is not as clear as the difference demonstrated in Panels A and B; banks in the weak quartile reduced the shareholding ratio by 16.7%, while banks in the strong quartile reduced the ratio by 15.5%. The different results shown in Panels B and C suggest that banks were more concerned about

the difference between their capital ratio and the regulatory minimum capital ratio than their capital ratio itself, which could be a natural response by banks to the implementation of the Prompt Corrective Action in 1998.[17]

Overall results suggest that some bank risk measures (total risk, market risk, and systematic risk) are positively associated with the shareholding ratio as documented in the previous section. However, regulators should not expect that restricting banks from shareholding automatically leads to less bank failures in a financial system because banks in weak financial condition voluntarily refrain from holding a large amount of shares in nonfinancial firms relative to their equity capital, and bank risk is less sensitive to shareholding ratio at banks in weak financial conditions.

6. Concluding Remarks

This paper examined empirically the relation between equity investment and the risk level at commercial banks using data from Japan from 1998 through 2000. To summarize, the overall results suggest that:

(1) Bank risk is positively associated with shareholding ratio, indicating that limiting banks from shareholding can mitigate their risk exposure to stock price fluctuations.

(2) The usage of equity derivatives for hedging purposes mitigates banks' exposure to the risk related with stock price fluctuations at banks that hold equities.

(3) Bondholding reduces the sensitivity of bank risk to shareholding ratio.

[17] Since April 1998, under Article 26 of the Banking Law legislation, the Financial Services Agency must take specific actions when a bank's capital ratio falls bellow the minimum capital requirement, where the specific prompt corrective action provisions depend on the level of the bank's capitalization.

(4) The risk level at banks in weak financial condition is less sensitive to shareholding ratio than that of banks in strong financial condition. Furthermore, the evidence suggests that banks in weak financial condition voluntarily refrain from holding a large amount of equities in nonfinancial firms relative to their equity capital.

Overall, the empirical evidence suggests that equity investment regulations can reduce bank risk, but regulators should not expect restricting banks from shareholding automatically leads to less bank failures in a financial system.

Although this paper shed some light on the debate over the separation of banking and commerce, there are questions that still remain unanswered.

Firstly, macroeconomic consequences of bank shareholding are yet to be explored. There is the concern that bank shareholding affects availability of bank credit, thereby magnifying business fluctuations. It is important to quantify the impact of bank shareholding on the availability of bank credit in an economy since the level of bank shareholding can be interpreted as a warning flag for policymakers.

Secondly, to finalize the debate over the separation of banking and commerce, it is necessary to quantify the effects of relaxing the separation on a complex set of interrelated costs and benefits. Little has been explored empirically since the mix of banking and commerce is not prevalent either in the U.S. or overseas due to the absence of data.

Thirdly, why Japanese banks hold so much equity claims on firms, while bank shareholding in some other countries are minuscule even though banks are allowed to hold equities, remains as a question.[18] Although Japanese banks have reduced their shareholding since late 1990s, they still hold shares worth approximately 30 trillion yen, or 270 billion

[18] See Berlin (2000) for an extensive discussion about reasons why banks do not take equity stakes in firms.

dollars (US$1.00=JPY110), as of September 2005. The value of banks' shareholding is also underestimated because Japanese banks hold equities in firms through their affiliated companies such as venture capital and securities firm subsidiaries. Also, banks effectively have more than the amount of firms' equities reported on their balance sheets through the web of cross-shareholdings that still remains in the Japanese economy.

Finally, which bank sold which firm's shares during the early 2000s, and how did the selling of shares affected lending relationships, and consequently, Japan's bank-centered financial system are interesting questions that require further investigation.

These questions are still unanswered and remain for future research.

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Table 1
Descriptive statistics of the sample

	All banks	City banks and long-term credit banks	Regional banks	Trust banks
	N=209	N=27	N=162	N=20
Panel A: Risk measures				
Total risk (%)				
mean	2.51	3.26	2.21	3.95
st. dev.	0.84	0.68	0.55	0.88
Bank-specific risk (%)				
mean	2.31	2.72	2.09	3.47
st. dev.	0.72	0.60	0.53	0.86
Systematic risk (%)				
mean	0.21	0.54	0.12	0.48
st. dev.	0.28	0.47	0.10	0.45
Market risk				
mean	0.66	1.23	0.49	1.27
st. dev.	0.47	0.57	0.24	0.64
Interest rate risk				
mean	-0.02	0.00	-0.02	-0.03
st. dev.	0.06	0.05	0.06	0.08
Panel B: Bank characteristics				
STOCK				
mean	1.00	1.99	0.66	2.40
st. dev.	0.91	0.62	0.63	0.85
BOND				
mean	3.06	1.47	3.45	1.85
st. dev.	1.38	0.51	1.26	0.88
GOVERNMENT BOND				
mean	1.41	1.01	1.50	1.15
st. dev.	0.71	0.42	0.70	0.78
LOCAL GOVERNMENT BOND				
mean	0.64	0.17	0.78	0.17
st. dev.	0.52	0.12	0.51	0.15
CORPORATE BOND				
mean	1.01	0.29	1.18	0.53
st. dev.	0.65	0.12	0.62	0.28
DERIV1 (million yen)				
mean	19,599	113,429	995	42,691
st. dev.	100,781	246,857	6,848	104,245
DERIV2 (million yen)				
mean	9,117,527	60,701,972	181,737	11,411,643
st. dev.	25,417,636	42,003,912	280,006	12,653,104
ASSET (billion yen)				
mean	9,256	43,933	3,454	9,154
st. dev.	149,176	16,354	2,025	5,469
FRANCHISE				
mean	1.01	1.03	1.01	1.03
st. dev.	0.03	0.03	0.02	0.05
FREQUENCY（%）				
mean	0.06	0.13	0.04	0.15
st. dev.	0.06	0.04	0.03	0.11
OWNERSHIP（%）				
mean	0.71	0.48	0.78	0.48
st. dev.	0.30	0.1	0.31	0.07

Table 1 (continued)

	All banks	City banks and long-term credit banks	Regional banks	Trust banks
	N=209	N=27	N=162	N=20
Panel C: Banks' financial condition				
BADLOAN (%)				
mean	5.43	5.36	4.58	12.41
st. dev.	3.52	1.70	2.42	4.92
BIS (%)				
mean	10.10	11.25	9.73	11.49
st. dev.	1.75	1.48	1.59	2.11
DIFFERENCE (%)				
mean	4.17	3.40	4.31	4.29
st. dev.	1.94	1.75	1.93	2.09
ROA				
mean	0.60	0.54	0.60	0.64
st. dev.	0.24	0.12	0.21	0.47

Table 2
Relation between shareholding and bank risk[a]

	(1) Total risk		(2) Market risk		(3) Systematic risk		(4) Bank-specific risk		(5) Interest rate risk	
Variable	Coefficeient		Coefficeient		Coefficeient		Coefficeient		Coefficeient	
STOCK	0.38	***	0.70	***	0.50	***	-0.13	***	-0.02	
	(10.96)		(14.43)		(21.47)		(-3.29)		(-1.25)	
BOND	-0.09	***	-0.07	***	-0.04	**	-0.05	**	0.00	
	(-4.25)		(-2.90)		(-2.03)		(-1.98)		(-0.46)	
SIZE	-0.06		1.74	**	1.60	***	-1.66	***	0.10	***
	(-0.08)		(2.39)		(3.48)		(-3.37)		(4.44)	
FRANCHISE	3.24		2.57		0.81		2.42		0.91	**
	(1.53)		(0.99)		(0.65)		(0.86)		(1.96)	
FREQUENCY	3.86		-1.47	***	-1.38	***	5.25	**	0.10	
	(1.56)		(-5.30)		(-21.26)		(2.09)		(0.58)	
OWNERSHIP	0.00		-0.15		-0.12		0.12		0.04	
	(0.01)		(-0.63)		(-1.10)		(0.77)		(0.66)	
Adjusted R^2	0.68		0.73		0.70		0.55		-0.07	
Obsevations	209		209		209		209		209	

[a] T-ratios are in parentheses. T-ratios are calculated using White's (1980) heteroscedastic-consistent standard errors.
*** Significant at the 1% level.
** Significant at the 5% level.

Table 3
Relation between shareholdings and bank risk with interaction terms[a]

	(1) Total risk		(2) Market risk		(3) Systematic risk		(4) Bank-specific risk		(5) Interest rate risk	
Variable	Coefficeient		Coefficeient		Coefficeient		Coefficeient		Coefficeient	
STOCK	0.50	***	0.79	***	0.60	***	-0.09	***	0.01	
	(12.44)		(23.43)		(14.95)		(-6.13)		(0.40)	
BOND	0.02	*	-0.04		0.00		0.02	***	0.02	*
	(1.89)		(-1.39)		(-0.06)		(5.34)		(1.72)	
BOND*STOCK	-0.04	***	-0.04		-0.04	**	0.00		-0.01	
	(-2.70)		(-1.39)		(-2.32)		-0.87		(-0.01)	
DERIV1*STOCK	-13.58	***	3.72	*	2.90	**	-16.48	***	-0.56	
	(-4.72)		(1.91)		(2.16)		(-3.99)		(-1.15)	
DERIV2*BOND	-0.16	*	0.10	***	0.10	***	-0.26	***	-0.03	***
	(-1.79)		(3.25)		(5.47)		(-3.52)		(-6.61)	
SIZE	0.17		1.69	**	1.56	***	-1.39	***	0.14	**
	(0.24)		(1.98)		(2.68)		(-2.62)		(2.27)	
FRANCHISE	3.63	*	2.34		0.56		3.06		1.03	*
	(1.93)		(0.86)		(0.41)		(1.00)		(1.92)	
FREQUENCY	3.76		-1.32	***	-1.25	***	5.01	**	0.15	
	(1.59)		(-5.48)		(-6.18)		(2.03)		(0.76)	
OWNERSHIP	0.05		-0.25		-0.22	*	0.27	*	0.04	
	(0.23)		(-1.10)		(-1.88)		(1.74)		(0.82)	
Adjusted R^2	0.69		0.73		0.73		0.58		-0.03	
Obsevations	209		209		209		209		209	

[a] T-ratios are in parentheses. T-ratios are calculated using White's (1980) heteroscedastic-consistent standard errors.
*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 1% level.

Table 4

Sensitivity of the impact of shareholding on bank risk to bank financial conditions and performance

	(1) Total risk		(2) Market risk		(3) Systematic risk		(4) Bank-specific risk		(5) Interest rate risk	
Variable	Coefficeient		Coefficeient		Coefficeient		Coefficeient		Coefficeient	
Panel A										
STOCK	0.39	***	0.91	***	0.65	***	-0.27	*	-0.01	
	(4.25)		(12.87)		(10.01)		(-1.76)		(-0.44)	
BADLOAN*STOCK	-0.01		-0.03	***	-0.02	***	0.01		0.00	***
	(-0.90)		(-4.46)		(-7.99)		(0.79)		(-4.18)	
Panel B										
STOCK	0.07	*	0.27	*	0.29	***	-0.53	**	-0.07	
	(-1.62)		(1.79)		(2.69)		(-2.15)		(-1.13)	
BIS*STOCK	0.00	***	0.05	***	0.02	***	0.04	*	0.00	
	(4.04)		(5.24)		(2.91)		(1.83)		(0.91)	
Panel C										
STOCK	0.35	***	0.68	***	0.49	***	-0.15	*	-0.03	
	(5.88)		(17.83)		(28.96)		(-1.92)		(-1.13)	
DIFFERENCE*STOCK	0.05		0.04	***	0.02	*	0.04		0.00	
	(1.48)		(4.65)		(1.69)		(0.85)		(0.68)	
Panel D										
STOCK	0.24		0.36	***	0.29	***	-0.05		0.01	
	(1.37)		(3.09)		(3.58)		(-0.42)		(0.44)	
ROA*STOCK	0.05		0.28	***	0.16	***	-0.11		-0.03	***
	(0.33)		(4.37)		(3.26)		(-0.98)		(-16.39)	
Obsevations	209		209		209		209		209	

[a] T-ratios are in parentheses. T-ratios are calculated using White's (1980) heteroscedastic-consistent standard errors.

*** Significant at the 1% level.

** Significant at the 5% level.

* Significant at the 1% level.

Table 5
Summary data for financial conditions quartiles

Panel A : Summary data for BADLOAN quartile

BADLOAN quartile	Change in shareholding ratio	Mean	Max	Min
Weak	-20.2%	8.6%	17.7%	4.9%
2	-22.1%	4.0%	4.7%	3.3%
3	-16.8%	2.8%	3.2%	2.4%
Strong	-11.8%	1.7%	2.4%	1.0%

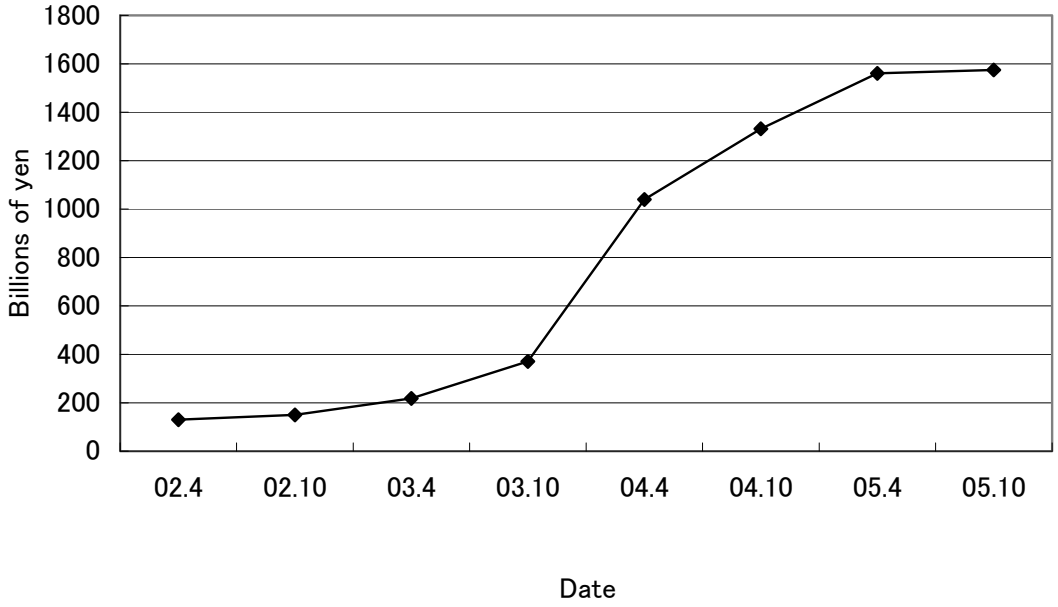
Panel B : Summary data for DIFFERENCE quartile

DIFFENRENCE quartile	Change in shareholding ratio	Mean	Max	Min
Weak	-21.7%	1.3%	1.9%	0.5%
2	-17.4%	2.3%	2.7%	1.9%
3	-18.9%	4.4%	5.5%	2.7%
Strong	-13.2%	6.4%	9.5%	5.5%

Panel C : Summary data for BIS quartile

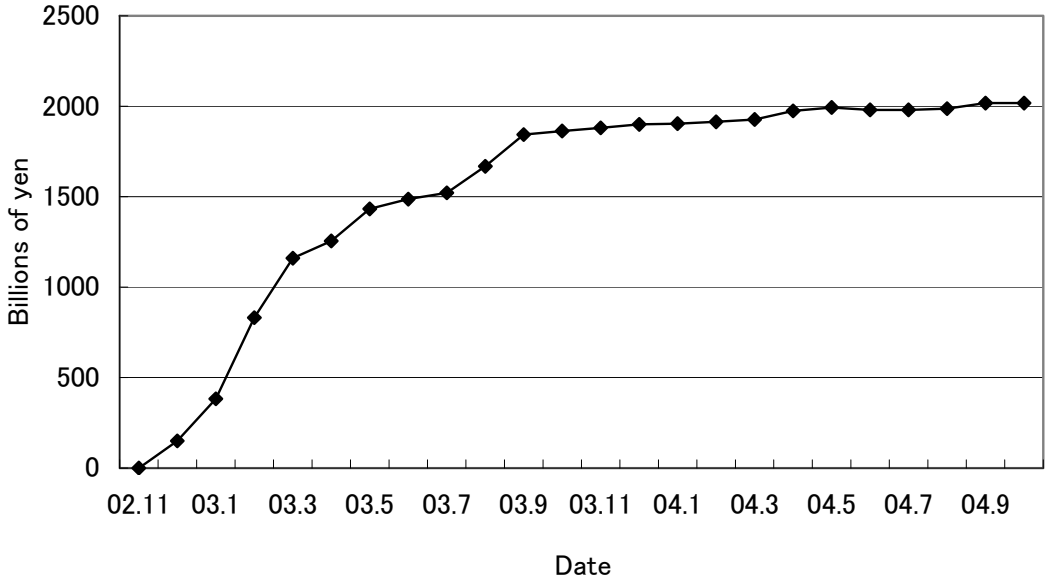
BIS ratio quartile	Change in shareholding ratio	Mean	Max	Min
Weak	-16.7%	8.5%	9.2%	5.7%
2	-24.6%	9.5%	9.9%	9.2%
3	-14.3%	10.1%	10.3%	9.9%
Strong	-15.5%	11.4%	13.6%	10.4%

Figure 1
Cumulative amount of shares purchased by the Banks' Share Purchasing Corporation from April 2002 to October 2005



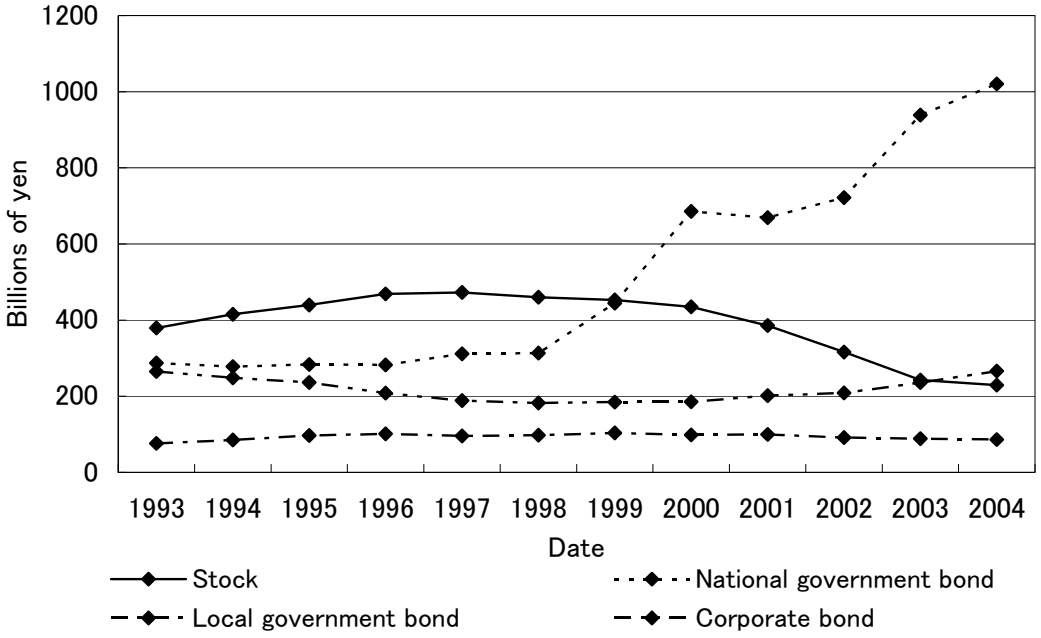
Source: Website of the Banks' Share Purchasing Corporation, http://bspc.jp/index.html

Figure 2
Cumulative amount of shares purchased by the Bank of Japan from November 2002 to October 2004



Source: Financial statements of the Bank of Japan

Figure 3
Aggregate amount of securities owned by all banks from 1993 to 2004



Source: Statistics of financial institution accounts, the Bank of Japan