Japanese Banking Industry: A Study on Stock Market Reactions to Changes in the 'Capital' Regulations

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This paper aims to analyze how the introduction and/or the changes of capital regulation affect bank stock prices, and how the introduction and/or the changes of accounting regulation affect bank stock prices. In this study, an agency model was used to describe how an introduction of the capital ratio regulation affects a bank manager's compensation contract, effort allocation, and a shareholder's profits. The four main results obtained from the analysis are: (1) the events which strengthen the capital regulation increase expected stock prices; (2) the events which relax the capital regulation decrease expected stock prices; (3) the events which relax the accounting regulation do not change expected stock prices except for the introduction of "Accounting for Income Taxes"; and (4) stock market responded differently to announcements of regulation changes depending on bank's attributes.

Introduction

The Japanese banking industry has attracted international attention over the past decade due to the failure of several large banks and to persistent problems with non-performing loans. Problems with non-performing loans became particularly significant in the 1990s due to changes in the regulatory environment. International pressure and domestic concerns about the health of the banking system led to a heightened focus on the capital adequacy ratio (generally defined as regulatory capital divided by risk-weighted assets) as a means of monitoring the country's financial institutions. In order to help banks maintain the required capital adequacy ratio, the Ministry of Finance (MOF), which is the regulatory body overseeing Japanese banks, announced that it would change the accounting rules for the valuation of securities held by banks beginning with the fiscal ending March 31, 1998. Prior to the MOF announcement, banks valued their securities portfolios using the lower-of-cost-or-market method. After the announcement, they had the option of using the historical cost method. This allowed banks, which have traditionally owned significant amounts of stock in other companies, to avoid recording losses on the declining market values of their investments.

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During the same period, the ruling Liberal Democratic Party (LDP) reacted to the problems by enacting two laws. First, it introduced the Land Revaluation Law, effective for the fiscal ending March 31, 1998. This law enabled banks to voluntarily revalue their real estate holdings to fair value, there by allowing them to bring unrealized gains from real estate into regulatory capital. Second, the LDP introduced the Financial Function Stabilization Law. This strengthened the Deposit Insurance Corporation (DIC)[1] by ensuring full government protection to deposits and by providing a pool of funds backed by Japanese Government bonds that the DIC could invest in banks through preferred stock and subordinated debt. Thus, banks willing to submit themselves to the scrutiny of a rigorous application and examination process could gain access to public funds, which in turn could be used to increase regulatory capital.

The combination of introduction of stringent capital regulations and a difficult economic environment provides an interesting setting to examine how stock market reacted to announcements of these changes in bank regulations. During the period considered, many banks had ratios that were close to falling short of the minimum requirements.

The empirical results of this study should be of interest to regulators and investors. Regulators have concerns about the economic consequences of changes in accounting regulations, and the study provided a direct evidence of those effects. Investors might also be interested in this study, as it sheds light on whether certain types of regulation changes affected the market value of banks.

The agency model was used to know how an introduction of the capital ratio regulation affects a bank manager's compensation contract, effort allocation, and a shareholder's profits. Empirical tests were conducted in order to confirm these two analytical results using Japanese banks as sample firms. It was also examined how stock market reacted differently to these changes in regulations depending on bank attributes such as bank size, size of non-performing loans, capital ratio, size of unrealized security gains or losses, and size of bank stocks held by institutional stock holders.

The rest of the article is organized as: Section 2 sketches agency model that the bank manager's benefit conflicts with the shareholder's benefit. Section 3 presents the empirical results, and is followed by the concluding remarks.

2. Basic Model [2]

There are bank shareholder (principal) and bank manager (agent) in the economy. The bank shareholder is interested in maximizing his or her profits, and the bank manager is interested in maximizing his compensation from shareholder while minimizing his or her cost of effort[3]. It is assumed

[1] The DIC is a "special juridical entity that was established in 1971 under the provisions of the Deposit Insurance Law for the purpose of operating the Deposit Insurance System." See the DIC Annual Report, 1998 available at http://www.dic.go.jp/annual/h10/h10-e.pdf.

[2] This model is strongly based on Kojima and Okura (2003).

[3] Refer to Lambert (2001) for applications of agency theory to accounting research.

that the shareholder is risk-neutral, and that the manager is weakly risk-averse. The manager is assumed to have the following exponential utility function:[4]

$$u(\pi) = 1 - e^{-r\pi} \quad \ldots (1)$$

where r denotes a risk parameter ($r > 0$) and π denotes an income from compensation reduced by the pecuniary equivalent cost of effort involved in the manager's decisions.

The manager can choose a combination of good and bad efforts. In this model, "good effort" and "bad effort" are defined as follows:

Good Effort—includes issuing new equity, reducing risky assets, and increasing safe assets, such as government bonds, that produce desirable outcomes for the shareholder.

Bad Effort—includes accounting manipulations that produce no substantial value for the shareholder.

The cost of effort associated with good effort, a, and bad effort, b, is determined as follows:

$$C(a,b) = \frac{1}{2}(a^2 + kb^2) \quad \ldots (2)$$

where k ($k > 0$) implies the degree of accounting flexibility. When k is very small, bad effort is almost costless because accounting is very flexible. As k increases, bad effort becomes more costly to the manager.

The manager's compensation is described as follows:[5]

$$c(y) = A + By \quad \ldots (3)$$

where A is a fixed component of the compensation and By is a variable component based on a fixed compensation rate, B, and stock price (signal), y. The stock price, y, is set as follows:

$$y = a + \theta(1 - \theta)b + \varepsilon \quad \ldots (4)$$

where $\theta \in [0,1]$ is the degree of market perfection. The stock price, y, can be observed by the shareholder after the manager chooses his effort allocation. Consider two extreme cases, $\theta = 0$ and $\theta = 1$. When $\theta = 0$, then the market cannot distinguish between good and bad efforts. On the other hand, when $\theta = 1$, the market can distinguish between them perfectly and the stock price, y, is only affected by good effort. The random error, ε, is assumed to be normally distributed with mean zero and variance σ_ε^2. The manager's income is then:

$$\pi = c(y) - C(a,b) = A + By - \frac{1}{2}(a^2 + kb^2). \quad \ldots (5)$$

[4] The development of the model is based on Hughes and Thevaranjan (1995).

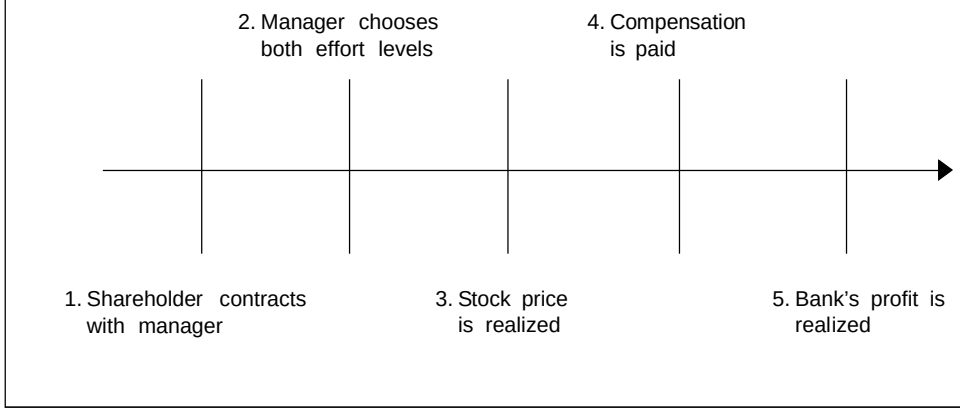
[5] Following Holmström and Milgrom (1987), Feltham and Xie (1994), and Banker and Thevaranjan (2000), it is assumed that the compensation plan is linear in the performance measure.

Good effort affects the value of the bank's profits, but bad effort affects only stock prices. Thus, the bank's profits can be shown by:

$$* \quad a \quad I. \qquad \ldots (6)$$

It is important to note that * becomes observable by a shareholder 'after' the manager's effort allocation and outcome are realized. * is calculated and only disclosed by the manager after the manager puts in effort and is compensated by the shareholder, while stock prices are available at any time. Therefore, the shareholder cannot offer a compensation plan based on because it is unavailable until the shareholder pays the manager. Figure 1 shows the sequence of the events in the model.

Figure 1: Sequence of Events



Moreover, suppose that the regulator enforces the following capital regulation :

$$R \quad a \quad b \qquad \ldots (7)$$

To analyze the effect of capital regulation, the capital ratio is defined as above. The intuition behind this definition is that the manager can achieve a certain level of capital ratio by both good and bad efforts. The capital ratio is improved either through good efforts, such as issuing equity, or bad efforts, such as by accounting manipulations. Since the capital ratio is calculated only by accounting numbers, it can be assumed that good and bad efforts are independent because both good and bad efforts affect accounting numbers independently.

Now, the shareholder's problem is to choose a compensation plan, and shareholder needs to maximize his or her expected profit subject to compliance with the individual rationality constraint, the incentive compatibility constraint, and capital regulation constraint. Specifically, the shareholder's problem is:

$$\underset{A,B}{\text{Maximize}} \quad - \{ E[\ *] \quad E[c(y)] \qquad \ldots (8)$$

Subject to E a exp r A By $\frac{1}{2}(a^2 \quad kb^2)$ t 0

$$(a,b) = \arg\max_{(a,b)} E\left[\frac{1}{\alpha}\exp\left(-r\left(A - By\right) - \frac{1}{2}(a^2 - kb^2)\right)\right], \text{ and}$$

$a - b = R$.

Therefore, from the above, B^*, a^* and b^* can be derived as follows:

$$B^* = \frac{\sigma_S}{\sigma_S^2(1-k)r\sigma_\varepsilon^2}, \quad \ldots(9)$$

$$a^* = \frac{1}{1-k}\left[\frac{\sigma_S^2}{\sigma_S^2(1-k)r\sigma_\varepsilon^2} - kR\right], \quad \ldots (10)$$

$$b^* = \frac{1}{1-k}\left[R - \frac{\sigma_S^2}{\sigma_S^2(1-k)r\sigma_\varepsilon^2}\right]. \quad \ldots (11)$$

The superscript * denotes that they are the optimal solutions when the capital ratio level is R.

Also by using equations (9) to (11), the expected stock price can be derived as:

$$E(y^*) = \frac{1}{1-k}\left[\frac{\sigma_S^2}{\sigma_S^2(1-k)r\sigma_\varepsilon^2} - kR + (1-k)\mu_S\right]. \quad \ldots (12)$$

3. An Empirical Work

3.1. Hypotheses Development

In this section, an empirical analysis is conducted based on the analytical model. First, two hypotheses are developed and tested. And second, (1) how the introduction and/or the changes of capital regulation affect bank stock prices, and (2) how the introduction and/or the changes of accounting regulation affect the bank stock prices, are analyzed.

Using the equation (12), it is easy to verify that an increase in R (i.e., to strengthen the capital regulation) leads to the increase in $E(y^*)$, that is,

$$\frac{\partial E(y^*)}{\partial R} > 0 \quad \text{for all } R \quad \ldots (13)$$

Differentiating the equation (12) with respect to k, the following condition can be derived:

$$\frac{\partial E(y^*)}{\partial k} > 0 \quad \text{for all } R > \bar{R} \quad \ldots (14)$$

where, $\bar{R} \quad 1 \quad \left(\frac{(1 \quad k)r V^2}{S^2 \quad (1 \quad k)r V^2} \right)^{\frac{1}{2}}$.

The equation (14) means that strengthening the accounting regulation leads to lower expected stock prices when the capital regulation level is relatively high. Thus, the hypotheses to be tested are as follows:

H1: Strengthening (relaxing) the capital regulation yields to higher (lower) expected stock price.

H2: Strengthening (relaxing) the accounting regulation yields to higher (lower) expected stock price.

3.2. Sample Selection

All listed Japanese banks are used as sample for sample years when there were frequent changes in capital/accounting regulations on banks in Japan. The sub-sample of Kojima (2004) is used for Japanese banks. There are 149 banks with financial data available from the 1996 edition of the "Analysis of Financial Statements of All Banks" ("the Analysis")[6] issued annually by the Japanese Bankers Association. Of these, one was excluded because it was a 100% subsidiary of another bank and five others were excluded because they were already failing and lacked complete financial data.[7] Of the 143 banks remaining (forming the initial sample), 117 were listed on various stock exchanges in Japan. The sample for the study consists of these 117 banks.

3.3. Empirical Model and Basic Results

It is examined whether there was a stock price reaction to each event that is supposed to affect the expected stock prices by the analytical model. In order to test the above two hypotheses, the average abnormal returns ($AVECAR_e$) are measured for each event as follows:

$$AVECAR_e \quad \frac{1}{3}_{d} \left(\frac{1}{n} \sum_{i=1}^{n} ABR_{i,d} \right), \qquad \text{... (15)}$$

where, $ABR_{i,d} \quad R_{i,d} \quad R_{m,d} \quad \frac{P_{i,d} \quad P_{i,d-1}}{P_{i,d-1}} \quad \frac{P_{m,d} \quad P_{m,d-1}}{P_{m,d-1}}$,

$P_{i,d}$: Stock price of bank i at date d;

$P_{m,d}$: TOPIX (Tokyo Stock Price Index) at date d;

d : The event date;

n : The number of banks at the event date.

Next the relevant events are specified from 1993 to 99 using the Nikkei Telecom database. The list of events is shown in Table 1.

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[6] "The Analysis" presents financial data of all the city banks, regional I banks and regional II banks, with the exception of a few that were failing. The valuation methods for security holdings and domestic/international/ international with market risk regulation classifications are also available from the Analysis. For example, the 1997 edition of the Analysis, issued in the summer of 1998, contained financial statements for all Japanese banks for the 1997 fiscal year (from April 1997 to March 1998).

[7] Three banks (Wakashio, Hanwa and Midori Bank) are excluded because the 1997 edition of the Analysis excludes these banks from the overall statistics. Two banks (Hokkaido Takushoku and Tokuyo city Bank) are excluded because they fail during the year 1997. One bank (Kyoto Kyoei Bank) is excluded because of lack of data.

Table 1: Events Seem to Affect the Stock Prices				
Events	**Dates**	**Article Title**	**Classifications**	**Predicted Sign**
1	March 1, 1993	Liberal Democratic Party examines the revaluation at the current prices.	Relax the accounting regulation (Land Revaluation Law).	–
2	April 6, 1993	Introducing the BIS capital regulation.	Strengthen the capital regulation.	+
3	March 20, 1995	The Ministry of Finance, Japan strengthens the standard for bad loans.	Strengthen the capital regulation.	+
4	January 8, 1996	The Ministry of Finance, Japan and Bank of Japan relax the regulations for banks to encourage decreasing bad loans.	Relax the capital regulation.	–
5	February 10, 1997	Business Accounting Deliberation Council publishes public comments for revising the consolidated accounting systems.	Relax the accounting regulation (Accounting for Income Taxes).	–
6	March 21, 1997	The Ministry of Finance, Japan obliges to apply current value accounting systems.	Strengthen the capital regulation.	+
7	June 9, 1997	Business Accounting Deliberation Council announced to revise the consolidated accounting systems.	Relax the accounting regulation (Accounting for Income Taxes).	–
8	October 24, 1997	Financial System Research Council reports that capital regulation extends to the holding companies.	Strengthen the capital regulation.	+
9	November 19, 1997	Liberal Democratic Party examines the organization to buy the preferred shares and prevent the bankruptcy for financial institutions.	Relax the capital regulation.	–
10	November 21, 1997	Prime Minister indicates to examine to reduce the bad loans.	Relax the capital regulation.	–
11	December 1, 1997	Deposit insurance system is strengthened by government guarantee.	Effect the capital regulation.	+/–

Contd...

Table 1: Events Seem to Affect the Stock Prices (Contd...)				
Events	**Dates**	**Article Title**	**Classifications**	**Predicted Sign**
12	December 24, 1997	Setting the special exceptional rule for calculating the capital ratio.	Relax the capital regulation.	–
13	December 25, 1997	The Ministry of Finance, Japan introduces the cost method evaluation for securities.	Relax the accounting regulation (Cost Method).	–
14	January 12, 1998	The Ministry of Finance, Japan applies the secondary BIS capital regulation for 20-30 banks.	Strengthen the capital regulation.	+
15	March 31, 1999	The new standard for financing risk is established.	Strengthen the capital regulation.	+
16	April 7, 1999	Japan, US, and European countries jointly examine the BIS capital regulation to prevent out of regulative actions.	Strengthen the capital regulation.	+

The signs of Table 1 (+, –) indicate their predictions of expected stock price reactions at each event derived by the analytical model. There are three types of events with regard to the changes in the accounting regulation: (1) introducing Accounting for Income Taxes (the capital ratio improves because of the usage of deferred tax assets), (2) introducing Land Revaluation Law (capital ratio improves because of the gains from land revaluation is included as a part of bank capital), and (3) allowing banks to switch valuation methods for their securities holding (the banks that switched the methods can defer recognition of losses from their securities). All of these events relax the accounting regulation with respect to capital ratio, and it is expected that these events lead to decrease in the expected stock prices.

Table 2 represents empirical results obtained based on the equation (15).

Table 2: Events and Stock Prices Reactions				
Events	**Classifications**	**Predicted Sign**	**Abnormal Return**	**t-value**
1	Relax the accounting regulation (Land Revaluation Law)	–	0.0001	0.0614
2	Strengthen the capital regulation	+	0.0087	2.5614**
3	Strengthen the capital regulation	+	0.0075	2.2190*
4	Relax the capital regulation	–	–0.0002	–0.0121
5	Relax the accounting regulation (Accounting for Income Taxes)	–	-0.0065	–1.8595*
6	Strengthen the capital regulation	+	0.0043	1.2783

Contd...

Table 2: Events and Stock Prices Reactions (Contd...)				
Events	Classifications	Predicted Sign	Abnormal Return	t-value
7	Relax the accounting regulation (Accounting for Income Taxes)	–	0.0024	0.7281
8	Strengthen the capital regulation	+	0.0050	1.4933
9	Relax the capital regulation	–	–0.0092	–2.6269**
10	Relax the capital regulation	–	–0.0082	–2.3613**
11	Strengthen or relax the capital regulation	+/–	0.0150	4.3738**
12	Relax the capital regulation	–	–0.0019	–0.5079
13	Relax the accounting regulation (Cost Method)	–	0.0012	0.3858
14	Strengthen the capital regulation	+	0.0065	1.9082*
15	Strengthen the capital regulation	+	–0.0004	–0.0984
16	Strengthen the capital regulation	+	–0.0068	–1.9354

Note: * Significant at 5% level; ** Significant at 1% level;
Predicted sign for the event 11 cannot be determined.

There are seven events that strengthen the capital regulation. The results for events 2, 3, and 14 are supported by the analytical results that predict positive stock price reactions. Also, there are four events in relation to relax the capital regulation. The results of events 9 and 10 are supported by the predictions by the analytical results (negative reactions). However, statistically significant results for events 4 and 12 are not statistically significant. There are four events that relax the accounting regulation. Only the results of event 5 are found to be statistically significant. Other three events do not show statistically significant results.

To summarize, the empirical studies show the following results:

- The events which strengthen the capital regulation increase expected stock prices.
- The events which relax the capital regulation decrease expected stock prices.
- The events which relax the accounting regulation do not change the expected stock prices except for the introduction of "Accounting for Income Taxes".

3.4. Additional Empirical Analysis

In addition to examine the aggregated market reactions to each event, it is to be examined how each bank characteristic affects the results, specifically, how bank characteristics affect stock market reaction. According to Kojima (2004), following variables are chosen that may distinguish market participants' reactions to each event.

"CAPRATIO" is the pre-choice capital adequacy ratio, or the bank's capital adequacy ratio in the year before the adoption of the particular accounting or economic choice. This variable measures the importance of contractual agreements between banks and regulators.

CAPRATIO for international (domestic) banks is calculated as follows:

$$CAPRATIO_{int(dom)} \quad \frac{\text{bank's capital ratio} \quad 8\%(\text{or } 4\%)}{8\%(\text{or } 4\%)}.$$

Since many Japanese banks were struggling to maintain the required level of capital ratio during the sample period, it is expected that this variable and stock market reactions are negatively related.

"DEPOSIT" is bank deposits in billions of Yen ($1 = ¥110). This measures bank size and is used as a proxy for the probability of regulatory intervention and protection. No directional prediction for stock market reactions was made for this variable. "NPLOAN" is non-performing loans scaled by total lending. This is a critical signal of the bank's balance sheet quality. It is assumed that the higher is the proportion of non-performing loans to total lending, the more damaged a bank's balance sheet is. This variable and stock market reactions are negatively related: it is expected.

"SECGAIN" represents unrealized gains or losses from security holdings scaled by total equity. It also represents a critical signal of balance sheet quality. This variable and stock market reactions are positively related since banks with high SECGAIN have bigger "buffer" before they violate regulatory requirements. "INSTHLDR" is used to measure the percentage of a bank's stock held by large (block) shareholders. It is measured as one minus the percentage of stocks held by smaller stockholders[8], "frequently traded stocks". No directional prediction for stock market reactions was made for this variable.

Pearson product-moment correlation coefficients for the independent variables described above are shown in Table 3. Descriptive statistics for individual variables mentioned above are shown in Table 4.

Table 3: Pearson Product-moment Correlation Coefficients for the Independent Variables

	CAPRATIO	DEPOSIT	NPLOAN	SECGAIN	INSTHLDR
CAPRATIO	1.000	–	–	–	–
DEPOSIT	0.077	1.000	–	–	–
NPLOAN	–0.361	0.084	1.000	–	–
SECGAIN	0.371	0.157	–0.262	1.000	–
INSTHLDR	0.026	0.473	0.449	0.121	1.000

Note: CAPRATIO is a pre-choice relative capital adequacy ratio calculated as: CAPRATIO = (bank's capital ratio – 8 (4) %) / 8 (4) % for international (domestic) banks. DEPOSIT is a bank's deposits in billions of yen ($1 = 110 yen, as of October 2003). NPLOAN is a bank's risk management loans (t – 1) scaled by (t – 1) total loans. SECGAIN is unrealized gains or losses (t – 1) scaled by (t – 1) total equity. INSTHLDR is the percentage of a bank's shares held by block shareholders. This variable is calculated as (1 – frequently traded stock). Frequently traded stock variables are hand-collected for each bank from the "Company Handbook" by Toyo Keizai Shinposha, Japan.

[8] The smaller stockholders are defined as stockholders that hold more than one unit but less than 50 units of shares.

Table 4: Descriptive Statistics					
	CAPRATIO	DEPOSIT	NPLOAN	SECGAIN	INSTHLDR
Mean	1.154	4,474,893	0.047	0.381	0.786
Median	1.149	1,944,989	0.036	0.352	0.787
Maximum	1.681	43,055,902	0.226	1.378	0.961
Minimum	0.374	295,487	0.006	(0.800)	0.458
Std. Dev.	0.160	7,941,938	0.038	0.305	0.102
Observations	117.000	117	117.000	117.000	117.000

Note: CAPRATIO is a pre-choice relative capital adequacy ratio calculated as: CAPRATIO = (bank's capital ratio – 8 (4) %) / 8 (4) % for international (domestic) banks. DEPOSIT is a bank's deposits in billions of yen ($1 = 110 yen, as of October 2003). NPLOAN is a bank's risk management loans (t – 1) scaled by (t – 1) total loans. SECGAIN is unrealized gains or losses (t – 1) scaled by (t – 1) total equity. INSTHLDR is the percentage of a bank's shares held by block shareholders. This variable is calculated as (1 – frequently traded stock). Frequently traded stock variables are hand-collected for each bank from the "Company Handbook" by Toyo Keizai Shinposha, Japan.

As a primary analysis, the following regression model is used for joint tests of the predictions shown above.

$$AVECAR_{jt} = \beta_0 + \beta_1 CAPRATIO_{jt} + \beta_2 DEPOSIT_{jt} + \beta_3 NPLOAN_{jt} + \beta_4 SECGAIN_{jt} + \beta_5 INSTHLDR_{jt} + \varepsilon_{jt} \quad \text{...(Model 1)}$$

where, $AVECAR_{it}$ = three day abnormal cumulative returns of bank *i* at event *t*;

B_k = the coefficient for the k^{th} independent variable; and

ε_{jt} = an error term uncorrelated with the regressors for bank *i* at event *t*.

Due to data restriction, the above model is examined for events 9, 10, 11, and 14 described in Table 1. Table 5 shows the regression results for each event which can be summarized explained as follows.

Event 9 is an event that relaxes the capital regulation. As it can be seen from Table 2, the overall market reactions to this announcement are significantly negative. The coefficient on CAPRATIO is negative and significant at 1% level, indicating that stock market reacted more negatively for banks with higher CAPRATIO. This captures the fact that banks with lower capital ratio benefited more by the regulatory change associated with this announcement and market reacted to this news differently for banks depending on their capital ratio. The coefficient on NPLOAN is also negative and significant at 1% level, indicating that stock market reacted negatively with banks with lower level of non-performing loans so this contradicts with the prediction.

For event 11, the event impacted on capital regulations, but directional effect is not specified. The coefficient on NPLOAN is positive and significant at 5% level as predicted. The coefficient on SECGAIN

is negative and significant at 10% level as predicted. Event 14 is an event that strengthens the capital regulation. The coefficient on DEPOSIT is negative and significant at 1% level. The coefficient on SECGAIN is negative and significant at 1% level as predicted.

Table 5: Results for Regression Analysis

Variable	Predicted Signs	Event 9		Event 11		Event 14	
Intercept	+/–	0.046 (2.442)	***	–0.104 (–2.061)	**	0.018 (1.705)	*
CAPRATIO	–	–0.043 (–2.971)	***	0.036 (1.020)		0.001 (0.205)	
DEPOSIT	+/–	0.000 (–1.421)		0.000 (–0.531)		0.000 (–5.545)	
NPLOAN	+	–0.367 (–3.093)	***	0.637 (2.273)	***	0.008 (0.194)	
SECGAIN	–	0.011 (1.226)		–0.024 (–1.352)	*	–0.007 (–1.653)	**
INSTHLDR	+/–	0.012 (0.438)		0.074 (1.387)		–0.010 (–0.791)	
Number of Observations		117		117		117	
McFadden R^2		0.225		0.312		0.322	
Probability (LR Stat)		0.000		0.000		0.000	

Event 9	Relax the capital regulation	Overall CAR's t-value –2.627
Event 11	Relax or strengthen the capital regulation	Overall CAR's t-value +4.374
Event 14	Strengthen the capital regulation	Overall CAR's t-value +1.91

Overall, stock market reacted differently depending on bank's capital ratio, size of non-performing loans, unrealized holding gains, and deposit.

Conclusion

The analysis has examined how the changes in accounting regulations and capital regulations affect bank stock prices. The agency model, that describes how an introduction of the capital ratio regulation affects a bank manager's compensation contract, effort allocation, and a shareholder's profits, is used to examine whether the analytical results by the model are consistent with the empirical results.

Two interesting analytical results were derived that (1) strengthening the capital regulation leads to expected stock prices and (2) strengthening the accounting regulation leads to lower expected stock prices when the capital regulation level is relatively high from the agency model.

Using listed Japanese banks' stock prices as sample during the 1990s when many banks were struggling to maintain the required regulatory capital ratio, it is studied how series of changes in

accounting and capital regulations for Japanese banks affect their stock prices. The results show that in general, regulatory changes that strengthen capital ratio regulation affect bank stock prices positively, while regulatory changes that weaken capital ratio regulation affect bank stock prices negatively. Explicit relations are not found between accounting changes for banks and stock prices. In addition, it was found that stock market seemed to react differently to announcements that affect capital regulation depending on banks capital ratio, size of non-performing loans, unrealized holding gains, and deposit. □

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