

The Stock Price Reaction to Changes in Accounting and Capital Regulation for Japanese Banks

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Abstract:

The purpose of the paper is to empirically show how the introduction and/or the changes of capital regulation affect to bank stock prices, and how the introduction and/or the changes of accounting regulation affect to the bank stock prices. To do so, we used the agency model developed by Kojima and Okura (2003) that describes how an introduction of the capital ratio regulation affects a bank manager's compensation contract, effort allocation, and a shareholder's profits.

There are three main results as follows. (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."

Keywords:

Capital regulation, Accounting regulation, Agency model

JEL Classification:

G21, M41

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1. Introduction

The purpose of the paper is to empirically show how the introduction and/or the changes of capital regulation affect to bank stock prices, and how the introduction and/or the changes of accounting regulation affect to the bank stock prices. To do so, we used the agency model developed by Kojima and Okura (2003) that describes how an introduction of the capital ratio regulation affects a bank manager's compensation contract, effort allocation, and a shareholder's profits.

This model used the agency model where the bank shareholder is principal who maximizes her profits, and the bank manager is agent who maximizes his compensation from the shareholder while minimizing his cost of effort. Two interesting 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.

This article conducts empirical checks in order to confirm these two results using Japanese banks as sample firms. The empirical studies generally supports above two results.

The rest of the paper is organized as follows. The Section 2 sketches agency model developed by Kojima and Okura (2003). Section 3 presents the empirical studies using Japanese banks data. Some concluding remarks are presented in Section 4.

2. Basic Model

Kojima and Okura (2003) built the model where a principal (bank shareholder) is interested in maximizing his or her profits, and an agent (bank manager) is interested in maximizing his or her compensation from shareholders while minimizing his or her cost of effort¹. We assume that the shareholder is risk-neutral, and that the manager is weakly risk-averse. The manager is assumed to have exponential utility:²

$$u(\omega) = 1 - e^{-r\omega} \tag{1}$$

¹ Refer to Lambert (2001) for applications of agency theory to accounting research.

² The development of the model is based on Hughes and Thevaranjan (1995).

where r denotes a risk parameter ($r \geq 0$) and ω 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 effort. For the purposes of our model, we define 'good effort' and 'bad effort' 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:

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

and $\kappa \in (0, \infty)$. κ implies the degree of accounting flexibility. When $\kappa = 0$, bad effort is costless because accounting is very flexible. As κ increases, bad effort becomes more costly to the manager.

The manager's compensation is described as follows:³

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

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

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

where the stock price, y , can be observed by the shareholder after the manager chooses her effort allocation and $\pi \in [0, 1]$ is the degree of market perfection. Consider two extreme cases, $\pi = 0$ and $\pi = 1$. When $\pi = 0$, then the market cannot distinguish between good and bad effort. On the other hand, when $\pi = 1$

³ Following Holmström and Milgrom (1987), Feltham and Xie (1994), and Banker and Thevaranjan (2000), we assume that the compensation plan is linear in the performance measure, signal, and the manager's compensation.

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_y^2 . Income from compensation is then:

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

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:

$$\Gamma = a + \varepsilon. \quad (6)$$

It is important to note that Γ becomes observable by a shareholder *after* the manager's effort allocation and outcome are realized. Γ 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 Γ because it is unavailable until the shareholder pays the manager. Figure 1 shows the sequence of the events in the model.

Figure 1 about here

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

$$R = a + b \quad (7)$$

To analyze the effect of capital regulation, we define the capital ratio 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, we can assume 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 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:

$$\begin{aligned}
& \underset{A,B}{\text{Maximize}} \quad \Pi \equiv E[\Gamma] - E[c(y)] \tag{8} \\
& \text{Subject to} \quad E\left[1 - \exp\left\{-r\left((A + By) - \frac{1}{2}(a^2 + \kappa b^2)\right)\right\}\right] \geq 0 \\
& \quad (a,b) \in \arg \max_{(a,b)} E\left[1 - \exp\left\{-r\left((A + By) - \frac{1}{2}(a^2 + \kappa b^2)\right)\right\}\right] \\
& \quad a + b = R.
\end{aligned}$$

Therefore, we can derive:

$$B^* = \frac{\pi}{\pi^2 + (1 + \kappa)r\sigma_y^2}, \tag{9}$$

$$a^* = \frac{1}{1 + \kappa} \left(\frac{\pi^2}{\pi^2 + (1 + \kappa)r\sigma_y^2} + \kappa R \right), \tag{10}$$

$$b^* = \frac{1}{1 + \kappa} \left(R - \frac{\pi^2}{\pi^2 + (1 + \kappa)r\sigma_y^2} \right). \tag{11}$$

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

Also by using equations (9) to (11), we can derive the expected stock prices:

$$E[y^*] = \frac{1}{1 + \kappa} \left[\frac{\pi^3}{\pi^2 + (1 + \kappa)r\sigma_y^2} + R(\kappa + (1 - \pi)) \right]. \quad (12)$$

3. An Empirical Work

In this section, we conduct an empirical analysis based on our analytical model. The results generally support our analytical model using the Japanese banks as sample firms. The authors analyze (1) how the introduction and/or the changes of capital regulation affect to bank stock prices, and (2) how the introduction and/or the changes of accounting regulation affect to the bank stock prices. Using the equation (12) of our article, it is easy to verify that to increase R (i.e., to strengthen the capital regulation) leads to the increase in $E[y^*]$, that is,

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

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

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

where $\bar{R} = 1 - \left\{ \frac{(1 + \kappa)r\sigma^2}{\pi^2 + (1 + \kappa)r\sigma^2} \right\}^2$.

The equation (14) means that strengthening the accounting regulation leads to lower expected stock prices when the capital regulation level is relatively high.

Thus, following two hypotheses are examined in the following part:

- (1) Strengthening (relaxing) the capital regulation yields to higher (lower) expected stock price.
- (2) Strengthening (relaxing) the accounting regulation yields to higher (lower) expected stock price.

We use all listed Japanese banks as sample for sample years when there were frequent changes in

capital/accounting regulations on banks in Japan. This article examines whether there was a stock price reaction to each event that is supposed to affect the expected stock prices by our analytical model. In order to check above two hypotheses, we measure the average abnormal returns ($AVECAR_e$) for each event as follows:

$$AVECAR_e = \frac{1}{3} \sum_{d=-1}^{+1} \left(\frac{1}{n} \sum_{i=1}^n ABR_{i,d} \right) \quad (15)$$

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

$P_{i,d}$: 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 specify the relevant events from 1993 to 1999 using the Nikkei Telecom database. The list of events is shown in Table 1.

Table 1 about here

The signs of Table 1 (+, -) indicate their predictions of expected stock price reactions at each event derived by our 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 use 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 we expect that these events lead to decrease in the expected stock prices.

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

Table 2 about here

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 event 9 and 10 are supported by the predictions by the analytical results (negative reactions). However, we could not obtain statistically significant results for events 4 and 12. There are four events that relax the accounting regulation. Only the results of event 5 are supported. The other three events do not show statistically significant results.

To summarize, our empirical studies show the following results:

- (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 the expected stock prices except for the introduction of “Accounting for Income Taxes.”

4. Concluding Remarks

Our analysis has examined how the changes in accounting regulations and capital regulations affect bank stock prices. The agency model developed by Kojima and Okura (2003) 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.

Using listed Japanese banks stock prices as sample during the 1990s when many of banks are struggling to maintain the required regulatory capital ratio, we examine how series of changes in accounting and capital regulations for Japanese banks affect their stock prices. Our 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 negatively affect bank stock prices. We do not find explicit relations between accounting changes for banks and stock prices.

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Tables and Figures

Figure 1 **Sequence of events**

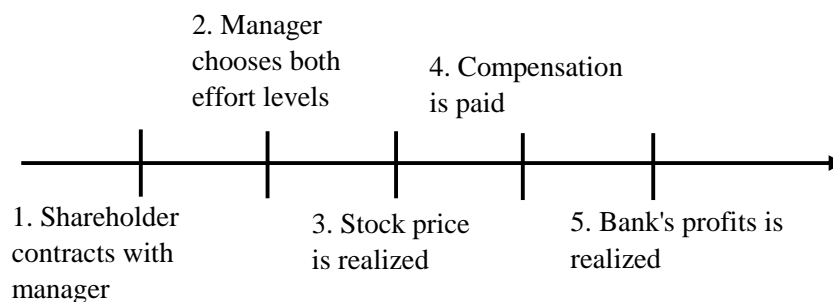


Table 1 Events seem to affect the stock prices

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 strengthen 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 strengthen by government guarantee	Effect the capital regulation	+ / -
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	+

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
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

* Significant at 5% level.

** Significant at 1% level.

Predicted sign for the Event 11 cannot be determined.