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Disciplinary Pressure is More Necessary for Cooperative Banks Than Stock Banks: Results from Bank Efficiencies Estimation

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Abstract

How to discipline managers of cooperative structured financial institutions (co-ops) is considered to be a critical issue by the Japanese financial regulatory authorities, because co-ops play a significant role in the domestic banking market, especially for small and medium-sized enterprises. This paper seeks to clarify whether the effect of the governance-related variables on firm performance varies across stock and cooperative banks in Japan. The results in this paper confirmed that the presence of outside directors has a significant effect on efficiency measures for cooperative banks. In contrast, such variables have no significant effect for stock banks. These results suggest that outsider directors' discipline is more necessary for cooperative banks than stock banks, which are under strong pressure from shareholders.

Key words: corporate governance; efficiency; outside directors; cooperative bank; regional bank

JEL Classification Code: G21; G29.

1. Introduction

In many countries around the world, cooperative structured financial institutions (co-ops) play an important role in the financial system. According to the latest statistics, some 56,000 credit unions serving 200 million members in 101 countries continue to operate despite the recent financial crisis.[1] Japan is no exception. Co-ops still hold more than a 20% share of household deposits in Japan. However, after the economic bubble burst in the early 1990s, many co-ops went bankrupt due to non-performing loan problems. These bankruptcies had several causes, but Japan's financial regulator reported that there were serious management problems in many co-ops that went bankrupt.[2]

According to the system of corporate governance, each owner of the co-ops has one vote, while at stock companies, one shareholder can hold a majority of votes and control the management of the company. The one-person-one-vote principle tends to increase the "free-riding" behavior of all members of the co-ops, since none of them has enough influence on the management and expects meaningful personal benefits from the efforts to discipline the management. In addition, as it is common practice that the members' shares are not tradable, owners of the co-ops cannot engage in takeover bids. Therefore, since there are weaker disciplinary pressures on the management in co-ops than in stock firms, the large number of co-op bankruptcies may be linked to their weak governance.[3]

Regarding U.S. credit unions, several studies provide evidence suggesting weakness in corporate governance. Leggett and Strand (2002) found that agency problems grow as credit unions increase membership groups and members, and expense preference behaviors in management and worse performance were likely to be found in large credit unions. Additionally, Frame et al. (2002) showed that membership expansion of credit unions dilutes the information advantages associated with a tight common bond of associations. Similarly, Gorton and Schmid (1999) found that the

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[1] See the details provided in the World Council of Credit Unions' Annual *Statistical Report 2012*.
[2] According to a report released by the Deposit Insurance Corporation of Japan, among 161 failures, 102 failed banks, or 63.4% of total failed banks, were considered to have serious management problems.
[3] Of course, stock companies have suffered from similar problems in governance. However, there have been many advances in recent years with regard to strengthening the governance of stock corporations. Conversely, such advancements have not been made well with regard to co-ops.

performance of Australian mutual banks declines as the number of cooperative members increases. Kane and Hendershott (1996) argued that the field-of-membership limitation and cooperative structure of the U.S. credit union encourage management to align its objectives with those of the membership, while passing up the investment opportunities. Their findings are consistent with the argument of Rasmusen (1988) that mutual banks should be associated with less risky activities than stock banks.[4] Therefore, previous studies suggest since co-op managers are under weaker disciplinary pressure, it is necessary to introduce several governance measures to discipline co-op managers.

Although the empirical evidence is not so clear-cut, some studies have looked at the relative performance of stock and mutual thrifts. Several studies indicate that stock institutions are more efficient and profitable than mutual banks (Mester, 1991; Iannotta et al., 2007; O'Hara, 1981; Sfiridis and Daniels, 2004; Verbrugge and Goldstein, 1981; Verbrugge and Jahera, 1981). In contrast, Cebenoyan et al. (1993) found that stock and mutual thrifts have similar cost structures and that the form of organization has no impact on cost efficiency. Furthermore, some studies show that mutual banks are more efficient than stock-owned banks (Altunbas et al., 2001; Blair and Placone, 1988; Mester, 1993; Valnek, 1999). Thus, it is interesting to provide new evidence about the difference in costs and efficiencies between mutual and stock companies. In this paper, we use Japanese data to investigate this issue.

Furthermore, regarding stock-owned banks, many studies have investigated what kind of board of directors operates banks efficiently. For instance, Lipton and Lorsch (1992) showed that boards with a reduced number of directors have controlled their operations more effectively than boards that have a large number of shareholders with different interests. Adams and Mehran (2005), using Tobin's Q as a proxy for performance, found that bank holding companies having a larger board are not less efficient than their peers with a smaller board. In contrast, Dalton et al. (1999) used meta-analysis and concluded that a non-zero positive relationship exists between board size and corporate performance.[5] Empirical studies on the effect of board composition on performance also

[4] Rasmusen (1988) denotes that the lower incentives of mutual institution managers to take risks, as compared with stock-owned institutions, could be one advantage of this type of bank in terms of stabilizing the financial system.

[5] In the literature on non-financial firms, some firms may benefit from large boards (Boone et al., 2007; Coles et al., 2008; Lehn et al., 2009; Linck et al., 2008).

have brought mixed results. Many studies show a significantly positive relationship between board composition (e.g., the presence of non-executives or independent members) and bank performance (Al-Hawary, 2011; Trabelsi, 2010; De Andres and Vallelado, 2008; Staikouras et al., 2007; Sierra et al., 2006; Choi and Hasan, 2005). In contrast, some empirical research shows no significant relationship between them (Adams and Mehran, 2005; Simpson and Gleason, 1999; Pi and Timme, 1993).

With regard to the mutual banks, few studies have investigated the relationship between the structure of the board of directors and bank efficiency. This is natural, because the actual corporate governance reforms of board structure to date have been developed at the demand of stock market investors. Yet how to discipline managers of cooperative companies is a particularly critical issue for financial system soundness. In particular, co-ops play a significant role in the Japanese retail banking market, especially for small and medium-sized enterprises (SMEs). Indeed, in some cases, no alternative lending source for SMEs exists in rural areas other than co-ops. On the other hand, many co-ops compete fiercely with stock banks in urban areas and become less profitable. Thus, the safety and soundness of co-ops are considerable issues not only for the SME financing landscape but also for the financial system in Japan.

The main purpose of this paper is to examine whether the structure of the board of directors affects bank performance differently across stock and cooperative banks in Japan. Our analysis consists of two stages. In the first stage, we estimate stochastic frontier cost and profit functions and examine the differences in efficiency measures between stock and cooperative banks.[6] In the second stage of the analysis, we seek to clarify the relationship between governance measures (e.g., the presence of outside directors) and efficiency by using a regression analysis for each type of bank. As far as we know, this paper is the first attempt to empirically investigate the differences in effectiveness of the corporate governance structure between stock and cooperative banks in Japan.

The remainder of this paper proceeds as follows: Section 2 reviews the nature of the corporate governance of Japan's regional financial institutions; Section 3 explains the data and methods used in the analysis; Section 4 reports the results; and Section 5 concludes the paper.

[6] Cebenoyan et al. (1993), Mester (1993), and Sfiridis and Daniels (2004) also used a stochastic frontier approach to investigate the cost efficiency of stock and mutual thrifts.

2. Corporate Governance of Japanese Regional Financial Institutions

Deposit-taking financial institutions in Japan can be divided into two groups, banks and co-ops, which have a stock-based or mutual capital structure, respectively. With regard to stock institutions, there are several types of banks, such as city banks, regional banks, second-tier regional banks, long-term credit banks, trust banks, and foreign banks. In terms of co-ops, there are credit associations, credit cooperatives, labor credit associations, agricultural cooperatives, and fishery cooperatives. Japan's Financial Services Agency (FSA) categorizes regional banks, second-tier regional banks, credit associations, and credit cooperatives as regional financial institutions because they conduct similar business without a nationwide branch network. In this study, only credit associations are considered to be mutual financial institutions due to the large difference in market share and organizational specificity of other co-ops.[7]

The regional banks and second-tier regional banks have formed a dense branch network in their regions, mainly in the prefectures where their head offices are located. Second-tier regional banks were formerly known as mutual savings banks and were allowed to convert to stock banks in 1989.[8] Since there is currently no difference in legal status and lines of business between regional banks and second-tier regional banks, we consider these two types of banks as belonging to the same group, regional banks, in the following sections. There existed 105 regional banks at the end of FY 2013, and 76 of them are publicly listed. Additionally, there are 16 banks that are subsidiaries of publicly listed bank holding companies.

With regard to the governance structure of regional banks, 75 of them adopted the executive officer system at the end of FY 2013. In Japan, the Commercial Code was substantially revised in 2003 to strengthen the corporate governance of Japanese firms. Now, some listed companies, including regional banks, have introduced the board committee system and abolished the traditional

[7] Credit associations' share of the loan market in Japan was 11.8% at the end of FY 2013, whereas credit cooperatives' share was only 1.8% at the same point in time. Credit cooperatives differ from credit associations in that they can accept deposits only from members. Furthermore, since credit cooperatives are divided into several groups according to the sharing type of common bonds in a membership, it is difficult to deal with them as one financial sector.

[8] Unlike regional banks, former second-tier regional banks were restricted from financing firms other than small firms but were allowed to perform installment financing operations.

auditor system, although they are few in number. Only two listed regional banks and one regional bank holding company adopted a board committee system at the end of FY 2013. On the other hand, appointing outside directors became popular, and 61 regional banks did so at the end of FY 2013.

Credit associations, commonly known as Shinkin banks, are relatively small financial institutions that are held by members living or operating in given regions. Shinkin banks concentrate their lending on small and medium enterprises in each region, and they are required to extend at least 80% of their loans to members. The highest decision-making body of Shinkin banks is the general meeting of all members, which is actually replaced by the meeting of representative members. To secure the independence of the representative members from the management, representative members are selected not by the management of the bank but by the nominating committee. However, the members of the nominating committee are appointed by the management. Therefore, the nominating committee likely selects those who support the management as representative members.

As previously mentioned, some Shinkin banks failed after the economic bubble burst almost two decades ago, and part of the reason for that failure has been linked to management problems. Due to these circumstances, and in order to overcome the weak governance structure of Shinkin banks, Shinkin banks have been required to appoint external auditors since 1997, with exceptions for small institutions. Recently, the FSA's council also recommended that co-ops appoint outside board directors as a means for strengthening governance.[9] Because most members of the board of directors are former bank staff members promoted to their current status by the CEO, it is difficult to expect them to oppose the CEO who gave them the positon. Therefore, the FSA council noted that it is important to appoint directors who are independent of the CEO.

In fact, many Shinkin banks have already appointed local business owners, lawyers, accountants, and politicians as part-time directors.[10] Since they have a wealth of experience, connections, and insight, part-time directors are in a good position to determine whether the management of the Shinkin banks is headed in the right direction. Moreover, they have their own main source of income

[9] A working group of the Finance Council established by the FSA published a report titled "*Progress Report of the Working Group about Cooperative Financial Institutions, Financial System Council*" (in Japanese) in June 2008.

[10] Because of the Shinkin Law, outside directors according to the legal meaning of that title are not established.

and thus do not have to worry about losing their position as a part-time director if they disagree with the chairman of the board. Therefore, they can be expected to act as a watchdog over the management.

3. Methodology and Data

3.1 Estimation of the stochastic frontier cost function

In the first stage, we concentrate on estimating the cost and profit efficiencies for the performance measures of each bank using stochastic frontier analysis (SFA). The main advantage of SFA over other methods is that it allows for measurement error and provides a firm-specific efficiency estimate.[11] More specifically, we use the standard translog cost function, which has been widely used in studies of banking efficiency. When the usual linear homogeneity restriction in input prices is imposed, the estimated functional form can be expressed as follows:

$$\ln\left(\frac{C_{it}}{p_{lit}}\right) = \alpha_0 + \sum_j \alpha_j \ln Y_{jit} + \sum_{k\neq l} \beta_k \ln\left(\frac{p_{kit}}{p_{lit}}\right) + \frac{1}{2}\sum_j \sum_m \alpha_{jm} \ln Y_{jit} \ln Y_{mit}$$

$$+ \frac{1}{2}\sum_{k\neq l}\sum_{n\neq l} \beta_{kn} \ln\left(\frac{p_{kit}}{p_{lit}}\right)\ln\left(\frac{p_{nit}}{p_{lit}}\right) + \sum_j \sum_{k\neq l} \delta_{jk} \ln Y_{jit} \ln\left(\frac{p_{kit}}{p_{lit}}\right) + \sum_t \tau_t DM_t + v_{it} + u_{it} \qquad (1)$$

Here, C_{it} denotes the real observed total cost of bank i at time t; Y_{it} and p_{it} are variables for total outputs and input prices, respectively. DM_t is a set of year dummy variables. α, β, δ, and τ are estimation parameters. v_{it} is a standard statistical error term with N(0, σ_v^2). In addition, u_{it} (u>0) is an indicator that shows the inefficiency for each bank and is assumed to be uncorrelated to any of the independent variables and v_{it}. Although the inefficiency u_{it} is usually assumed to follow a half-normal distribution in the previous studies, we assume an exponential distribution by proposing

[11] While SFA distinguishes randomness from inefficiencies, it requires an a priori assumption of the error term. In contrast, nonparametric methods such as data envelopment analysis avoid this restriction, but they neglect random noise.

the likelihood ratio test.

Following Young's theorem, symmetry conditions are also imposed on the second-order parameters in (1), i.e., $\alpha_{jm} = \alpha_{mj}$ for all j and m, and $\beta_{kn} = \beta_{nk}$ for all k and n. Moreover, this model's estimation is conducted through the maximum likelihood procedure, which is typical of the stochastic frontier approach. The estimated inefficiency of any bank is taken as the conditional mean or mode of the distribution of the inefficiency term u_{it}, given the observation of the composed error term. We employed the point estimator proposed by Battese and Coelli (1988).

We also use an alternative profit function specification that relates profit to input prices, where output is held constant while output prices vary and may affect profits.[12] It thus employs the same independent variables as the cost function. To avoid a negative log, the dependent variable is given by ln ($\pi + z + 1$), where z indicates the absolute value of the minimum value of profits (π) for all banks in the sample, and it is added to every firm's dependent variable in the profit function. In addition, the composite error term is now defined as $v - u$. As previously described, parameter restrictions are imposed, and firm-specific estimates of profit efficiency are computed as the point estimator of Battese and Coelli (1988), which is identical to the cost efficiency.

Using efficiency estimates as the dependent variable, our second-stage analysis examines the effect of governance-related variables on bank performance. To verify the robustness of the results, we also use an efficiency ranking based on ordering the banks' cost and profit efficiency levels in each year. The rankings are then changed to a uniform scale over [0, 1] using the formula $(order_{it} - 1)/(n_t - 1)$, where $order_{it}$ is the place, in ascending order, of the *i-th* bank in year t in terms of efficiency level and n_t is the number of banks in year t.[13] Thus, bank i's efficiency ranking in year t gives the proportion of the other sample banks with lower efficiency levels in that year. The bank with the lowest cost efficiency level has the lowest ranking of 0, and the bank with the highest cost efficiency level has the highest ranking of 1.

Specifying inputs and outputs is often a controversial issue in the empirical literature on banking efficiency. Following most previous studies, we employ an intermediation approach that assesses banks as financial intermediaries that utilize labor and capital to transform deposits into loans and other earning assets. Since Japanese depository financial institutions, including co-ops, rely less

[12] Translog profit and alternative profit functions have been modeled in Berger and Mester (1997).
[13] These calculation procedures follow the method of Berger et al. (2009), which applies to the Chinese banking sector.

heavily on earnings from non-intermediation activities, the intermediation approach is adequate to represent the behavior of our samples. The following three outputs are considered: interest on loans and discounts (Y_1), other interest income (Y_2), and commissions and fees (Y_3).[14] Input prices are as follows: the labor price (p_1; personnel expense / number of full-time employees and directors), the price of fund (p_2; interest expenses on deposits / total amount of deposits), and the price of capital (p_3; non-personnel expense / value of movable and immovable capital). Total cost (C) is the ordinary expenses, including these three input expenses. In the profit function, total profits (π) are defined as ordinary profits, which are simply calculated as operating income minus operating expenses.

To observe fluctuations in efficiency measures that reflect the recent changes in the managerial environment designed to mitigate the impact of the Lehman Shock in 2008, we used the data of each financial institution from FY 2009 to FY 2013 and calculated the individual technical efficiency.[15] As described earlier, in order to examine the differences between the two types of financial institutions (regional banks and Shinkin banks), the cost and profit functions are estimated for the full sample and each sub-sample. Then *F*-tests for the equality of each variance are conducted by using the sum of squares of residuals obtained from the ordinary least squares (OLS) regression. Summary statistics of these variables used to estimate the cost and profit functions are presented in Table 1.

<Insert Table 1>

3.2 Regression analysis between efficiency and governance measures

In the second stage, the efficiency measures obtained from the stochastic frontier approach are regressed with proxies for corporate governance as well as several control variables.[16] We employ a

[14] Many studies of bank efficiency have used stock measures of banking output. However, since Shinkin banks generally invest their surplus funds to their central banks, Shinkin Central Bank. Therefore, flow measures of banking output are appropriate to assess actual financial intermediation activity for Shinkin banks rather than total loans and securities.
[15] Pooled data in this study are unbalanced because of the consolidation of sample banks.
[16] We have tested a one-stage approach that simultaneously estimates the individual inefficiency as well as determinants of inefficiency. However, the results tended to be unstable due to the difficulties in choosing initial values for the coefficients of the factors that can be considered as determinants of inefficiency.

pooled cross-section OLS model with heteroskedasticity consistent standard error estimators.[17] In addition to an analysis that uses the measured efficiency indicators (efficiency level), we also performed an analysis that substituted these for ranking scores within each FY sample (efficiency rank). As previously described, Japan's FSA has recently aimed to promote the strengthening of corporate governance of co-ops. Therefore, if the estimates of such governance measures have a larger impact on efficiency indicators, the governance reform is expected to improve the performance of Shinkin banks.

For the governance variables that are likely to have an impact on the efficiency of Shinkin banks, we consider three factors. The first is the number of board members (NBM), consisting of directors and corporate auditors. If a larger board size reflects a lower transparency of Shinkin banks, the estimate for NBM is expected to be negative, even though previous studies show mixed findings about the effect of board size on the performance of financial institutions. The second factor is the ratio of independent board members to total board members (ROBM), which is employed to capture the level of board independence. As mentioned before, part-time board members are expected to function as independent directors at Shinkin banks. In this paper, ROBM is defined as the ratio of part-time board members to total board members for Shinkin banks. Although these part-time directors occasionally include former bank executives, we expect them to behave in a manner similar to outside directors. Finally, in order to consider the distinctive corporate governance structure of Shinkin banks, the ratio of representative council members to total members (RRM) is employed. If having a large number of members in managerial or decision-making bodies results in lower efficiency, we can expect that the estimate for RRM will have a statistically significant negative value.

Of course, since regional banks have a stock-based capital structure, RRM is excluded for the regional banks analysis. Instead, for regional banks, we include a dummy variable (LCDM), which takes the value of 1 when a bank is listed on the stock exchange to capture the effect of a market-driven governance system.[18] In contrast to Shinkin banks, ROBM is calculated by using

[17] While bootstrap standard error estimates were also employed, some parameters could not be estimated for regional banks because of complete replications. On the other hand, consistent results were confirmed for Shinkin banks.

[18] Regional banks affiliated with publicly listed bank holding companies are also subjected to this dummy variable.

actual outside board members, not part-time board members, for regional banks.

In addition to these governance-related variables, we incorporated control variables that might be expected to have an impact on the efficiency of each type of bank.[19] First, for the bank financial indicators, the capital asset ratio (CAR) and bad loan ratio (BLR) are considered. Next, to account for lenders' willingness to meet loan demand, loan to deposit ratio (LDR) is considered. Finally, in accordance with previous studies that report a drop in efficiency directly following a merger, a dummy variable for banks that experienced a merger for each fiscal year (MGDM) is included. To reduce the simultaneity bias, we use one-year lagged values of these variables except for two dummy variables.

Financial statements for regional banks were obtained from the *Analysis of Financial Statements of All Banks* published by the Japanese Bankers' Association.[20] Those for Shinkin banks were obtained through the *Financial Statements of Shinkin Banks*, edited by Financial Book Consultants, Ltd. (Kinyu Tosho Consultant Sha). Governance variables are obtained from the *Japan Finance Directory*, published by the Japan Financial News Co., Ltd. Basic statistics of these variables used in the governance analysis are presented in Table 2.

<Insert Table 2>

4. Empirical Results

4.1 Summary of efficiency measures

To start with, we examined the differences in cost and profit structure between regional banks and Shinkin banks; thus, whether each sub-sample has the same functional structure was of concern. As a result, the *F*-test rejected the null hypothesis of constant error variances at the 1% level for both cost and profit functions; thus we concluded that stock and mutual banks have different functional

[19] In previous studies, the natural logarithm of total assets was commonly used as a control variable. However, since severe multicollinearity is present with the size of board that is considered as a key governance variable, we exclude it from our regression model.
[20] When needed, we used the financial statements of individual banks.

structures.

Based on the stochastic frontier analysis using the sub-samples of each type of bank, Table 3 gives the yearly efficiency indicators.[21] The results suggest that regional banks have exhibited a mean cost efficiency score of 0.9246 over the entire sample period, which is much greater than that of Shinkin banks. As shown in the overall standard deviation, the variation in cost efficiency scores of Shinkin banks is greater than that for regional banks. With regard to changes in the yearly mean cost efficiency scores, both types of banks show a similar, stable trend.

On the other hand, Shinkin banks exhibited a greater mean profit efficiency score than did regional banks. However, the gap is smaller than that of the cost efficiency score, and the yearly mean efficiency scores of Shinkin banks as a whole become higher. Furthermore, the variation in profit efficiency scores of Shinkin banks is less than that of regional banks on the whole.

< Insert Table 3>

4.2 Regression results

Table 4 displays the second-stage OLS regressions with cost efficiency (levels and ranks) as the dependent variable. The results for regional banks are shown on the left side of the table. With regard to cost efficiency levels, none of the estimates of governance-related variables are statistically significant. At least for cost efficiency ranks, the estimate of NBM (number of board members) is negative and statistically significant at the 1% level. Although the effect of bank board size on bank performance is mixed, the result is inconsistent with Tanna et al. (2011), who found a positive and statistically significant relationship between board size and efficiency for UK banks.[22] The estimates of ROBM (the ratio of independent board members to total board members) and LCDM (dummy variables for listed banks) have no significant effect on the efficiency of regional banks. With regard to the other control variables, the estimates of CAR (capital asset ratio) have significant positive impacts on both cost efficiency measures. In contrast, the estimates of MGDM (dummy variables for merged banks) have significant negative impacts.

[21] To save space, the estimated parameters are not shown; however, they are available upon request.
[22] Tanna et al. (2011) used efficiency measures derived from a data envelopment analysis (DEA) approach.

The results for Shinkin banks are shown on the right side of the table. In sharp contrast to the results for regional banks, the estimates of governance-related variables are statistically significant on the whole. In particular, the estimates of ROBM show positive signs, indicating that a higher level of board independence is associated with higher cost efficiency. Although very few studies have investigated the effects of outside directors for the co-ops, the results support previous findings that show the positive role of outside directors (Baysinger and Butler, 1985; Ezzamel and Watson, 1993; Rosenstein and Wyatt, 1990). Moreover, while the result is statistically insignificant for cost efficiency levels, the estimates of RRM (the ratio of representative council members to total members) show negative signs. As described in an earlier section, the representative council is the highest decision-making body for Shinkin banks. Thus, though it seems good for as many members as possible to participate in the decision process of the co-ops because of their cooperative ownership structure, the results suggest that a smaller representative council fosters Shinkin banks' efficiency. In accordance with the results for regional banks, NBM have negative impacts on both efficiency levels and ranks. With regard to the other control variables, all the estimates have significant impacts on the efficiency measures.

<Insert Table 4>

The corresponding findings for profit efficiency are presented in Table 5. The results for regional banks are shown on the left side of the table. Among governance-related variables, only the estimates of NBM have negative and statistically significant impacts on both of the profit efficiency measures. In accordance with the results in Table 4, none of the estimates of ROBM and LCDM have significant impacts on either of the profit efficiency measures. Thus, our results show no clear evidence that board composition and market discipline affect the performance of Japanese regional banks.[23] With regard to the other control variables, almost all of the estimates are statistically insignificant. Interestingly, only the estimates of LDR (loan to deposit ratio) have positive and statistically significant impacts for the models excluding governance-related variables. These results are totally opposite to those for cost efficiency measures.

[23] Several studies have found that listed banks have lower efficiency than non-listed banks (Altunbas et al., 2001; Athanasoglou et al., 2008).

The right side of Table 5 shows the results for Shinkin banks. In contrast to the findings for regional banks, only the estimates of NBM are statistically insignificant. The estimates of ROBM show positive signs, indicating that a higher level of board independence is associated with higher profit efficiency, in accordance with the results for cost efficiency measures. Similarly, the estimates of RRM show negative signs, indicating that profit efficiency may be improved through the reduction of decision-making bodies. With regard to the other control variables, all of the estimates have significant impacts on the profit efficiency ranks. However, many of them are statistically insignificant for profit efficiency levels. In addition, almost all of the estimates of these variables show signs opposite to those for cost efficiency measures. These results probably reflect the differences in the consequences of risk-taking activities. Thus, as shown in the estimates of LDR, a more aggressive lending attitude might lead to lower profit margins due to fierce competition.

Finally, in order to confirm the justification for including the governance variables in the estimation formula, we conduct a likelihood ratio test. As a result, we find that the null hypothesis that the estimates for all governance-related variables are 0 can be rejected at the 1% significance level for Shinkin banks, whereas those for regional banks cannot be rejected even at the 10% significance level. This suggests that because disciplinary pressures other than measures that are explicitly considered in this paper have effectively disciplined regional banks' managers, additional effects of these measures cannot be detected.

5. Conclusion

This study examines whether the relationship between governance measures and firm performance varies across stock and mutual forms in Japanese regional financial institutions through a two-stage approach: (1) calculating cost and profit efficiency scores from the stochastic frontier approach and (2) regressing efficiency scores on governance-related factors. We have compared two types of regional financial institutions: regional banks and Shinkin banks. The latter institution is classified as a cooperative bank in Japan. Among various governance measures, we pay special attention to the role of outside directors.

Results in this paper confirmed that the effects of governance measures on efficiency scores are quite different between stock and cooperative banks. Although no significant impacts on regional

banks have been found, there were positive and significant impacts on both cost and profit efficiency measures for Shinkin banks. Thus, with respect to Shinkin banks, our findings support the current proposals of the FSA's council to appoint outside directors to the board as a means for strengthening governance of the co-ops. Additionally, the significant negative effects of the size of representative council members may suggest that a general meeting of representatives is not entirely effective in disciplining the managers at Shinkin banks. However, it is not easy to restructure the board of directors for co-ops. In stock companies, pressure exerted by large shareholders may also encourage changes in board size and structure; however, in co-ops, where each owner has only one vote, this type of pressure from owners is absent. Therefore, regulatory intervention will be needed.

<Insert Table 5>

Of course, our paper leaves several open questions for future research, such as reasons for the insignificant results for regional banks. However, few previous studies have investigated the effects of governance on efficiency measures between stock and mutual banks simultaneously. Therefore, this paper sheds light on research debates about the governance of financial institutions.

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Table 1. Descriptive statistics of the variables employed in the cost function estimation (2009–2013)

(Unit：Person, Millions of Yen, %)

Variables	Regional banks		Shinkin banks	
	Mean	Std. dev.	Mean	Std. dev.
Total cost (C)	45,454	32,992	7,745	8,768
Operating profit（Π）	11,335	14,879	1,134	2,293
Interest on loans and discounts (Y_1)	33,821	27,047	5,217	6,350
Other interest and dividend income (Y_2)	9,272	8,351	2,103	2,376
Fees and commissions (Y_3)	8,075	7,695	701	859
Price of labor (p_1)	8.0665	1.1040	7.1911	0.8929
Price of deposits (p_2)	0.0013	0.0009	0.0014	0.0008
Rental price of capital (p_3)	0.4787	0.2886	0.3907	0.1615
Observations	526		1351	

Table 2. Descriptive statistics of the variables employed in the governance analysis

(Unit: Person, %)

Variables	Regional banks		Shinkin banks	
	Mean	Std. dev.	Mean	Std. dev.
Number of board members (NBM)	13.9563	3.5499	13.1347	2.7159
Ratio of outside board members (ROBM)	7.3408	12.3461	26.9840	16.8278
Ratio of representative members (RRM)	-	-	0.5284	0.3178
Dummy variables for listed banks (LCDM)	0.8669	0.3400	-	-
Capital adequacy ratio (CAR)	10.8128	1.7902	13.6894	6.5768
Bad loans ratio (BLR)	3.6218	1.2760	6.9132	2.9609
Loan–deposit ratio (LDR)	74.4411	7.3114	51.5106	9.6734
Dummy variables for merged banks (MGDM)	0.0076	0.0870	0.0074	0.0857
Observations	526		1351	

Table 3. Descriptive statistics of efficiency scores

	Regional banks					Shinkin banks				
	Obs.	Cost efficiency		Profit efficiency		Obs.	Cost efficiency		Profit efficiency	
		Mean	Std. dev.	Mean	Std. dev.		Mean	Std. dev.	Mean	Std. dev.
2009	106	0.9125	0.0836	0.8932	0.1033	272	0.8697	0.1019	0.9174	0.0869
2010	105	0.9283	0.0435	0.9058	0.0581	271	0.8671	0.0988	0.9269	0.0384
2011	105	0.9250	0.0543	0.9099	0.0486	271	0.8558	0.1280	0.9224	0.0562
2012	105	0.9274	0.0491	0.9047	0.0601	270	0.8734	0.0964	0.9214	0.0613
2013	105	0.9298	0.0413	0.9086	0.0460	267	0.8766	0.0875	0.9246	0.0373
All	526	0.9246	0.0567	0.9044	0.0666	1351	0.8685	0.1036	0.9225	0.0590

Note: These measures were obtained from each subsample.

Table 4. Determinants of cost efficiency levels and ranks

Variable	Regional banks				Shinkin banks			
	Efficiency level		Efficiency rank		Efficiency level		Efficiency rank	
Constant	0.8952 ***	0.9094 ***	0.3735 *	0.5850 ***	0.7453 ***	0.7761 ***	0.1331 **	0.2111 ***
	(0.0410)	(0.0430)	(0.1916)	(0.1989)	(0.0260)	(0.0340)	(0.0655)	(0.0785)
CAR	0.0031 *	0.0036 **	0.0109	0.0188 **	0.0030 ***	0.0031 ***	0.0106 ***	0.0107 ***
	(0.0017)	(0.0017)	(0.0079)	(0.0079)	(0.0005)	(0.0005)	(0.0017)	(0.0017)
BLR	-0.0027	-0.0033 *	-0.0267 ***	-0.0373 ***	-0.0067 ***	-0.0070 ***	-0.0214 ***	-0.0226 ***
	(0.0020)	(0.0019)	(0.0097)	(0.0100)	(0.0010)	(0.0010)	(0.0024)	(0.0025)
LDR	0.0001	0.0001	0.0015	0.0008	0.0025 ***	0.0025 ***	0.0072 ***	0.0074 ***
	(0.0003)	(0.0003)	(0.0018)	(0.0018)	(0.0004)	(0.0004)	(0.0009)	(0.0009)
MGDM	-0.2391 ***	-0.2385 ***	-0.4740 ***	-0.4473 ***	-0.2268 ***	-0.2214 ***	-0.3888 ***	-0.3739 ***
	(0.0746)	(0.0752)	(0.0306)	(0.0320)	(0.0484)	(0.0469)	(0.0279)	(0.0299)
NBM		-0.0011		-0.0114 ***		-0.0019 *		-0.0070 **
		(0.0007)		(0.0042)		(0.0011)		(0.0029)
ROBM		-0.0001		-0.0004		0.0003 *		0.0010 *
		(0.0002)		(0.0012)		(0.0002)		(0.0005)
LCDM		0.0009		-0.0582				
		(0.0091)		(0.0389)				
RRM						-0.0228 *		-0.0277
						(0.0126)		(0.0324)
Adjusted R^2	0.1490	0.1472	0.0371	0.0529	0.1241	0.1260	0.1257	0.1286
Observations	526				1351			

Note: The numbers in parentheses are the White heteroskedasticity adjusted standard error. *** and ** stand for significance at the 1% and 5% levels, respectively.

Table 5. Determinants of profit efficiency levels and ranks

Variable	Regional banks				Shinkin banks			
	Efficiency level		Efficiency rank		Efficiency level		Efficiency rank	
Constant	0.9277 ***	0.9711 ***	0.5342 ***	0.6921 ***	0.9161 ***	0.9354 ***	0.6753 ***	0.7293 ***
	(0.0417)	(0.0419)	(0.1908)	(0.2177)	(0.0174)	(0.0236)	(0.0645)	(0.0773)
CAR	-0.0011	0.0002	-0.0062	-0.0009	-0.0003	-0.0002	-0.0049 ***	-0.0043 ***
	(0.0017)	(0.0016)	(0.0078)	(0.0080)	(0.0003)	(0.0003)	(0.0014)	(0.0014)
BLR	0.0042 *	0.0025	0.0212 **	0.0139	0.0011 *	0.0006	0.0145 ***	0.0134 ***
	(0.0023)	(0.0017)	(0.0106)	(0.0096)	(0.0006)	(0.0006)	(0.0027)	(0.0027)
LDR	-0.0003	-0.0004	-0.0006	-0.0009	0.0000	-0.0001	-0.0041 ***	-0.0047 ***
	(0.0004)	(0.0004)	(0.0018)	(0.0020)	(0.0003)	(0.0003)	(0.0010)	(0.0009)
MGDM	-0.2294 ***	-0.2278	-0.1738	-0.1641	0.0487 ***	0.0516 ***	0.3996 ***	0.4061 ***
	(0.0320)	(0.1982)	(0.1464)	(0.1898)	(0.0058)	(0.0078)	(0.0468)	(0.0517)
NBM		-0.0028 ***		-0.0127 ***		-0.0007		0.0005
		(0.0010)		(0.0048)		(0.0008)		(0.0032)
ROBM		-0.0003		-0.0006		0.0005 ***		0.0013 **
		(0.0003)		(0.0016)		(0.0001)		(0.0006)
LCDM		0.0026		0.0265				
		(0.0059)		(0.0342)				
RRM						-0.0292 ***		-0.1194 ***
						(0.0093)		(0.0325)
Adjusted R^2	0.0921	0.1009	0.0073	0.0182	0.0069	0.0256	0.0527	0.0645
Observations	526				1351			

Note: The numbers in parentheses are the White heteroskedasticity adjusted standard error. *** and ** stand for significance at the 1% and 5% levels, respectively.