The Fall of "Organ Bank" Relationships During the Wave of Bank Failures and Consolidations: Experience in Pre-war Japan*

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Abstract

This paper examines how the close ties between banks and non-banking firms—the so-called "organ bank" relationship in Japanese banking literature—declined through bank failures and banking consolidations in pre-war Japan. With a unique dataset compiled from 1,007 Japanese banks that were doing business between 1926 and 1936, we measure the degree of the "organ bank" relationship by the number of people who worked as directors or auditors for both a bank and a non-banking firm at the same time. We found that the number of "interlocking directors" declined in our sample period, when there were many bank failures and bank mergers and acquisitions. Furthermore, the remaining interlocked directors, after the wave of bank failures and consolidations, no longer demonstrated negative effects on the performance of the banks, as measured by their profitability. Our findings suggest, based on experience in Japan, that banking consolidations and selection through failure may help eliminate the detrimental connections between banks and non-banking firms.

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1 Introduction

The financial system in pre-war Japan has long been characterized by the fact that a number of banks had close relationships with non-banking companies. Those banks are called "organ banks," the original meaning of which is a bank that acts as a tool for related non-banking companies. Organ banks played an important role in raising funds for their related industrial firms. However, the literature has stressed that loans organ banks made to their related group tended to be used for unsound projects, and as a result, they were frequently defaulted on, which in turn damaged the banks' performance.[1]

Meanwhile, during the 1920s and 1930s, the Japanese banking sector experienced a significant structural change due to a wave of bank failures and mergers and acquisitions. The total number of private banks declined from its peak of 2,334 in 1901 to 65 by 1945. The most rapid decline happened in the period between 1920 and 1932, when, due to a sequence of financial crises, government policies promoted banking consolidations.

What happened to organ bank relationships during the period of banking consolidation in pre-war Japan? According to our data, the connections between banks and non-banking companies faded as a result of banking consolidation, both in terms of the number of connections and the negative effects of these connections on bank performance. In other words, we observe the fall of the "organ bank" relationship during the wave of bank consolidations.

This observation comes from a dataset we compiled from 1,007 Japanese banks that were doing business between 1926 and 1936, consisting of major accounting variables, such as total assets, total deposits, security holdings, return on equity, etc., as well as information such as the time of a failure or a merger or acquisition event. It also includes information on bankers'

[1] See Kato (1957), Takahashi and Morigaki (1968), Ishii (1999), Imuta (2002), and Okazaki, Sawada and Yokoyama (2005), for example.

personnel ties with non-banking companies. As for the information on personnel ties, we measure the degree of the connections banks had with non-banking companies through the number of "director interlocks," defined as the number of instances in which a bank director or auditor served as a director or auditor of a related non-banking company at the same time. Our empirical analysis shows that banking consolidation reduced the number of director interlocks. With respect to small banks in particular, the number of interlocks per bank, as well as per director, declined during our sample period. The number of director interlocks declined faster for the banks that experienced consolidation. Furthermore, in addition to the decline in the number of interlocks, the quality of the interlocks changed. We confirmed that the negative effect of interlocks on the banks' profitability, measured by returns on equity, diminished over our sample period, and that this change was only observed in the banks that experienced consolidations.

Our empirical study, using pre-war Japanese banking data, addresses the question of the impact of banking consolidation on the bank-firm relationship. There is already a vast body of literature on the impact of banking consolidation, but our study distinguishes itself from the others with a new focus on how the personal ties between banks and non-banking firms changed because of the consolidations. The studies closest to ours might be the analysis of the impact of banking consolidation on the supply of credit to small business borrowers, represented by Berger et al. (1998). Empirical studies on small business lending in the United States generally explore loan-level data and investigate how banking consolidation changes the allocation of loan portfolios. We could not find loan-level data for pre-war Japanese banks, but we have data on the personal connections of the directors of banks and non-banking firms, and there was a dramatic change in the bank-firm relationship within our sample period. So, although our study also examines the bank-firm relationship, we focus on how this relationship affects the

performance of banks through the governance structure determined by this relationship.

It was recently discovered in the banking literature that it is the organizational and governance structure, not bank size, that matters in small-business lending (Takats, 2004; Peek and Rosengren, 1998). This suggests that the change in the organizational and governance structure of banks brought about by bank consolidation may be more important than the change in bank size, which was also a consequence of bank consolidation. The historical data we used in this paper has a unique feature in providing us with information on how the banks' boards of directors were organized, in terms of their relationships with industrial companies, both before and after consolidation.[2] To our knowledge, this is the first empirical study on the impact of banking consolidation on the bank-firm relationship through the channel of governance structure of banks.

Another strand of the literature relating to our work is on relationship banking, or sometimes more narrowly called "related lending." As summarized in La Porta, Lopez-de-DeSilanes and Zamarripa (2003), there are advantages and disadvantages to relationship banking (i.e. close ties between banks and firms). The "information view" focuses on the positive effect of relationship banking in overcoming asymmetric information problems between banks and business borrowers, especially in the early stages of economic development. Lamoreaux (1994), Aoki, Sheard, and Patrick (1994), Petersen and Rajan (1994), and Hoshi and Kashyap (2001) provide empirical evidence supporting this view. The "looting view," on the other hand, stresses that related lending may result in unsound loans to related firms and encourages interest groups to loot bank resources and direct them to their related borrowers in case the borrowers default. La Porta et al. (2003) showed an example of "looting" through

[2] Data on director interlocking in 1926 was compiled and first explored in Okazaki, et al. (2005). Interlocking data used in this paper extended the old data set by including the number of interlocks in 1931 and 1936.

related lending with loan data from Mexican banks during their financial distress of the 1990s. Also, using data on interlocking in Japanese banks in 1926, Okazaki et al. (2005) confirmed that director interlocks were harmful to the profitability of banks and increased the probability of bank runs and closures.

Related to these prior works, in particular to Okazaki et al. (2005), we explore how this negative side of relationship banking changed over time in pre-war Japan. Interestingly, these negative effects diminished along with banking consolidation.[3]

The rest of paper is organized as follows. Section 2 explains our data. Sections 3 to 5 describe our empirical analysis on the impact of banking consolidation on organ bank relationships. Section 3 focuses on the quantitative decline of organ bank relationships accompanying bank failures and consolidations. Section 4 focuses on the effect of bank-firm relationships on bank performance and its change over time. And Section 5 provides a comparison between a sub-sample of consolidated banks and non-consolidated banks on both the quantity change and the quality change of their connections with non-banking firms. Conclusions and discussions are summarized in Section 6.

2 Overview of Organ Bank Relationships and Banking Consolidations

2.1 Data

We focus on the interlocking of directors and auditors between banks and non-banking companies to measure the connection between them, following Okazaki et al. (2005). The data source for director interlocking is *Ginko Kaisha Yoroku* (*Directory of the Banks and Firms*) by

[3] Other studies that document the negative effect of organ bank relationships in pre-war Japan include Kato (1957), Takahashi and Morigaki (1968), Teranishi (2000), Yamazaki (2000), and Okazaki et al. (2005), but these studies did not address the change of this effect of banking consolidation.

Tokyo Koshinjo, one of Japan's largest private credit bureaus.[4] We found the names of the directors and auditors of each bank and non-banking firm with a paid-in capital larger than ¥200,000. As in Okazaki et al. (2005), if a person was a director at a certain bank and a director of a non-banking firm at the same time, we identified this as one interlock. If a person was a director at a certain bank and at the same time served as a director for two non-banking firms, we identified two interlocks. As we were interested in how the organ bank relationship was affected by structural changes in the late 1920s and early 1930s, we compiled data on interlocking in 1926, 1931, and 1936.

We obtained financial data on each bank from *Ginkokyoku Nenpo* (*Yearbook of the Bank Bureau of the Ministry of Finance*), which covers all of the banks in Japan. We took banks commonly found in both sources, *Ginko Kaisha Yoroku* and *Ginkokyoku Nenpo,* as samples.[5] The financial data in *Ginkokyoku Nenpo* was limited to balance-sheet data. Also, data on negative profits (losses) was censored.[6]

Ginko Jiko Geppo (*Monthly Report Bank Issue*), prepared by the Bank of Japan, exists as a data source. Using this source, we identified the cause of each exit: consolidation, bankruptcy, closure, dissolution, etc.[7] For each consolidation, we found information on the date of the event, the type of consolidation, and the locations of the headquarters, as well as information on the paid-in capital of the participants. The consolidation types fall into three categories: absorption, acquisition, and combination forming a new bank. The third type,

[4]Director positions include chairman, president, vice-president, executive director, ordinary director, and auditor. Some banks did not have senior director positions (chairman, president, vice-president, or executive director).

[5]As the point of time covered in *Ginko Kaisha Yoroku* differs from that in *Ginkokyoku Nenpo,* we lost many observations in matching these sources, especially when consolidations and failures occurred frequently. Therefore, to keep as many sample observations as possible, we used the end value of 1926 and the beginning value of 1931 and 1936 (the end value of 1930 and 1935), with respect to *Ginkokyoku Nenpo*.

[6]If a bank's profit was negative, the negative value was not reported in this source.

[7] *Ginko Jiko Geppo* dose not carry information on all types of exits, other than consolidations before June 1930. Therefore we supplemented this information, using Goto (1968).

combining into a new bank, was where a new bank was established after the dissolution all of the participants. According to Kin'yu Kenkyukai (Research Committee of Financial Issues) (1934), in the cases where the participants were of nearly equal power, they tended to choose to combine into a new bank. So, in the following analysis, we define the third type of consolidation, a combination into a new bank, as a "merger of equals." We define the first two types of consolidation, absorption and acquisition, as absorbing consolidations. All the other bank exits are categorized as bank failures.

2.2 Basic Statistics

Panel A in Table 1 shows basic statistics on director interlocking in 1926, 1931, and 1936. We divided the banks into two groups, large banks and small banks. Large banks are those with assets of more than ¥10 million. The number of large banks decreased by about 25% between 1926 and 1936, while the number of small banks decreased by about 60%, implying that the share of small banks sharply declined in this period. With respect to all of the banks in the sample, the average number of interlocks per bank in 1926 was as large, at 7.26. This value gradually increased from 1926 to 1936. Looking at the small-bank and large-bank sub-samples, we found the average number of interlocks in small banks declined in this period, whereas it did not in the large banks. We observed a similar tendency with respect to the number of interlocks normalized by the total number of directors (the number of interlocks per director). On the other hand, the number of interlocks normalized by asset size (number of interlocks/asset) decreased in both large and small banks. In the end, we found that director interlocking with non-banking companies was attenuated in small banks in the late 1920s and early 1930s, while it was not in large banks.

Panel B shows the composition of director interlocks by year. Using the positions of

the directors involved in the bank and the non-banking company, we classified director interlocking into four types. Here, we focus on the positions of senior director and junior director. Senior director refers to the president, chairman, vice-president, and executive director. Junior director refers to an ordinary director and auditor. For example, in 1926, interlocks between the senior directors at banks and the senior directors at non-banking companies made up 5.2% of all interlocks. This composition of director interlocking did not vary substantially in 1926, 1931, and 1936. Also, the composition did not differ considerably between large and small banks (not reported in the table).

Panel C shows basic statistics on the banking industry by year and bank size.[8] There was a sharp upward trend in the asset size of all banks from 1926 to 1936. The increase in bank size is mainly due to consolidations and failures among small banks. While profitability (ROA and ROE, or return on assets and return on equity, respectively)[9] decreased from 1926 to 1931, it improved slightly after that until 1936, basically reflecting changes in macroeconomic conditions.[10]

3 Bank Exits and the Presence of Director Interlocking

3.1 Expected Effect of Bank Exits

As stated above, many banks exited the industry through consolidations and failures in the late 1920s and early 1930s. We examined how director interlock affected the possibility of bank exits and investigated its implications. As the banks with director interlocking tended to exit from the industry with higher probability, the share of those banks with director

[8] See appendix (definition of variables) for variable definitions.
[9] In calculating ROA and ROE, we used zero as the value of censored profits.
[10] The bottom year of the Great Depression in Japan was 1931. Japan returned to the gold standard in 1930, accompanied by cutbacks in government spending and deflation.

interlocking would decline. This effect is related to a change in the quantity of director interlocking. At the same time, bank exits might have had the effect of changing the quality of director interlocking (Okazaki, 2004). We detail this quality change in Section 4, where we show that director interlocking was negatively correlated with profitability in respect to small banks, but not with respect to large banks. Given this relationship, we inferred that if there was a higher probability of small banks with director interlocking exiting the industry, the average quality of director interlocking would improve. So, here we examine whether director interlocking increased the probability of exiting, especially with respect to small banks.

3.2 Model

We used data on the banks that operated in 1926 to examine how director interlocking between banks and non-banking companies affected the probability of bank exits in the period from 1927 to 1936. In this analysis, we refer to all types of exits, except consolidations, as failures, and we classify bank consolidations into absorbing consolidations and mergers of equals. The first classification includes absorptions and acquisitions in *Ginko Jiko Geppo*, and the second includes the combinations that became new banks. So, in our analysis there are three types of bank exits, categorized according to their cause: failures, absorbing consolidations, and mergers of equals. To capture the effect of director interlocking (as well as bank size) on the probability of bank exits, we estimate the following equation using a multi-nominal logit model.

$$\text{Prob}(EXIT_i) = F[\beta_0 + \beta_1 * INTERLOCK_i + \beta_2 * SIZE_i + \beta_3 EQ_i + \beta_4 * CAPDEPO_i + \beta_5 * LIQUID_i + \beta_6 * ROE_i + \beta_7 * SECURITY_i] \quad (1)$$

The dependent variable, EXIT, can take 4 values. It takes the value one, two, or three if a

bank exited through a merger of equals, an absorbing consolidation, or a failure, respectively. It takes the value of zero if the bank survived through the end of 1936. While independent variables are data from 1927 to 1936, the explanatory valuables are data from 1926.

In selecting the explanatory variables, we principally followed the literature on the determinant of bank failures and M&As (Focarelli et al. 2002; Wang, 2004; Wheelock and Wilson, 2000). INTERLOCK is the variable we used to capture the effect of the organ bank relationship[11]. If banks with director interlocking tended to exit with higher probability, the expected INTERLOCK coefficient would be positive. We used two alternative INTERLOCK variables. One is the natural log value of the number of interlocks (LNINTERLOCK).[12] The other is the number of interlocks normalized by the number of directors (INTDIRC). SIZE, measured by the log value of banks' total assets, is supposed to capture the risk of a bank[13]. Since large banks can generally bear an economic or liquidity shock more easily through diversifying their asset or liability risk, compared to small banks, larger banks have a greater capability to endure shocks than smaller banks. Smaller banks were more likely to be consolidated because their restructuring was more manageable to the banks acquiring them (Focarelli et al. 2002)[14], and also because the Bank Law of 1927 discouraged the existence of small banks, by prescribing a high minimum capital requirement. Therefore, we expected the SIZE coefficient to be negative. EQ is used to capture the effect of the Great Kanto Earthquake in 1923. It takes the value 1 if a bank's headquarters was located in the areas damaged by this earthquake, i.e., Tokyo, Kanagawa, Chiba and Saitama prefectures. Several prior investigations pointed out that many banks in the south Kanto area suffered from bad loan problems as a result

[11] In Wang (2004), INTERLOCK is used to capture the management efficiency of a bank.
[12] In actual estimations, we used the natural log value of one plus the number of interlocks.
[13] We used the value of total capital plus total deposits as total assets, because we could not get the complete value of the total assets of the banks from *Ginkokyoku Nenpo*.
[14] Actually, former research confirmed that bank size significantly correlated with the probability of being acquired (Focarelli et al. 2002; Wheelock and Wilson, 2000; etc.).

of Great Kanto Earthquake (Kato, 1957; Takahashi and Morigaki, 1968, etc.). Hence, we expected EQ to have a positive effect, at least, on the probability of failure.

The rest of the explanatory variables are financial ratios. These variables were chosen to capture the components of the CAMEL rating, which has become a standard guideline for the risk of bank failure (Wang, 2004; Wheelock and Wilson, 2000)[15]. CAPDEPO, indicating the ratio of equity capital to total deposits (the inverse of LEVERAGE), was used to the capture capital adequacy of a bank. Low value for this variable indicates high risk[16]. Therefore, we expected the sign of this variable to be negative. LIQUID was the variable for liquidity. It indicates the ratio of bank deposit reserves to total assets. If a bank had sufficient liquid assets, it was unlikely to face a run or closure, because it could accommodate the withdrawal demands of its depositors. Therefore, we expected LIQUID to have a negative effect on bank failures. We used ROE (return on equity as a variable indicating profitability, and expected ROE to have a negative effect on bank failures. Also, we expected ROE to have a negative effect on the probability of being consolidated, if the purpose of the bank consolidation was to transfer superior management skills from the acquirer banks to the target banks. Finally, we used SECURITY to capture asset quality. As stated in previous section, security holdings were considered to be relatively safe as compared to loans. Therefore, we expected SECURITY to be negatively associated with bank failures.

3.3 Results

The results are reported in Table 2. INTERLOCK refers to the log value of the number

[15]CAMEL: capital adequacy, asset quality, management efficiency, earnings, liquidity. This rating system has been used by Federal Reserve banks in the United States.

[16] It should be noted that, as is stated in Wang (2004), high CAPDEPO value may reflect a bank's inability to collect deposits due to loss of credibility. In this case, CAPDEPO is expected to have a positive effect on bank failures. Therefore, it might be better to interpret the CAPDEPO coefficient as the net effect between capital adequacy and incredibility.

of interlocks (LNINTERLOCK) in Panel A and the number of interlocks per director (INTDIRC) in Panel B. In each of the panels, model [1] shows the estimated result of equation (1) without the four financial ratio variables, while model [2] shows the result when we added the four financial ratios. With respect to all of the models, we tested the independence of irrelevant alternatives to check whether existence of each type of exit was irrelevant to the choice of the remaining two exit options.[17] For each type of exit, we cannot reject the null hypothesis that the two remaining alternatives that were available to a bank are irrelevant, as indicated in the last row.

For Model [1] in the panel A of Table 2, all of the INTERLOCK coefficients are positive, but it is statistically significant only with respect to failure, which implies that the more interlocks a bank had, the more likely the bank was to fail. This is consistent with the view that banks with a strong connection to their related firms performed badly due to unsound loans and, consequently, were forced to exit the market through failure. The SIZE coefficient is negative and statistically significant at the 1% level for all types of exits. This result indicates that exiting banks were smaller than the surviving banks. Furthermore, its magnitude for failure is especially large, which may reflect that bank size is strongly associated with risk. As was expected, EQ had positive effects on absorbing consolidations and failures, which indicates that banks damaged by the earthquake in 1923 were forced to exit from the market through absorptions and failures. In Model [2], where four financial ratios are added, we were also able to confirm the positive correlation between the probability of failure and the number of interlocks, but this correlation is slightly weaker. On the other hand, ROE had a strongly negative effect on the probability of failure. It is likely that ROE partially absorbed the effect of director interlocking, as we were able to show through analysis in the following section that the director interlocking

[17] See Hausman and McFadden (1984) for details.

indeed had a negative effect on ROE. However, it is notable here that director interlocking had two effects: directly increasing the probability of failure as well as indirectly lowering profitability. Other financial ratios had no significant effect on any type of exits. In panel B, we checked the result by replacing LNINTERLOCK with INTDIRC. We confirmed a positive correlation between the probability of failure and director interlocking in this alternative specification.

Finally we ran the same regressions, splitting the bank samples into small banks and large banks, as defined in Section 2. Table 3 shows the results for small banks, and Table 4 shows the results for large banks. With respect to small banks, we have results similar to the full-sample regression. Namely, small banks with greater director interlocking failed at a higher frequency. However, with respect to large banks, we did not observe a significant correlation between director interlocking and the probability of failure[18]. These results are consistent with the observation in Table 1. As we have seen, the average number of interlocks declined in small banks. That decline, at least in part, reflects the selection pressure that excluded the small banks with director interlocking.

4. Effect of Director Interlocking on Profitability and Its Change Over time

In the previous section, we observed a decline in director interlocking between banks and non-banking companies in terms of quantity through bank exits. In this section, we focus on the change in quality of director interlocking along the banking consolidation wave. To capture the change in the nature of director interlocking between banks and non-banking firms over time, we focused on the effect of director interlocking on bank performance, which is measured

[18] We eliminated EQ in our estimations of large banks (Table 4), because EQ always equals zero for all banks exiting through mergers of equals.

by the return on equity (ROE).[19] We compared the effect of director interlocking on ROE for the years 1926, 1931, and 1936, by running OLS regressions on bank profitability for each year separately.

4.1 Model

Our model of bank profitability is similar to the one used in Okazaki et al. (2005). Profitability is measured by ROE, and the factors affecting bank profitability include the loan quality, the intensity of the competition, the attitude toward risk, and economies of scale[20]. The basic OLS regression equation to be estimated is as follows:

$$ROE_i = \beta_0 + \beta_1 * INTERLOCK_i + \beta_2 * EQ_i + \beta_3 * MARKET_i + \beta_4 * SIZE_i + \beta_5 * SECURITY_i + \beta_6 * LEVERAGE_i + \varepsilon_i \quad (2)$$

The dependent variable is the banks' ROE. With respect to the explanatory variables, INTERLOCK is used to capture the organ bank relationship, as defined in the previous section. According to the literature on the organ bank relationship, the banks with stronger connections with non-banking companies devoted more funds through corrupt loans to them. Consistent with the literature, Okazaki et al. (2005) confirmed the negative effect of these variables on bank profitability, based on the data from 1926. On the other hand, for this paper, we were interested in how this negative effect changed over time.

The EQ and SIZE variables are the same as defined in Section 3, standing for earthquake

[19] ROA is also considered to be an alternative measure. However, as mentioned before, we could not get the complete value of the total assets of the banks from *Ginkokyoku Nenpo.* Therefore, we focused on ROE here. But we also estimated ROA, calculated using incomplete total assets (total capital + total deposits), and we confirmed that the result was not qualitatively different than that of ROE.

[20] There are many studies on the determinants of bank profitability that propose various models, according to the specific problems the authors were analyzing. However, most of the literature considers three factors to be important determinants of bank profitability: economies of scale, the level of external competition, and the attitude toward risk (Smirlock, 1985; Bourke, 1989; Berger, 1995, Goddard et al. 2001, 2004). In addition to these factors, Okazaki et al. (2005) included the variable of director interlocking between banks and firms to test the organ bank hypothesis.

dummy and total asset log, respectively. We included SIZE here to capture economies of scales. We used MARKET as a proxy for the extent of market competition[21]. It indicates the market share of the top three banks in a prefecture, in terms of the number of branch offices[22].

The SECURITY and LEVERAGE variables control for a bank's risk. If a bank is strongly risk-averse with a high proportion of safe assets in its portfolio, it is unlikely to earn high profits, but is also unlikely to be exposed to risk. We used SECURITY as the ratio of security holdings to the total loans[23]. Here, we assumed that securities were relatively safe assets, since they were mainly government bonds and debentures of major companies[24]. However, the sign of this coefficient is not clear *a priori*, because it depends on the relative average returns on the loans and securities. As corporate performance generally slowed in this period, it was especially possible that the profit at a bank holding more safe assets would be higher than the profits of a bank holding more risky assets[25]. LEVERAGE, which indicates a bank's financial leverage, is used to control for the effect of a bank's capital structure, following Modigliani and Miller's proposition□[26]. M&M's proposition□states that the expected return on equity increases along with financial leverage. In addition to these control variables, we included area dummies, given that some regional economic shocks were observed in the 1920s and 1930s, although this is not reported in the tables[27].

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[21] In the following analysis, we classified a prefecture as a separate market.

[22] Unfortunately, we could not access information on individual loan and deposit amounts by prefecture, with respect to banks operating in multiple prefectures. We got similar results when we replaced the share of the top three banks with the share of the top single bank.

[23] In Okazaki et al. (2005), SECURITY was defined as the ratio of security holdings to assets. However, based on data from 1931 and 1936, this ratio highly correlated with SIZE (ρ =0.454 and 0.508). On the other hand, the correlation between the ratio of security holdings to total loans and SIZE is not high (ρ = 0.188 and 0.277). Therefore, we used this ratio as the definition of SECURITY.

[24] Imuta (2002) confirmed that stocks accounted for only 10.9% of total security holdings on average, with respect to 60 banks whose data for 1925 was available.

[25] Actually, Okazaki et al. (2005) confirmed that SECURITY had a positive sign, and its magnitude was larger, especially in small banks.

[26] See Brealey and Myers (2002), Chapter 17.

[27] We split the whole country into nine areas: Hokkaido/Tohoku, North-Kanto, South-Kanto,

4.2 Results

The estimation results are reported in Table 5. Panel A indicates the results for 1926. In columns 1 and 2, the natural log value of the number of interlocks, LNINTERLOCK, is used as INTERLOCK. In column 3 and 4, the number of interlocks per director, INTDIRC, is used as INTERLOCK. According to the results, director interlocking had a strongly negative effect on bank profitability, which implies that the connection between banks and non-banking companies was unfavorable for bank profitability, as the literature on the organ bank relationship has pointed out. With respect to the other variables, the SIZE coefficient is positive and statistically significant, which implies that large banks benefited from economies of scale. EQ is negative and statistically significant. We can infer that banks damaged by the big earthquake in 1923 suffered from a problem with bad loans. We also found that, as the standard oligopoly theory predicts, banks in highly concentrated markets were relatively profitable. Finally, the banks' asset portfolios did not have a significant effect on profitability. These results are generally consistent with those of Okazaki et al. (2005)[28].

The results for 1931 are reported in Panel B. In column 1, the INTERLOCK coefficients are still negative and statistically significant. Although the absolute values of the coefficients are smaller than they were in 1926, the difference is not large. Also, the SIZE coefficient is still positive and statistically significant, and the coefficient is slightly larger than it was in 1926. Furthermore, the negative effect of the earthquake dummy (EQ) is still negative and statistically significant.

Panel C presents the results for 1936. According to column 1, the INTERLOCK

Chubu/Hokuriku, Tokai, Osaka/ Hyogo, other Kansai, Chugoku/Shikoku and Kyushu/Okinawa. Please note that the South-Kanto dummy is identical to the earthquake dummy, EQ.

[28] One exception is that the positive effect of SECURITY is attenuated compared to that in Okazaki et al. (2005). This may be because we changed the definition of SECURITY. See footnote 23.

coefficient is still negative. However, the statistical significance of the coefficient declines to 10%, and the magnitude is 40% smaller than that in 1926. On the other hand, SIZE still has a strongly positive effect on profitability, which implies that economy of scale was stable in the period from 1926 to 1936. With respect to EQ, the negative effect is no longer observed in 1936, because the Japanese banking system had recovered from the damage of the earthquake by that year.

We then checked other specifications. In column 2 of Panels A-C, including LEVERAGE, we confirmed the results with those of column 1. Namely, the negative effect of INTRERLOCK observed in 1926 and 1931 is attenuated in 1936. On the other hand, the positive effect of SIZE weakened in 1926 and 1936 compared with column 1. We considered this to reflect that LEVERAGE was highly correlated with SIZE in 1926 and 1936 (ρ=0.487, 0.527)[29]. Actually, the positive effect of LEVERAGE is especially bigger in 1926 and 1931. Hence, the LAVERAGE coefficient is considered to partially capture the effect of SIZE. Columns 3 and 4 confirm that the negative effect of INTERLOCK was remarkably attenuated from 1926 to 1936. The INTERLOCK coefficient is no longer statistically significant, and its magnitude is substantially smaller in 1936.

Meanwhile, Okazaki et al. (2005) pointed out that in 1926 the effect of director interlocking on bank performance depended on bank size. That is, with respect to small banks, director interlocking had a negative effect on bank performance, whereas it did not with respect to large banks. Hence, we estimated equation (2) by bank size (small banks and large banks). The results are reported in Table 6. Panels A, B, and C report the results for 1926, 1931, and 1936, respectively. Columns 1 and 2 in each panel show the results for small banks, and columns 3 and 4 show those for large banks. And, we used LNINTERLOCK in column 1 and 3,

[29] On the other hand, the correlation between LEVERAGE and SIZE is not high in 1931 (ρ =0.285).

and INTDIRC in column 2 and 4, as the INTERLOCK variable. In columns 1 and 2 in Panel A, we confirmed that director interlocking was harmful to small banks. As we show in columns 1 and 2 in Panels B and C, the coefficient for director interlocking at small banks is still negative and statistically significant in 1931 and 1936. Also, the absolute value of the INTERLOCK coefficient did not decline when we used INTDIRC as INTERLOCK[30]. On the other hand, with respect to large banks (columns 3 and 4), the nature of director interlocking was not bad in general.

The results of these sub-sample regressions suggest that the improvement in the quality of director, confirmed by the full sample regressions, mainly reflects a change in the scale distribution of banks. That is, the decrease in the number of small banks, which had bad relationships with non-banking companies, led to improvement in the average quality of director interlocking.

5 Effect of Banking Consolidation on Director Interlocks Using a Sub-sample

5.1 Expected Effect of Bank Consolidations

A bank consolidation is potentially expected to change the governance structures of the participating banks through the change of ownership structure and, hence, the change in the board of directors. As a matter of fact, Shiratori (2001) pointed out that one of the aims of the consolidation promotion policy in the 1920s in Japan was to remove unsound relationships between banks and industrial companies. Specifically, the government recognized that if a small bank was acquired by a large bank and became a branch of the acquiring bank, that unsound

[30] We also conducted the same regression, including the LEVERAGE variable. The results were generally similar to those in Table 6. However, the effect of SIZE weakened in 1926 and 1936, as seen in Table 5.

loans to related companies would be reduced through the discipline of the acquiring bank[31]. Even a merger of equals was likely to improve the relationship with industrial companies, because each participating bank did not want the new bank to take over the other participant's unsound relationships. Therefore, first we expected that number of director interlocks to decline through consolidations. Second, we expected that quality of director interlocking would improve, in the sense that its negative effect became weaker. In the rest of this section, we examine these expectations.

5.2 Sub-sample of Consolidated and Non-consolidated Banks

To examine the effect of the bank consolidation on director interlocking, we used the consolidation samples in the period, from January 1927 to December 1929, when bank consolidations increased sharply. Then, we compared how the quality of director interlocking changed through the consolidations, by comparing the changes in the INTERLOCK coefficient in equation (2), from 1926 to 1931, between consolidated banks and non-consolidated banks.[32]

The source of the consolidation data is *Ginko Jiko Geppo* (*Monthly Bank Affairs*), described in the previous section. We could not use all of the consolidations as samples for two reasons. The first was the availability of data on interlocking. As *Ginko Kaisha Yoroku,* the data source for interlocks, does not contain information on banks and non-banking firms with paid-in capital of less than ¥200,000, we needed to exclude the consolidations in which the paid-in capital of at least one participant was less than ¥200,000. The second reason was that in order to capture clearly the effects of consolidations in the sample period, we eliminated the effects of

[31] Stein (2002) proposed the theory that a decentralized organization had an advantage in transactions associated with soft information as compared to a hierarchical organization. Given that related lending was based on soft, corrupt relationships between banks and business groups, according to Stein's model, bank consolidation could reduce such related loans.
[32] If we use 1936 as the post-consolidation year, we lose many consolidation samples.

consolidations that occurred one year before or one year after the sample period. Namely, we excluded those consolidations where at least one participant took part in another consolidation in either 1926 or 1930. After these procedures, 69 consolidation events involving 172 participants were left to us. As the control sample, we selected those banks that did not participate in any consolidation in the period from 1926 to 1930.

Table 7 shows the number of consolidation samples and the control sample we arrived at in this way. The consolidation participants are classified into four categories, by the type of the consolidation in which they were involved. Here, multi-time consolidation refers to consolidations where at least one bank experienced more than one consolidation in the sample period. For example, if Bank A merged with Bank B in 1927 and then acquired Bank C in 1929, we regard these two consolidations as one multi-time consolidation, where Bank A consolidated with Bank B and Bank C. Basic statistics by type of participants are shown in the Table 8.[33]

5.3 Results

First, we compared the number of interlocks between the consolidation sample and the control sample (Table 9). The 172 consolidated banks had 1,218 interlocks in the pre-consolidation year (1926), and 387 non-consolidated banks had 2,416 interlocks in the same year. On the other hand, in the post-consolidation year (1936), the number of interlocks came to 814 and 1,913, respectively. The changes are -33.2% for the consolidated banks and -20.8% for the non-consolidated banks[34]. As we expected, consolidations contributed to reducing director

[33] In Table 8 and the following analysis, multi-time mergers are classified into mergers of equals if the last of the multiple consolidations was in the form of a combination into a new bank; they are classified as absorbing consolidations if the last consolidation was in the form of an acquisition or absorption. Using this classification, they were divided into 16 absorbing consolidations and 2 mergers of equals.

[34] In calculating the change of interlocks in consolidated banks, we found some bank directors who held director positions in both banks to be consolidated. To avoid double counting, we used only the value of interlocks in one side of bank with respect to such directors.

interlocks.

Next, we checked the effect of consolidations on the quality of director interlocking. The baseline of the following analyses is equation (2) in Section 4, but here we allowed the difference in the effects of director interlocking between consolidated banks and non-consolidated banks, in order to capture the effect of consolidation. Specifically, we used the consolidation dummy (CONS), with the value of one, if the bank participated in a consolidation, and a value of zero if otherwise. Then, we expressed the effect of director interlocking in the consolidated banks by the interaction terms of INTERLOCK and CONS. In the same way, the effect of director interlocking in non-consolidated banks is expressed by the interaction terms of INTERLOCK and (1-CONS).

The results are reported in Table 10. We used LNINTERLOCK as INTERLOCK in columns 1-2 and INTDIRC in columns 3-4. Column 1 indicates the results of the pre-consolidation year (1926). The coefficient of the interaction term of INTERLOCK and CONS was negative and statistically significant at a 1% level. Namely, director interlocking in consolidated banks was unfavorable to profitability in the pre-consolidation year. On the other hand, the coefficient of the interaction term of INTERLOCK and (1-CONS) was negative but not statistically significant. In addition, the absolute value of the coefficient was much smaller than that of the interaction term with CONS. These results suggest that, in the pre-consolidation year, director interlocking was unfavorable for consolidated banks, but was not so for the non-consolidated banks.

In to column 2, the coefficient of the interaction between INTERLOCK and CONS was still negative, but it was no longer statistically significant in the post-consolidation year (1931). Furthermore, its magnitude declined by 50%, compared with that in the pre-consolidation year (1926). This indicates that the quality of director interlocking in consolidated banks improved.

On the other hand, the coefficient of director interlocking in non-consolidated banks was still negative and statistically insignificant. In addition, its absolute value was two times larger than that in the pre-consolidation year. Namely, the quality of director interlocking in the non-consolidated banks was not improved in the least.

These results indicate that the consolidation had a positive effect on the nature of director interlocking. In column 3 and 4, where we replaced LNINTERLOCK with INTDIRC, we confirmed similar results, except for the CONS coefficient in the pre-consolidation year, the results were basically the same as those in columns 1-2. As the effect of the SIZE became greater, from the pre-consolidation year to the post-consolidation year, it might have affected the estimated results. Therefore, we ran the regressions, using the number of interlocks normalized by bank assets as INTERLOCK (not reported). In this case, the quality of director interlocking in the consolidated banks was improved, whereas it became worse in the non-consolidated banks. Furthermore, we had similar results in case including the LEVERAGE variable (not reported).

Next, we split CONS into three dummy variables by participant type in the consolidations, namely, ACQUIRER, TARGET, and EQUALS. ACQUIRER and TARGET are the dummy variables that indicate the bank was an acquirer and a target of the absorbing consolidation (absorptions or acquisitions, respectively). EQUALS is a dummy variable which indicates that the bank is a participant in a combination of a new bank. Then, we use these three dummy variables and their interaction terms with INTERLOCK.

The results are reported in Table 11. We used LNINTERLOCK in columns 1-2 and INTDIRC in columns 3-4 as INTERLOCK, respectively. In column 1, the INTERLOCK coefficient for the acquirer banks was negative and statistically significant at a 1% level. On the other hand, the INTERLOCK coefficient for the target banks was negative and statistically

significant at a 1% level. Although the absolute value of the latter is larger than that of the former, the difference is not large. Therefore, in the pre-consolidation year, the quality of director interlocking was not favorable for either the acquirer banks or the target banks.

In column 2, which show the results of the post-consolidation year, the variables related to the target banks were excluded by definition, and the dummy variable ACQUIRER referred to the acquirer bank after absorbing the target bank. The coefficient of ACQUIRER*INTERLOCK is still negative and statistically significant. However, the negative correlation between director interlocking and profitability in the acquirer bank is attenuated, although it absorbed the target bank with unsound relationships with non-banking firms. Also, in columns 3 and 4 we confirmed similar results. Therefore, we can say that the absorbing consolidation had a positive effect on improving the quality of director interlocking. How did the improvement happen then? Considering the power balance between acquirer banks and target banks, it is reasonable to assume that the unsound relationships, at least in the target banks, were eliminated through consolidations. To confirm this assumption, we checked how director interlocking at the target bank was eliminated through the absorbing consolidation. We found that 91% of the directors at the target banks who had director positions in non-banking companies were eliminated from the post-consolidation banks, which means 92% of the total number of interlocking relationships in the target banks were terminated. This fact is consistent with our assumption.

As for mergers of equals, the negative effect of director interlocking weakened according to columns 1 and 2. However, in columns 3 and 4, where INTDIRC was used as INTERLOCK, this effect was not observed at all. In this sense, we could not find strong evidence that mergers of equals had the effect of improving the quality of relationships between banks and firms.

6 Concluding remarks

In pre-war Japan, many banks were tied to non-banking companies through director interlocking, and the banks controlled by the non-banking companies, called "organ banks," were a source of unsound loans, which is similar to lending in contemporary developing countries. In this paper, we examined how the organ bank relationship faded in the period from the late 1920s to the early 1930s. First, we confirmed that the number of interlocks per bank, as well as per director in small banks, declined in this period. One of the reasons is that, with respect to small banks, the number of interlocks positively affected the probability of bank failure. The other reason is that consolidations had an effect on reducing interlocks. Number of interlocks declined faster with respect to the banks that experienced consolidations. In addition to a decline in the number of interlocks, the quality of the interlocks changed at the same time. As consolidations selectively excluded interlocks of unsound quality, the average quality of the interlocks improved. We confirmed that the absolute value and statistical significance of the coefficient of the interlock variable in the ROE regressions declined over time, and that this change was observed only in the banks that experienced consolidations.

A close bank-firm relationship is not unique to pre-war Japan. Lamoreaux (1994) made clear that "insider lending" was pervasive in New England in the 19th century. La Porta, et al. (2003) studied "related lending" in contemporary Mexico and pointed out that such related lending behavior is widely observed in contemporary developing countries.[35] This paper is the first attempt to see how this relationship changed over time and what mechanisms worked to promote the change, using a unique dataset on bank-level director interlocking in pre-war Japan. Our findings suggest that banking consolidation and selection through failures may help eliminate the detrimental connections between banks and non-bank firms.

[35] Further literatures include Maurer and Haber (2004) who investigated related lending in Mexico from 1880-1913, Laeven (2001) and Charumilind et al. (2003) who studied the cases for Russia and Thailand in the 1990s, respectively.

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Figures and Tables

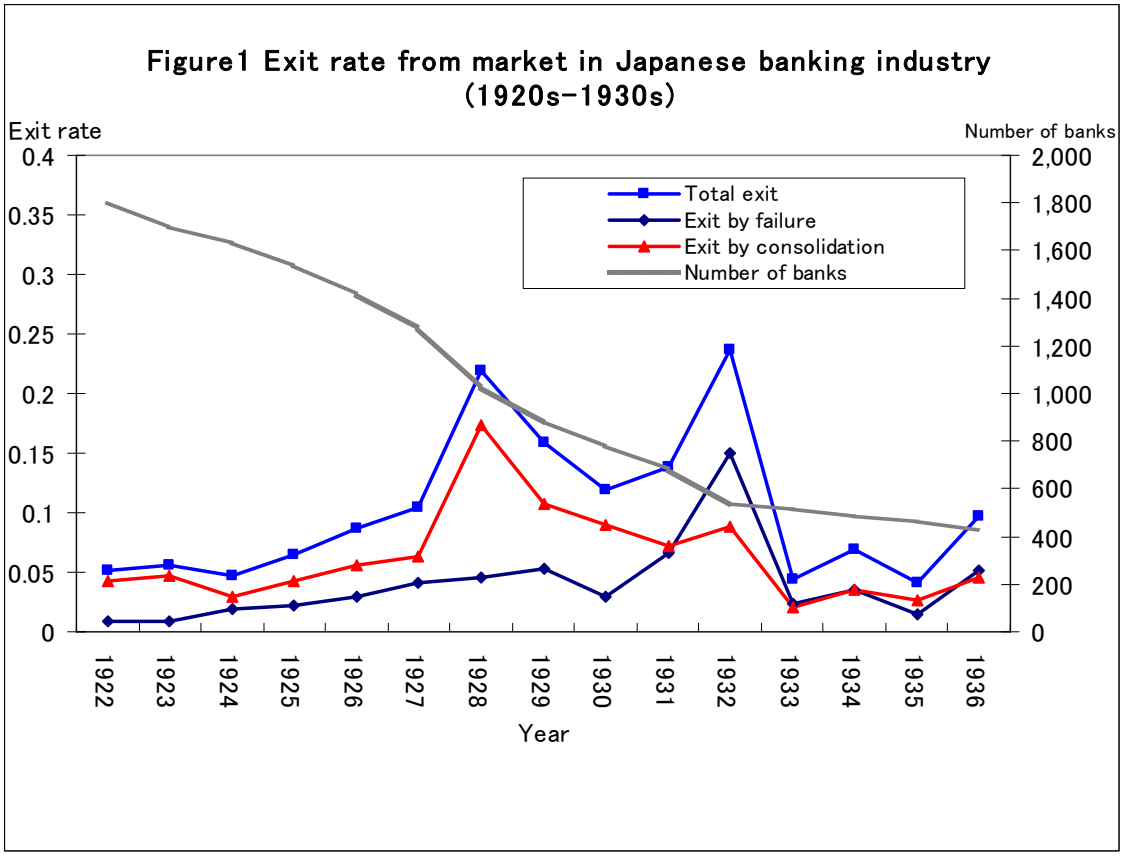

Table 1. Sample description

PanelA: Characteristics of director interlocking

Year		1926			1931			1936		
Variables/Bank size		Total	Large	Small	Total	Large	Small	Total	Large	Small
Number of interlocks	Mean	7.26	20.06	5.02	7.83	21.45	4.58	8.04	19.94	4.13
	Median	4.00	15.00	3.00	4.00	18.00	3.00	4.00	15.00	2.00
Number of directors	Mean	8.57	10.71	8.20	8.90	10.97	8.40	8.59	9.65	8.24
	Median	8.00	10.00	8.00	8.00	11.00	8.00	8.00	9.00	8.00
Number of interlocks per	Mean	0.84	1.87	0.67	0.86	1.99	0.59	0.90	2.03	0.53
director	Median	0.50	1.65	0.38	0.50	1.58	0.36	0.44	1.68	0.29
Number of interlocks/ Asset	Mean	2.77	0.72	3.13	2.38	0.71	2.78	1.75	0.62	2.12
size(million yen)	Median	1.29	0.51	1.64	1.04	0.51	1.36	0.77	0.37	1.04
Number of banks		1007	150	857	659	127	532	453	112	339
Number of banks with interlocks		836	147	689	539	126	413	374	109	265
(percentage)		83.0%	98.0%	80.4%	81.8%	99.2%	77.6%	82.6%	97.3%	78.2%

Panel B: Composition of director interlocking

Year	1926		1931		1936	
	Director in non-banking company					
	Senior	Junior	Senior	Junior	Senior	Junior
(Bank Director)						
Senior director	5.1%	22.4%	4.7%	22.1%	5.7%	22.2%
Junior director	10.8%	61.7%	11.7%	61.6%	15.6%	56.4%

Panel C: Basic statistics

		1926			1931			1936		
Variables/ Bank size		Total	Large	Small	Total	Large	Small	Total	Large	Small
Assets(miliion yen)	Mean	10.96	60.3	2.33	15.92	72.2	2.49	25.69	95.62	2.72
	Std.dev.	(47.53)	(111)	(2.01)	(72.61)	(153)	(2.12)	(119.8)	(227.86)	(2.14)
Total Loans/Total Deposits	Mean	2.11	1.59	2.2	1.51	1.25	1.58	1.36	1.42	1.14
	Std.dev.	(11.13)	(6.78)	(11.72)	(2.81)	(3.06)	(2.74)	(4.12)	(4.15)	(0.34)
Equity Capitals/Total Deposits	Mean	1.04	0.29	1.17	0.81	0.34	0.93	1.01	1.23	1.14
	Std.dev.	(7.06)	(0.26)	(7.65)	(1.87)	(0.59)	(2.04)	(5.11)	(5.85)	(4.03)
ROE	Mean	13.28	13.84	13.18	7.94	8.96	7.7	8.97	10.27	8.54
	Std.dev.	(7.92)	(7.82)	(7.94)	(6.45)	(3.85)	(6.91)	(5.98)	(5.28)	(6.14)
ROA	Mean	4.11	2.75	4.35	2.35	1.72	2.5	2.43	1.61	2.70
	Std.dev.	(3.2)	(2.64)	(3.23)	(2.17)	(1.06)	(2.34)	(1.99)	(0.93)	(2.17)
Security Holdings /Total Loans	Mean	0.155	0.243	0.14	0.292	0.464	0.251	0.507	0.798	0.412
	Std.dev.	(0.298)	(0.253)	(0.303)	(0.647)	(0.34)	(0.695)	(0.699)	(1.078)	(0.482)
bank deposit reserve/Assets	Mean	0.089	0.088	0.089	0.102	0.100	0.102	0.13	0.098	0.139
	Std.dev.	(0.077)	(0.050)	(0.804)	(0.093)	(0.700)	(0.098)	(0.094)	(0.057)	(0.101)

Table 2. Determinants of type of exits in Prewar Japanese banking industry (all banks)

Panel A: LN(INTERLOCK)

	[1]			[2]		
Type of Exit	Mergers of	Absorbing	Failures	Mergers	Absorbing	Failures
Explanatory Variables	equals	consolidation		of equals	consolidation	
LN(INTERLOCK)	0.151	0.0178	0.3241 a	0.1674	0.0084	0.2414 b
	(0.1164)	(0.0998)	(0.1085)	(0.117)	(0.0992)	(0.1113)
SIZE	−0.3277 a	−0.4195 a	−0.6234 a	−0.3494 a	−0.4233 a	−0.4952 a
	(0.0945)	(0.0771)	(0.0935)	(0.1098)	(0.08)	(0.0936)
EQ	−0.4554	0.6522 a	1.0485 a	−0.3696	0.6477 b	0.8918 a
	(0.3759)	(0.2505)	(0.2486)	(0.383)	(0.2546)	(0.2638)
CAPDEP				−0.2515 b	−0.0036	0.0271
				(0.1227)	(0.0419)	(0.0296)
LIQUID				−1.1452	0.701	−2.3637
				(1.1236)	(1.0035)	(1.566)
ROE				0	−0.0136	−0.0823 a
				(0.0104)	(0.0107)	(0.0193)
SECURITY				−1.0552	−0.0634	−0.296
				(0.6953)	(0.2365)	(0.4114)
INTERCEPT	3.9416 a	5.9679 a	8.1952 a	4.6303 a	6.1783 a	7.7012 a
	(1.2977)	(1.059)	(1.2677)	(1.537)	(1.1071)	(1.2658)
NOB		1007			1007	
Log Likelihood		−1310.309			−1276.662	
Pseudo		0.0375			0.0622	
IIA-test	−0.56	3.11	−0.28	0.39	0.67	−2.65

Panel B: Number of Interlocks per director

	[1]			[2]		
Type of Exit	Mergers of	Absorbing	Failures	Mergers	Absorbing	Failures
Explanatory Variables	equals	consolidation		of equals	consolidation	
INTDIRC	−0.026	0.0582	0.3568 a	−0.0009	0.0525	0.3113 a
	(0.1149)	(0.0995)	(0.0948)	(0.1143)	(0.0962)	(0.0961)
SIZE	−0.2501 a	−0.4348 a	−0.6188 a	−0.2669 b	−0.4427 a	−0.5109 a
	(0.0916)	(0.0722)	(0.0866)	(0.107)	(0.0744)	(0.0864)
EQ	−0.4635	0.6346 b	0.9187 a	−0.382	0.6349 b	0.7878 a
	(0.3775)	(0.2524)	(0.2502)	(0.3845)	(0.2563)	(0.2625)
CAPDEP				−0.2323 c	−0.0062	0.023
				(0.1208)	(0.0341)	(0.0222)
LIQUID				−1.1223	0.695	−2.3767
				(1.1614)	(0.9986)	(1.5336)
ROE				−0.0015	−0.0133	−0.0821 a
				(0.0106)	(0.0107)	(0.019)
SECURITY				−1.0857	−0.0639	−0.3481
				(0.721)	(0.2422)	(0.4224)
INTERCEPT	3.0523 b	6.1772 a	8.349 a	3.6868 b	6.4378 a	8.0671 a
	(1.3107)	(1.0339)	(1.2234)	(1.5515)	(1.0762)	(1.2269)
NOB		1007			1007	
Log Likelihood		−1307.358			−1274.027	
Pseudo		0.0397			0.0642	
IIA-test	−0.16	1.31	−1.08	1.75	−3.05	−3.54

Notes: Significance at 1%, 5% and 10% level are denoted by "a" "b" and "c", respectively. The figures in parentheses are heteroscedasticity robust standard errors. Significance levels are reported for two-tailed tests. IIA-test reports the value of test on the Independence from Irrelevant Alternatives property (Hausman and McFadden, 1984). Definition of variables can be found in appendix.

Table 3. Determinants of type of exits in Pre-war Japanese banking industry (small banks)

Panel A: LN(INTERLOCK)

	[1]			[2]		
Type of Exit	Mergers of	Absorbing	Failures	Mergers	Absorbing	Failures
Explanatory Variables	equals	consolidation		of equals	consolidation	
LN(INTERLOCK)	0.1178	0.019	0.3464 a	0.1424	0.0061	0.2638 b
	(0.1266)	(0.1062)	(0.1163)	(0.1276)	(0.1054)	(0.1206)
SIZE	−0.4622 a	−0.4114 a	−0.6806 a	−0.5637 a	−0.411 a	−0.4619 a
	(0.1351)	(0.1183)	(0.1347)	(0.157)	(0.1219)	(0.1416)
EQ	−0.1156	0.4012	1.1761 a	0.0315	0.3867	1.0703 a
	(0.3984)	(0.2928)	(0.2805)	(0.4025)	(0.3014)	(0.3019)
CAPDEP				−0.3695 b	−0.0022	0.0197
				(0.1472)	(0.0254)	(0.0174)
LIQUID				−2.0895 c	0.0711	−3.1919 c
				(1.2264)	(1.0078)	(1.6866)
ROE				−0.0026	−0.0129	−0.0893 a
				(0.01)	(0.0116)	(0.0205)
SECURITY				−0.8013	0.0541	−0.6605
				(0.6818)	(0.2052)	(0.6302)
INTERCEPT	5.8561 a	5.8999 a	8.9528 a	7.8326 a	6.0843 a	7.374 a
	(1.8681)	(1.6516)	(1.8607)	(2.1849)	(1.6999)	(1.9334)
NOB		857			857	
Log Likelihood		−1130.926			−1094.3022	
Pseudo		0.0265			0.058	
IIA-test	3.56	1.04	−0.45	14.63	−0.50	−1.12

Panel B: Number of Interlocks per director

	[1]			[2]		
Type of Exit	Mergers of	Absorbing	Failures	Mergers	Absorbing	Failures
Explanatory Variables	equals	consolidation		of equals	consolidation	
INTDIRC	0.0506	0.1109	0.4454 a	0.0922	0.1048	0.4166 a
	(0.1471)	(0.1216)	(0.1132)	(0.148)	(0.12)	(0.1181)
SIZE	−0.429 a	−0.4375 a	−0.6861 a	−0.5248 a	−0.4429 a	−0.4855 a
	(0.1302)	(0.115)	(0.1301)	(0.1526)	(0.1187)	(0.1361)
EQ	−0.1402	0.375	1.0219 a	−0.0018	0.3654	0.9327 a
	(0.4016)	(0.2944)	(0.2849)	(0.4057)	(0.302)	(0.3049)
CAPDEP				−0.3603 b	−0.0047	0.017
				(0.147)	(0.0198)	(0.0125)
LIQUID				−2.0944 c	0.015	−3.307 b
				(1.2476)	(0.9946)	(1.6502)
ROE				−0.0037	−0.0124	−0.089 a
				(0.01)	(0.0115)	(0.0204)
SECURITY				−0.831	0.0462	−0.7484
				(0.7031)	(0.2173)	(0.561)
INTERCEPT	5.5107 a	6.2374 a	9.2277 a	7.4306 a	6.4925 a	7.8325 a
	(1.8443)	(1.6353)	(1.8374)	(2.1685)	(1.6882)	(1.9048)
NOB		857			857	
Log Likelihood		−1127.1989			−1090.2144	
Pseudo		0.0297			0.0615	
IIA-test	2.76	0.15	−0.45	5.86	1.08	−0.69

Notes: Significance at 1%, 5% and 10% level are denoted by "a" "b" and "c", respectively. The figures in parentheses are heteroscedasticity robust standard errors. Significance levels are reported for two-tailed tests. IIA-test reports the value of test on the Independence from Irrelevant Alternatives property (Hausman and McFadden, 1984). Definitions of variables can be found in Appendix.

Table 4. Determinants of type of exits in Prewar Japanese banking industry (large banks)

Panel A: LN(INTERLOCK)

	[1]			[2]		
Type of Exit	Mergers of	Absorbing	Failures	Mergers	Absorbing	Failures
Explanatory Variables	equals	consolidation		of equals	consolidation	
LN(INTERLOCK)	0.3662	0.0019	0.0636	0.4411	0.0896	0.1063
	(0.3162)	(0.3251)	(0.3139)	(0.339)	(0.301)	(0.3358)
SIZE	−0.5084	−0.2683	−0.2828	−0.3794	−0.107	−0.2986
	(0.3095)	(0.2793)	(0.2766)	(0.287)	(0.283)	(0.3138)
CAPDEP				0.0832	−2.9449 c	1.3666 c
				(0.8082)	(1.7218)	(0.813)
LIQUID				10.7774 b	12.024 b	7.5564
				(5.1089)	(5.3376)	(5.4765)
ROE				0.0089	−0.0634	−0.0228
				(0.0278)	(0.0461)	(0.0401)
SECURITY				−3.4657 c	−7.2836 a	0.9775
				(1.9866)	(2.0958)	(0.6272)
INTERCEPT	6.5676	3.4695	3.3773	3.8017	2.3466	2.4839
	(4.8912)	(4.3801)	(4.4605)	(4.7723)	(4.6986)	(5.328)
NOB		150			150	
Log Likelihood		−179.29038			−162.41772	
Pseudo		0.0123			0.1053	
IIA-test	−0.01	−0.24	0.04	1.07	0.62	−8.98

Panel B: Number of Interlocks per director

	[1]			[2]		
Type of Exit	Mergers of	Absorbing	Failures	Mergers	Absorbing	Failures
Explanatory Variables	equals	consolidation		of equals	consolidation	
INTDIRC	−0.2354	0.0827	0.0328	−0.1876	0.1642	0.0819
	(0.195)	(0.1955)	(0.2013)	(0.2055)	(0.2111)	(0.2109)
SIZE	−0.2402	−0.3206	−0.2793	−0.1182	−0.1636	−0.3072
	(0.3031)	(0.2843)	(0.2764)	(0.2861)	(0.29)	(0.3094)
CAPDEP				0.2361	−2.9249 c	1.358 c
				(0.783)	(1.6865)	(0.7985)
LIQUID				8.9404 c	12.4046 b	7.5747
				(5.2243)	(5.3654)	(5.567)
ROE				0.0079	−0.0587	−0.0221
				(0.0277)	(0.0427)	(0.039)
SECURITY				−3.7615 c	−7.3652 a	0.9925
				(1.9741)	(2.1801)	(0.6273)
INTERCEPT	3.386	4.2162	3.4299 c	1.056	3.1618	2.7544
	(5.0342)	(4.6828)	(4.6066)	(4.9409)	(4.9094)	(5.4192)
NOB		150			150	
Log Likelihood		−179.20565			−162.46878	
Pseudo		0.0128			0.105	
IIA-test	−0.01	0.18	−0.10	−2.56	−0.09	3.37

Notes: Significance at 1%, 5% and 10% level are denoted by "a" "b" and "c", respectively. The figures in parentheses are heteroscedasticity robust standard errors. Significance levels are reported for two-tailed tests. IIA-test reports the value of test on the Independence from Irrelevant Alternatives property (Hausman and McFadden, 1984). Definition of variables can be found in Appendix.

Table 5. Effect of director interlocking on bank profitability

PanelA: Year 1926

Dependent Variable	ROE			
Definition of INTERLOCK	LN(INTERLOCK)		INTDIRC	
Explanatory Variables/Model	[1]	[2]	[3]	[4]
INTERLOCK	−1.1852 a	−0.9959 a	−0.8087 a	−0.7541 a
	(0.3361)	(0.3335)	(0.2949)	(0.2705)
SIZE	1.1844 a	0.4505 c	0.9497 a	0.2599
	(0.2454)	(0.2652)	(0.2287)	(0.2417)
EQ	−3.0715 a	−3.5748 a	−2.7208 a	−3.2713 a
	(0.9063)	(0.8839)	(0.9087)	(0.8873)
MARKET	0.0508 c	0.0389	0.0481	0.0361
	(0.0296)	(0.0272)	(0.0295)	(0.027)
SECURITY	1.5287	1.5084	1.646	1.6118 c
	(1.011)	(0.9705)	(1.0021)	(0.9554)
LEVERAGE		0.6937 a		0.7178 a
		(0.1556)		(0.1551)
INTERCEPT	−3.6472	5.5166	−1.4092	7.3098 b
	(3.5392)	(3.5932)	(3.4571)	(3.4405)
Log Likelihood	−3397.137	−3376.7	−3400.32	−3378.36
NOB	1007	1007	1007	1007
Censored Observation	64	64	64	64

Panel B: Year 1931

Dependent Variable	ROE			
Definition of INTERLOCK	LN(INTERLOCK)		INTDIRC	
Explanatory Variables/Model	[1]	[2]	[3]	[4]
INTERLOCK	−0.9548 a	−0.9099 a	−0.7265 a	−0.6967 b
	(0.3445)	(0.3395)	(0.2719)	(0.2696)
SIZE	1.3961 a	1.1063 a	1.2603 a	0.9776 a
	(0.2949)	(0.2814)	(0.2665)	(0.2547)
EQ	−2.396 b	−2.6749 a	−1.9927 b	−2.2889 b
	(0.9766)	(0.9905)	(0.9436)	(0.9527)
MARKET	0.0024	0.0027	−0.002	−0.0015
	(0.02)	(0.0196)	(0.0203)	(0.0199)
SECURITY	0.1697	0.1482	0.1612	0.1406
	(0.4981)	(0.4807)	(0.5132)	(0.4944)
LEVERAGE		0.257 a		0.2584 a
		(0.0408)		(0.0402)
INTERCEPT	−11.8607 a	−8.2417 b	−10.6643 a	−7.1115 b
	(3.7532)	(3.6027)	(3.5229)	(3.3804)
Log Likelihood	−2008.167	−1995.11	−2009.39	−1996.24
NOB	659	659	659	659
Censored Observation	92	92	92	92

Panel C:Year 1936

Dependent Variable	ROE			
Definition of INTERLOCK	LN(INTERLOCK)		INTDIRC	
Explanatory Variables/Model	[1]	[2]	[3]	[4]
INTERLOCK	−0.6987 c	−0.5882 c	−0.2437	−0.3519
	(0.3943)	(0.3527)	(0.5753)	(0.3331)
SIZE	1.2199 a	0.4312	1.01 a	0.3013
	(0.2509)	(0.2764)	(0.2801)	(0.2708)
EQ	1.3931	0.3319	1.5933 c	0.5465
	(1.0342)	(0.8941)	(0.9191)	(0.8677)
MARKET	−0.0375 c	−0.0329	−0.0382 c	−0.034
	(0.0217)	(0.0215)	(0.0217)	(0.0214)
SECURITY	1.7315 b	1.5072 b	1.7143 b	1.5229 b
	(0.8157)	(0.6826)	(0.8305)	(0.6794)
LEVERAGE		0.5666 a		0.5787 a
		(0.1366)		(0.1416)
INTERCEPT	−9.2026 b	1.116	−7.0121 c	2.3692
	(3.5486)	(3.6995)	(3.9574)	(3.7127)
Log Likelihood	−1365.33	−1343.33	−1366.93	−1344.14
NOB	453	453	453	453
Censored Observation	46	46	46	46

Notes: Significance at 1%, 5% and 10% level are denoted by "a" "b" and "c", respectively. The figures in parentheses are heteroscedasticity robust standard errors. 7 area dummies are included. Significance levels are reported for two-tailed tests.

Table 6. Effect of director interlocking on bank profitability by bank size

PanelA: Year 1926

Dependent Variable	ROE			
Bank Size	Small banks		Large banks	
Definition of INTERLOCK	LN(INTERLOCK)	INTDIRC	LN(INTERLOCK)	INTDIRC
Explanatory Variables/Model	[1]	[2]	[3]	[4]
INTERLOCK	−1.3368 a	−0.8622 b	0.1483	−0.2348
	(0.3584)	(0.3376)	(0.9197)	(0.6348)
SIZE	1.9452 a	1.6322 a	−0.1975	0.0054
	(0.4069)	(0.396)	(0.8356)	(0.7841)
EQ	−3.7282 a	−3.3522 a	1.1645	1.1694
	(1.0134)	(1.0268)	(2.2492)	(2.1831)
MARKET	0.0603 b	0.0574 c	0.0476	0.0476
	(0.0306)	(0.0311)	(0.0897)	(0.0904)
SECURITY	1.863 c	1.9989 c	−0.8223	−0.8454
	(1.0933)	(1.074)	(1.0713)	(1.0669)
INTERCEPT	−14.2235 b	−11.0431 c	14.0973	11.4547
	(5.7592)	(5.6795)	(12.7275)	(12.9044)
Log Likelihood	−2875.095	−2879.683	−511.353	−511.282
NOB	857	857	150	150
Censored Observation	61	61	3	3

Panel B: Year 1931

Dependent Variable	ROE			
Bank Size	Small banks		Large banks	
Definition of INTERLOCK	LN(INTERLOCK)	INTDIRC	LN(INTERLOCK)	INTDIRC
Explanatory Variables/Model	[1]	[2]	[3]	[4]
INTERLOCK	−0.9314 b	−0.8638 b	−0.8136	−0.4961 c
	(0.3817)	(0.3989)	(0.5159)	(0.2558)
SIZE	2.0842 a	1.9388 a	1.1104 b	1.1138 b
	(0.5556)	(0.5335)	(0.4589)	(0.4364)
EQ	−2.7546 b	−2.3646 b	−1.7895	−1.489
	(1.2083)	(1.1736)	(1.6002)	(1.5128)
MARKET	−0.0015	−0.0049	0.0276	0.0247
	(0.0264)	(0.0266)	(0.0217)	(0.022)
SECURITY	0.1011	0.1136	0.2807	0.4126
	(0.5122)	(0.5353)	(0.8932)	(0.8972)
INTERCEPT	−21.5161 a	−20.0841 a	−8.7364	−10.1724
	(7.4901)	(7.293)	(6.523)	(6.8085)
Log Likelihood	−1627.155	1628.152	−337.328	−336.777
NOB	532	532	127	127
Censored Observation	86	86	6	6

Panel C:Year 1936

Dependent Variable	ROE			
Bank Size	Small banks		Large banks	
Definition of INTERLOCK	LN(INTERLOCK)	INTDIRC	LN(INTERLOCK)	INTDIRC
Explanatory Variables/Model	[1]	[2]	[3]	[4]
INTERLOCK	−0.7979 c	−0.9128 c	0.3049	0.6372
	(0.435)	(0.5173)	(0.814)	(0.7775)
SIZE	1.9589 a	1.8782 a	0.6343	0.4768
	(0.535)	(0.5198)	(0.6664)	(0.6683)
EQ	0.2159	0.413	3.1791	2.4087
	(1.0148)	(1.0039)	(2.1866)	(1.5503)
MARKET	−0.0393	−0.0405	0.0092	0.0133
	(0.0274)	(0.0272)	(0.029)	(0.0301)
SECURITY	3.1819 a	3.2158 a	0.84 c	0.6861
	(0.9741)	(0.9829)	(0.4375)	(0.495)
INTERCEPT	−20.0308 a	−19.4359 b	−3.8687	−1.5341
	(7.6638)	(7.5546)	(10.0294)	(10.622)
Log Likelihood	−1017.76	−1018.087	−332.7052	−331.326
NOB	341	341	112	112
Censored Observation	41	41	5	5

Notes: Significance at 1%, 5% and 10% level are denoted by "a" "b" and "c", respectively. The figures in parentheses are heteroscedasticity robust standard errors. 7 area dummies are included. Significance levels are reported for two-tailed tests.

Table 7. Observations of consolidation samples

	Number of consolidation				
	Total	1927	1928	1929	Number of participating banks
(1) Consolidation					
Merger (absorption)	23	8	9	6	47
Acquisition	11	2	7	2	22
Combination into a new bank	17	5	7	5	42
Multi-times merger	18				61
Total consolidations	69				172
(2) Peer group (Non-consolidated)	387				387

Table 8: Sample description about pre-merger banks

Panel A: Acquirer banks

Variable	NOB	Mean	Std. Dev.	Min	Max
Number of Interlocks	50	11.44	12.33	0.00	63.00
Number of interlocks per director	50	1.21	1.24	0.00	5.25
ROE	50	13.65	4.46	1.47	23.96
ROA	50	3.50	2.05	0.10	9.64
Assets(1000 yen)	50	36486.53	87244.54	761.16	475586.30
EQ	50	0.12	0.33	0	1
MARKET	50	32.16	15.41	11.31	63.64
SECURITY	50	0.26	0.39	0.01	2.73

Panel B: Target banks

Variable	NOB	Mean	Std. Dev.	Min	Max
Number of Interlocks	74	6.04	7.60	0.00	34.00
Number of interlocks per director	74	0.70	0.90	0.00	4.20
ROE	74	12.38	7.10	0.00	47.62
ROA	74	4.32	5.12	0.00	40.37
Assets(1000 yen)	74	4968.41	11003.66	56.71	80121.54
EQ	74	0.11	0.31	0	1
MARKET	74	33.90	16.03	11.31	63.64
SECURITY	74	0.14	0.13	0.00	0.78

Panel C: Participants in mergers of equals (combination into a new bank)

Variable	NOB	Mean	Std. Dev.	Min	Max
Number of Interlocks	48	5.75	5.48	0.00	27.00
Number of interlocks per director	48	0.74	0.72	0.00	3.38
ROE	48	14.62	5.91	0.00	30.06
ROA	48	4.54	2.01	0.00	9.02
Assets(1000 yen)	48	2170.54	1700.50	480.14	8722.22
EQ	48	0.00	0.00	0	0
MARKET	48	31.45	15.23	13.17	94.59
SECURITY	48	0.12	0.16	0.00	0.80

Panel D: Non-consolidated banks (Control samples)

Variable	NOB	Mean	Std. Dev.	Min	Max
Number of Interlocks	387	6.24	8.47	0.00	66.00
Number of interlocks per director	387	0.79	0.97	0.00	5.60
ROE	387	13.63	7.50	0.00	63.26
ROA	387	4.42	3.21	0.00	28.43
Assets(1000 yen)	387	7029.58	39319.25	249.68	572070.10
EQ	387	0.13	0.34	0	1
MARKET	387	28.27	12.63	11.31	100.00
SECURITY	387	0.14	0.20	0.00	2.34

Table 9. Change in number of interlocks from pre- to post-consolidation

	NOB	Total number of interlocks		Growth rate
		1926(pre-M&A)	1931(Post-M&A)	
(1) Total consolidation	69	1218	814	-33.2%
Absorbing consolidation	50	997	683	-31.5%
Merger of equals	19	221	131	-40.7%
(2) Peer group (Non-consolidated)	387	2416	1913	-20.8%

Table 10. Effect of consolidation on the nature of bank governance

Panel A: Ln(Number of Interlocks)

Dependent Variable	ROE			
Definition of INTERLOCK	LN(INTERLOCK)		INTDIC	
Year	1926 (Pre-merger)	1931 (Post-merger)	1926 (Pre-merger)	1931 (Post-merger)
Explanatory Variables/Model	[1]	[2]	[3]	[4]
CONS	2.8098 b	0.9443	1.145	−0.3292
	(1.2841)	(1.4334)	(0.8773)	(1.0204)
CONS*INTERLOCK	−2.3426 a	−1.1678 c	−2.1131 a	−0.5092
	(0.5588)	(0.638)	(0.4953)	(0.4721)
(1−CONS)*INTERLOCK	−0.2769	−0.6343	−0.2155	−0.7202 c
	(0.4582)	(0.4308)	(0.4924)	(0.4318)
SIZE	0.694 b	1.3743 a	0.566 c	1.2883 a
	(0.3201)	(0.3774)	(0.3002)	(0.3561)
EQ	−2.7088 b	−3.0789 b	−2.4693 c	−2.8032 b
	(1.3211)	(1.2519)	(1.3248)	(1.2189)
MARKET	−0.0029	0.0045	−0.0055	0.0019
	(0.0289)	(0.0234)	(0.0289)	(0.0233)
SECURITY	2.6362 b	0.0868	2.6384 b	0.1
	(1.2686)	(0.5221)	(1.3269)	(0.5397)
INTERCEPT	3.7376	−11.5482 b	5.3795	−10.6207 b
	(4.4525)	(5.0325)	(4.3433)	(4.8408)
Log Likelihood	−1844.965	−364.508	−1846.87	−1364.99
NOB	559	456	559	456
Censored Observation	20	71	20	71

Notes: Significance at 1%, 5% and 10% level are denoted by "a" "b" and "c", respectively. The figures in parentheses are heteroscedasticity robust standard errors. 7 area dummies are included. Significance levels are reported for two-tailed tests.

Table 11. Effect of consolidation on the nature of bank governance by type of participants

Dependent Variable	ROE			
Definition of INTERLOCK	LN(INTERLOCK)		INTDIC	
Year	1926 (Pre-merger)	1931 (Post-merger)	1926 (Pre-merger)	1931 (Post-merger)
Explanatory Variables/Model	[1]	[2]	[3]	[4]
ACQUIRER	3.2444 b	2.2611 c	1.6428	0.4559
	(1.4747)	(1.2567)	(1.051)	(1.0807)
ACQUIRER*INTERLOCK	−2.3641 a	−1.4346 b	−2.195 a	−0.5683
	(0.6323)	(0.5865)	(0.6246)	(0.4571)
TARGET	2.2248		0.4873	
	(1.9753)		(1.3242)	
TARGET*INTERLOCK	−2.6444 a		−2.5143 a	
	(0.906)		(0.8797)	
EQUALS	3.5927 c	−1.4972	1.5837	−0.8301
	(1.9176)	(3.5155)	(1.3409)	(2.3657)
EQUALS*INTERLOCK	−2.0271 c	−0.667	−1.1638	−2.1719
	(1.0709)	(1.6955)	(1.2075)	(2.732)
(1−CONS)*INTERLOCK	−0.2514	−0.6067	−0.1912	−0.6859
	(0.4611)	(0.4341)	(0.4939)	(0.4319)
SIZE	0.6587 b	1.3237 a	0.5248 c	1.2265 a
	(0.3348)	(0.385)	(0.3122)	(0.3569)
EQ	−2.4943 c	−3.1326 b	−2.2895 c	−2.8478 b
	(1.3301)	(1.2523)	(1.3368)	(1.2186)
MARKET	0.0021	0.0046	−0.0007	0.0019
	(0.0288)	(0.0234)	(0.029)	(0.0232)
SECURITY	2.569 b	0.0787	2.5726 c	0.0903
	(1.2739)	(0.5197)	(1.3206)	(0.5373)
INTERCEPT	4.0447	−10.8455 b	5.8212	−9.7439 b
	(4.652)	(5.1523)	(4.5038)	(4.8665)
Log Likelihood	−1843.32	−1363.71	−1845.3	−1364.182
NOB	559	456	559	456
Censored Observation	20	71	20	71

Notes: Significance at 1%, 5% and 10% level are denoted by "a" "b" and "c", respectively. The figures in parentheses are heteroscedasticity robust standard errors. Seven area dummies are included. Significance levels are reported for two-tailed tests.

Appendix: Definitions of the variables

Variables	Definition
EXIT	Dummy variable that takes four values. It equals 1, 2 and 3, if a bank exited by a merger of equals, an absorbing consolidation and a failure, respectively. It takes value zero if the bank survived through the end of 1936.
LN(INTERLOCK)	Natural log value of number of interlocks. Number of interlocks means the total number of the positions of directors and auditors of non-banking companies, held by the directors and auditors of each bank.
INTDIRC	Number of interlocks per director. That is, the number of interlocks divided by the number of directors.
SIZE	Natural log value of total deposit plus the book value of capital. Capital is the sum of paid-in capital, reserved fund and profit
EQ	Dummy variable which equals 1, if the bank's head office was located in Tokyo, Kanagawa, Chiba, or Saitama prefecture, and 0, otherwise.
MARKET	Share of top three banks in term of the number of branch offices in each prefecture.
ROA	Ratio of profit to total deposit plus the book value of capital. Profit is equal to the profit of the second half of the fiscal year, multiplied by two.
ROE	Ratio of profit to the book value of capital. The profit is equal to the profit of the second half of the fiscal year, multiplied by two. Capital is the sum of paid-in capital, reserved fund and profit
LIQUID	Ratio of bank deposit reserve to assets(total deposit plus the book value of capital) . Bank deposit reserve indicates the sum of cash holdings and deposit to BOJ and other banks.
CAPDEPO	Ratio of the book value of capital to total deposits.
SECURITY	Ratio of security holdings to total loans
LEVERAGE	Ratio of total deposits to the book value of capital. Capital is the sum of paid-in capital, reserved fund and profit
CONS	Dummy variable which takes the value one, if the bank participated in a consolidation, and zero otherwise.
ACQUIRER	Dummy variable which takes the value one, if the bank was an acquirer in an absorbing consolidation, and zero otherwise.
TARGET	Dummy variable which takes the value one, if the bank was a target in an absorbing consolidation, and zero otherwise.
EQUAL	Dummy variable which takes the value one, if the bank was a participant in a combination into a new bank, and zero otherwise.