Measuring the Extent and Implications of Director Interlocking in the Pre-war Japanese Banking Industry*

Tetsuji Okazaki**, Michiru Sawada*** and Kazuki Yokoyama****

Abstract

In pre-war Japan, many banks were controlled by industrial companies through capital and personal relationships. Those banks are known as "organ banks" (*kikan ginko*). Organ banks engaged in unsound lending to their related companies, which resulted in damage to the banks' financial positions and consequently destabilized the financial system. This is a popularly held view of the financial history of pre-war Japan (organ bank hypothesis). However, this view has been based largely on case studies and casual observations. In this paper we examine the organ bank hypothesis using quantitative data and econometric methodology. To measure the extent of connections between banks and non-banking companies, we compiled a comprehensive database of directors and auditors of banks and non-banking companies in 1926. It was found that interlocking of directors and auditors between banks and non-banking companies was very pervasive. More than 80% of ordinary banks had at least one director or auditor who was at the same time a director or auditor of at least one non-banking company. Also, regression analyses confirmed that director interlocking had a negative effect on bank performance, especially for smaller banks.

JEL Classification Numbers; G32, N25

Key words: organ bank, related lending, director interlocking, business group, corporate governance

---

This paper is a revised version of Okazaki and Yokoyama, "Measuring". Research supports from the Asian Development Bank Institute (ADBI), Research Institute of Economy Industry and Trade (RIETI) and Ministry of Education and Science are gratefully acknowledged. Juro Teranishi and Takafumi Korenaga kindly provided us with the data set they constructed from Ministry of Finance, *Ginkokyoku Nenpo,* 1926 issue. We would like to thank Masahiko Aoki, Patrick Fridenson, Hiroshi Fujiki, Yukiko Fukagawa, Avner Greif, Yasushi Hamao, Takeo Hoshi, Kazuto Ikeo, Satoru Kano, Anil Kashyap, Makoto Kasuya, Yukinobu Kitamura, Matao Miyamoto, Kunio Okina, Makoto Saito, Masanori Sato, Yuri Sato, Masato Shizume, Ulrike Shaede, Akira Suehiro, Masayuki Tanimoto, Meredith Woo-Cumings, Tsutomu Watanabe, Gavin Wright, Masaru Yoshitomi and other participants in the seminars at ADBI, RIETI, Stanford University, UC San Diego, Ecole des Hautes Etudes en Sciences Sociales, The University of Tokyo, the Bank of Japan and the Financial Services Agency, NBER Japan Project Meeting, the Meeting of the Socio-Economic History Society, and the Meeting of the Japan Society of Monetary Economics, for their helpful comments and suggestions. Comments and suggestions of the editor of *The Journal of Economic History* and anonymous referees were very helpful. All errors are authors' responsibility.

** The University of Tokyo (okazaki@e.u-tokyo.ac.jp.)

*** Nagoya Gakuin University (sawada@ngu.ac.jp)

**** Nagoya City University (kazky@econ.nagoya-cu.ac.jp)

1. Introduction

It is well known that the financial system in postwar Japan was bank-based, and that it was characterized by the "main bank system".[1] However, in pre-war Japan, a large part of industrial investment was financed by equity and, correspondingly, large shareholders played a major role in corporate governance.[2] Banks basically were not active in monitoring industrial companies in pre-war Japan. In fact, many banks were controlled by the owners of industrial companies.

Banks controlled by industrial companies were called "organ banks" (*kikan ginko*)[3], and have been regarded as characterizing the pre-war Japanese financial system. According to the literature, a typical organ bank was established to generate funding for the industrial businesses of the bank founders. Therefore, an organ bank was not managed for its own profitability, but rather for the benefit of the corporate group with which it was affiliated. Consequently, organ banks tended to advance a large amount of loans to a small number of industrial companies connected with the bank founders.[4] Furthermore, many researchers have pointed out that organ banks engaged in unsound lending to their related companies without diversifying the portfolios, which damaged the banks' financial positions, and destabilized the financial system. This view has become well established in today's literature on Japanese financial history. And, some regard the organ bank relationship as a basic cause of the 1927 Showa Financial Crisis.[5]

On the other hand, recent literature in the field of banking and finance has made it clear that this kind of bank-firm relationship ("related lending") can be widely observed in today's developing

---

1 Aoki, Sheard, and Patrick, "*Main Bank"*; Hoshi and Kashap, *Corporate Financing*.
2 Hoshi and Kashap, *Corporate Financing*; Okazaki,*Corporate Governance*; Okazaki, *Mochikabu*; Okazaki, "The Role ".
3 "Kikan ginko" was translated into "organ bank" in Hoshi and Kashyap,*Corporate Financing* ,while it was translated into "institution bank" in Teranishi, "The Main Bank".
4 Kato, *Honpo Ginkoshi Ron* ; Murakami, "*Futsu Ginko"* .
5 Teranishi, "The Fall "; Takahashi and Morigaki, *Showa Kin'yu Kyoko*; Yamazaki, *Showa Kin'yu Kyoko*.

countries.[6] Furthermore, "insider lending" was also prevalent in the U.S. in the nineteenth century.[7] This suggests that the organ bank relationship in pre-war Japan was symptomatic of the pattern of financial relationships in underdeveloped financial markets. Investigating the organ bank relationship can contribute not only to understanding Japanese financial history, but also to a broader examination of comparative financial systems and comparative financial history.[8]

An extensive body of literature on the organ bank relationship has been published since Kato's seminal work.[9] However, this research is based on case studies of a small number of banks, and there has been no literature that analyses the organ bank relationship quantitatively. In fact, we do not even have such basic data as how pervasive the close bank-firm relationship was in pre-war Japan, for the very good reason that this information is difficult to find. In this paper, we use a newly compiled database of directors and auditors of banks and non-banking companies in 1926 to identify bank-firm relationships through the "interlocking" of directors and auditors. Then, using the interlocking variable, we quantitatively examine the effect of director interlocking on bank performance.

The paper is organized as follows: In Section 2, the historical background is summarized. In Section 3, we describe the database of directors and auditors, and present basic findings derived from this database. Section 4 presents econometric analyses of the influence of the interlocking of directors and auditors on bank performance. Section 5 concludes the paper.

2. A Brief Historical Background

[6] La Porta, Rafel, Lopez-Silanes, and Zamarrip, "Related Lending"; Beim and Calomiris, *Emerging Financial Markets.*
[7] Lamoreaux, *Insider Lending.*
[8] Allen and Gale, *Comparing Financial systems;* Calomiris, *U.S. Bank Dereguration;* La Porta, "Legal Determinants"
[9] Kato, *Honpo Ginkoshi Ron*; Imuta, "Shohyo"; Sugiyama, "Gomeigaisha Mitsui ";Ishii, "Hyaku Sanju Ginko ".

The modern history of the banking industry in Japan started with the National Bank Act in 1872. The national banks were private banks that were granted the privilege of issuing banknotes. After revision of the Act in 1876, which suspended the convertibility of national banknotes, the number of national banks grew rapidly to reach 153, the upper limit prescribed by the National Bank Act, in 1879. In 1882, the Bank of Japan (BOJ) was established as the central bank, and in 1885 it began to issue bank notes convertible to silver, resulting in a further revision to the National Bank Act, which obliged national banks to convert into ordinary banks within twenty years of establishment.[10]

Enactment of the 1893 Bank Act as the legislative framework for ordinary banks brought about a rapid increase in their number. In 1901, the number of ordinary banks approached the peak of 1890.[11] These ordinary banks had the following notable characteristics: Although deposits into ordinary banks grew rapidly, the ratio of banks' equity to deposits remained high until the early twentieth century. In 1901, equity accounted for 36% of the total liabilities of ordinary banks.[12] Also, at the beginning of the twentieth century, ordinary banks depended heavily on borrowings from the BOJ.[13] In this sense, the ordinary banks differed from that of the typical modern bank based on deposits.

The ratio of deposits to total bank liabilities increased in the 1900s. This was primarily due to a change in the BOJ policy. Until 1897, the BOJ was open-handed in lending to private banks, and the banks earned substantial profits from the interest rate spread between borrowings from the BOJ and loans to non-banking companies. However, in 1897 the BOJ initiated direct lending to non-banking companies, in order to prevent banks from earning profits from the interest rate spread.[14] This policy change was aimed at pressuring banks to decrease their borrowings from the BOJ, and to focus on attracting deposits.

---

[10] Asakura, *Shinpen Nihon Kin'yu Shi*, pp.36-37; Teranishi, *Nihon no Keizai Hatten*, p.35-37.
[11] Goto, Goto, *Kin'yu Tokei*, p.56.
[12] Calculated from the data in Goto, *Kin'yu Tokei*, p.86-87.
[13] Ishii, "Hyaku Sanju Ginko ".
[14] Bank of Japan. *Nihon Ginko Hyakunen Shi.*

At the same time, the number of ordinary banks began declining, due to bank failures and mergers.

In the 1910s, the First World War had a substantial impact on the banking sector, and on the Japanese economy as a whole. Deposits increased rapidly, due to economic growth and an expansionary monetary policy. Consequently, the average equity-liability ratio of ordinary banks fell below 20%. And ordinary banks began resembling typical modern banks, at least in terms of the composition of liabilities. Meanwhile, during the War boom, many ordinary banks advanced large amounts to industrial companies, especially those in the heavy and chemical industries. In many cases, these companies faced difficulties when the War ended and international competition revived, which in turn led to a considerable number of bank loans becoming non-performing. Because the equity-liabilities ratio of banks had substantially declined during the 1910s, the deterioration of banks' assets seriously damaged their financial positions. This was the fundamental cause of the instability of the financial system in the 1920s.

The bank panic of 1920 saw many banks, particularly smaller ones, close down. In order to secure stability of the financial market, the government initiated an organizational reform of the banking sector in the early 1920s, imposing entry regulations and promoting mergers.[15] The 1923 Great Earthquake in Tokyo further destabilized the financial market, because the earthquake, many of the assets that had been used as collateral for bank loans, or were expected to generate cash flow to repay the loans, were destroyed or burnt.

In 1926, the government decided to implement fundamental measures to restructure the financial system, and proposed two draft bills designed to dispose of the bad loans. However, the Diet opposed these bills on the grounds that they favoured capitalists connected to the government. During the Diet

15 Goto, *Ginko Godo,*p.19; Okazaki, "Ginkogyo".

deliberations, the Minister of Finance made a notorious slip of the tongue concerning the closure of certain banks, which triggered the Showa Financial Crisis of 1927. This was the largest financial crisis in Japanese economic history[16]. Forty-five banks closed as a result of runs in 1927. They represented 2.91% of all ordinary and savings banks in terms of numbers, and 9.02% in terms of value of deposits. Among them were Jugo Bank and the Bank of Taiwan. Jugo Bank was one of the ten largest banks, and the Bank of Taiwan was a special bank which was established for developing the Taiwan area in 1899. The magnitude of the financial crisis can be indicated by the shift of deposits away from banks to the Postal Bureau. In 1927, while the total outstanding deposits of all banks decreased, Postal Bureau deposits increased by 30.1% .[17]

Several studies have suggested that a basic cause of the crisis was the organ bank relationship. [18] There had been no effective regulation of either director interlocking or maximum loan exposure to a single customer prior to enactment of the Bank Law in 1928. Hence, non-banking companies were free to control certain banks for the purposes of raising funds.[19] Comprehensive data on loans by banks and by borrowers are not available, but, the BOJ did record the data of those banks that closed during the Showa Financial Crisis.

With respect to the closed banks, detailed data on the loans are available in the documents of the BOJ. Panel A of Appendix Table 1 shows that most of the closed banks engaged in lending to related groups that were connected to the banks through shareholding and/or director interlocking. Panels B and C compare the terms and ex post performances of the related loans and total loans.[20] There was a

[16] See Hoshi and Kashyap, *Corporate Financing* for details.
[17] Toyo Keizai Shinposha, *Kanketsu Showa Kokusei,* pp.365,p.401.
[18] Kato, *Honpo Ginkoshi* ; Takahashi and Morigaki, *Showa Kinyu Kyoko*; Ishii, "Hyaku Sanju Ginko ."
[19] The Bank Act, enacted in 1893, imposed a regulation that restricted loans and discounts by a bank to a single customer to no more than 10% of the bank's capital. However, due to the objections of bankers and industrialists, this regulation was rescinded in 1895 (Patrick , "Japan").
[20] "All loans minus loans to related borrowers" might not be equal to actual loans to the unrelated

larger proportion of unsecured loans among the related loans, and the percentage of unrecoverable loans was higher among related loans than among total loans. Thus, at least in respect of the closed banks, lending to related groups was likely to be based on some degree of corrupt relationship, beyond proper financial judgement.[21]

For a more detailed insight into how and why these banks failed, we looked at two cases, Nakazawa Bank and Murai Bank, from BOJ.[22] Nakazawa Bank was established in 1897 by Hikokichi Nakazawa. At the end of 1925, the Nakazawa family still owned more than 90% of the bank's shares. When Yoshikazu Nakazawa became the third president of the bank, he was the second largest shareholder. At the same time, he was a director of seven non-banking companies owned by him and his family.[23] Over 90% of Nakazawa Bank's loans were made to the Nakazawa group (Panel A of Appendix Table 1). However, in the 1920s the businesses of the Nakazawa group got into trouble, and some group companies failed as a result of speculative investment in stock. Nakazawa Bank had no option but to continue lending money to the Nakazawa group. Finally, as the business situation of the Nakazawa group steadily worsened, Nakazawa Bank was forced to close during the Showa Financial Crisis of 1927.

Murai Bank was established in 1904 by the Murai family. At the end of 1926, Murai Bank was still wholly owned by the Murai family, which also provided all the bank's board members. As in the case of Nakazawa Bank, the Murai family operated several non-banking businesses, including trading, mining, agriculture and real estate enterprises. As a result, the loan portfolio of Murai Bank was skewed toward four non-banking companies owned by the Murai family (Panel A of Appendix Table 1). Despite the

---

borrowers, since we cannot always get the data of loans to all the related borrowers.

[21] Moreover, we can confirm that 13 of the 15 banks in Appendix Table 1 had director interlocking with non-banking companies, according to the data of *Ginko Kaisha Yoroku*.

[22] Bank of Japan. "Sho Kyugyo Ginko".

[23] BOJ, "Sho Kyugyo" provided no information on the ownership structure of Nakazawa-related companies. So, we checked the ownership structure of the four related companies whose business reports were available, namely Kinsen Inryo, Sapporo Mokuzai, Taiwan Takushoku and Toshin Gomukogyo. It is confirmed that Yoshikazu Nakazawa was the major shareholder in all four companies.

Murai Group foundering in the 1920s, Murai Bank continued to lend them money. Eventually, Murai Bank was forced to close in 1927, due to a combination of defaults on bad loans to the Murai group defaulting, and the Great Earthquake.

The government perceived that the organ bank relationship was inimical to a sound banking system. The Bank Law of 1927 compelled ordinary banks to be registered as joint-stock companies, and to be capitalized at not less than one million yen.[24] According to the Bank Law, existing banks whose capital was currently below the minimum limit ("unqualified banks") had to meet the capital criterion within seven years. In addition, executive directors and managers of ordinary banks were prohibited from engaging in other businesses without the approval of the Minister of Finance.[25]

3. Interlocking between Banks and Non-banking Companies

In pre-war Japan, wealth distribution was far from equal, and there were a number of wealthy individuals who were large shareholders of many companies, concurrently.[26] Furthermore, in many cases those large shareholders held directorships in the companies in which they invested.[27] The ownership and governance structure of banks was part of this picture. Large investors owned shares and held directorships in banks as well as industrial companies, as we will see in this section. To put it another way, they created business groups that included banks as well as industrial companies. It is said that, in many of these cases, the banks were not managed for their own profitability but rather for the primary purpose of generating funding companies within the same group .[28]

---

[24] A bank was required to have capital of at least two million yen in Tokyo and Osaka, and at least 500,000 yen in towns and villages with populations of less than ten thousand.
[25] Bank of Japan, *Nihon Ginko Hyakunen.*p.273-274; Shiratori, "1920 Nendai".
[26] Mizoguchi, "Nihon no Shotoku"; Minami and Ono,"Senzen Nihon".
[27] Morikawa, *Nihon Keieishi;* Miyamoto, "Sangyo"; Okazaki, "Corporate Governance"; Okazaki, *Mochikabu;* Miyamoto and Abe "Kogyoka".
[28] Bank of Japan. "Sho Kyugyo"; Takahashi, and Morigaki. *Showa Kinyu.*

In this section, we measure the pervasiveness of close bank-firm relationship, in respect of ordinary banks. We approached this task by compiling a comprehensive database of directors and auditors of banks and non-banking companies in 1926. The data source is Tokyo Koshinjo[29]. Tokyo Koshinjo, one of the largest private credit bureaus in pre-war Japan, published a directory of corporate directors, *Ginko Kaisha Youroku*, every year from 1897 to 1942. We used the 1926 edition to identify bank-company connections immediately prior to the Showa Financial Crisis of 1927.

From Tokyo Koshinjo, we have taken the names of the directors and auditors of each bank and non-banking firm whose paid-in capital was two hundred thousand yen or more. Conveniently, Tokyo Koshinjo includes an index by person.[30] We identified interlocking between banks and non-banking companies through the following procedure: If, for example, a person who was a director of a given bank was concurrently a director of a particular non-banking company, we identified that as "one interlock". If a director of a given bank was simultaneously a director of two non-banking companies, we classified that as "two interlocks".

The financial data for each bank are taken from the Ministry of Finance, which covers 1,417 ordinary banks in Japan, excluding colonies, at the end of 1926. Complete financial data are available for 1,398 of the 1,417 banks.[31] And, the data on directors and auditors are available in Tokyo Koshinjo for 1,007 of the 1,398 banks whose capital was not less than two hundred thousand yen. Hereinafter, we use these 1,007 banks as our basic sample banks.[32][33]

Table 1 shows the distribution of numbers of directors and auditors per bank. The average was around 8 (mean = 8.57, median = 8.00). And more than 80% of the sample banks had between 5 and 11.

---

29 Tokyo Koshinjo, *Ginko Kaisha Youroku*, 1926 issue.
30 Tokyo Koshinjo, *Ginko Kaisha Youroku*, 1926 issue.
31 Ministry of Finance , *Ginkokyoku Nenpo,* 1926 issue.
32 Tokyo Koshinjo, *Ginko Kaisha Youroku*, 1926 issue.
33 In the following section, we discuss the possibility of selection bias in our data sampling.

Table 1 also shows the distribution, in cases where we classified the positions of the directors and auditors into four categories, namely 1) top executives (president and chairman), 2) executive directors, 3) ordinary directors, and 4) auditors.[34]

Panel A of Table 2 summarizes the basic findings on director interlocking between banks and non-banking companies. A total 836 banks, comprising 83% of total observations, had at least one director or auditor who held at least one position of director or auditor in a non-banking company. The average number of interlocking positions per bank was 7.26. Panel A of Table 2 shows the data broken down by position in the non-banking companies, classified into four categories, as in Table 1. For example, banks in which at least one director or auditor had the position of top executive of a non-banking company numbered 407, or 40.4% of total observations.

Panels B to E of Table 2 show the data broken down by position with the bank. In respect of 48% of total observations, the top executives of the banks held at least one position of director or auditor of a non-banking company, and the average number of interlocks in which the banks' top executives were involved was 1.48. On the other hand, as shown in Panel D, the percentage of banks in which at least one ordinary director held a position of director or auditor of a non-banking company was 68.5%, and the average number of interlocks of the banks' ordinary directors was 3.48. From these results, we can safely say that most ordinary banks were connected with non-banking companies through the interlocking of directors and auditors.

Table 3 is a breakdown of Panel A of Table 2 by scale of banks. We split the 1,007 observations into three equal groups in terms of bank assets. We defined smaller banks as banks in the 0-33.3 percentile in terms of asset level, medium-sized banks as banks in the 33.3-66.7 percentile, and large

[34] Some companies did not have a president or a chairman. In these cases, we identified the executive director as the top executive.

banks as banks in the 66.7-100 percentile. The first point to note is that the interlocking of directors and auditors with non-banking companies pervaded all three groups. However, in a relative sense, interlocking with non-banking companies was more pervasive among the large banks. This remains true when we break down the data by positions with non-banking companies. In all sub-categories of the data, both the percentage of banks with interlocking positions and the average number of interlocks were greatest in the large banks.[35]

The results from our database are striking, and the facts support the conjecture of Kato on the pervasiveness of the organ bank relationship.[36] More than 80% of the ordinary banks were connected to non-banking companies through the interlocking of directors and auditors.[37] Moreover, the interlocking was more pervasive in the large banks. However, the fact of interlocking does not by itself mean that there was an organ bank relationship in the sense discussed in Section 1. It is necessary to examine in more detail the nature and influence of the interlocking shown by Table 2 and Table 3.

For this purpose, we looked first at the cases of the ten banks with the greatest number of interlocks, namely Yokohama Koshin Bank (88), Bushu Bank (74), Meiji Bank (67), Yokkaichi Bank (67), Mitsui Bank (64), Mitsubishi Bank (60), Shimotsuke Chuo Bank (53), Jugo (49), Yasuda Bank (45), and Joshu Bank (43).[38] In seven of the ten banks the presidents were one of the ten largest shareholders of these banks. In this sense, management of those banks was not distinct from ownership. Furthermore, in many of the cases where bank presidents directed or audited non-banking companies, they were also major

---

[35] Breaking down the data by position in the bank, we confirmed that the situation was almost the same (not reported in table).

[36] Kato, *Honpo Ginkoshi Ron.*

[37] We also checked the extent of director interlocking among non-banking companies. While the number of non-banking companies that had at least one interlocking director with a ordinary bank was 3113, Tokyo Koshinjo, *Ginko Kaisha* covered 9644 non-banking companies. Therefore, 32.2% of non-banking companies covered in Tokyo Koshijo, *Ginko Kaisha* had at least one interlocked director with a ordinary bank.

[38] The numbers in parentheses denote the number of interlocks.

shareholders of those companies. Therefore, we can say that the interlocking of directors and auditors between banks and non-banking companies was based primarily shared common major shareholders.

This also implies that the nature of director interlocking between banks and non-banking companies in pre-war Japan was essentially different from that in the main bank relationship in postwar Japan.[39] In postwar Japan, the main bank, not its major shareholders, seconds employees as directors of the borrowing companies for the purpose of monitoring their performance. In addition, "contingent governance" is a characteristic of corporate governance under the main bank relationship. Contingent governance means that the governance of a company is contingent on its financial state. If a company runs into financial problems, the main bank initiates management intervention to restructure the bank, by seconding directors .[40] Hence, under the postwar main bank system, it is the poor financial position of a company that motivates the personal connection with its main bank. The cases of above ten banks suggest that this causality was not usual in pre-war Japan, because director interlocking essentially reflected the common ownership between the banks and non-banking companies.

4. Influence of Governance Structure on Bank Performance

4.1 Interlocking and Bank Profitability

In this section we quantitatively examine the influence of interlocking on bank performance. Because the following analysis in this subsection focuses on bank profitability, and specifically the return on equity (ROE), as a measure for bank performance, we initially considered using a simple model for bank returns. There are many studies on the determinants of bank profitability that propose various models, according to the kinds of problems the authors were analyzing. However, most of the literature

[39] Since seconded directors usually resign from the bank's board, the director interlocking that we focus on in this paper is not observed in the postwar main bank system.
[40] Aoki, Sheard, and Patrick, "Main Bank".

considers three factors as important determinants of bank profitability: economies of scale, the level of external competition, and the attitude to risk.[41] In addition to these three factors, we consider loan quality to be a factor affecting the profitability of a bank, because we cannot assume that loan quality was homogeneous among banks in pre-war Japan. Actually, it is the essence of the organ bank hypothesis that the quality of loans of those banks controlled by non-banking companies was low. Therefore, the baseline model is as follows:

$$ROE_i = f(LQ_i, COM_i, RISK_i ES_i) \qquad (1)$$

where *LQ, COM, RISK* and *ES* refer to the variables indicating loan quality, level of competition, attitude to risk, and economies of scale, respectively. We now briefly discuss these four variables, and the control variables used in estimation:

(1) Loan quality (*LQ*). Loan quality (loan performance, rate of recovery of bad loans, etc.) is a factor that directly affects bank profitability. According to the organ bank hypothesis, banks with strong ties to business groups engaged in unsound lending to the related companies. To capture the organ bank relationship, we use the variable, INTERLOCK, which indicates the number of interlocks for each bank, as defined in section 3. Here, we assume that the larger the INTERLOCK value, the stronger the connection with the related business group. Therefore, if the organ bank hypothesis holds, the effect of INTERLOCK on ROE is negative. In addition, we take into account the effect of the Great Kanto Earthquake of 1923 on loan quality, because many banks in the South Kanto area suffered from bad loan

[41] Smirlock, "Evidence"; Bouke, "Concentration"; Berger, "The Profit-Structure"; Goddard, Molyneux , and Wilson. *European Banking;* Goddard, Molyneux , and Wilson. "The Profitability".

problems as a result of this natural disaster.[42] To capture this effect, we use the earthquake dummy variable, EQ, which takes the value, "one," if the headquarters of the bank was located in the South Kanto area, i.e., Tokyo, Kanagawa, Chiba, Saitama prefectures. Accordingly, we expect the coefficient of EQ to be negative.

(2) Level of Competition (*COM*). According to the standard oligopoly theory in the industry organization literature, banks in highly concentrated markets are able to enjoy higher interest rates charged on loans, and lower interest rates paid on deposits. Most studies on the determinants of bank profitability in the United States and Europe focus on the effects of market concentration.[43] However, it should be noted that in the case of pre-war Japan the extent of competition in the banking industry differed by operating region[44]. Therefore, it is necessary to measure the effects of market concentration by region. In the following analysis, we class a prefecture as a separate market. Then, in order to capture the effect of market concentration, we use the variable, MARKET, which is the market share of the top three banks, defined as their number of branch offices as a proportion of all bank branch offices in the prefecture.[45] The coefficient of MARKET is expected to be positive.

(3) Attitude to risk (*RISK*). The attitude of banks to risk has been regarded as an important determinant of bank profitability.[46] If the management and shareholders of a bank are strongly risk-averse and maintain a high proportion of safe assets, the bank is unlikely to earn large profits, but is

---

[42] Losses from this earthquake amounted to about 5 billion yen, which was equivalent to about 30% of GNP at that time (Hoshi and Kashyap, *Corporate Financing*).

[43] See Goddard et al. *European Banking*, Chapter 4, which provides a review of literature on the relationship between market structure and bank performance.

[44] Imuta, "Nihon"; Teranishi, *Nihon no Keiza Hatteni*

[45] Unfortunately, we could not access information on the individual amounts of loans or deposits by prefecture, with respect to banks operating in multiple prefectures. Even if we replace the share of the top three banks with the share of the top single bank, the effect of market concentration is positive and statistically insignificant, as is the case if we use the share of the top three banks.

[46]Bouke, "Concentration"; Berger, "The Profit-Structure"; Goddard, Molyneux , and Wilson. *European Banking;* Goddard, Molyneux , and Wilson. "The Profitability",etc.

also less likely to be exposed to risk. To capture the effect of asset risk, we include the variable, SECURITY, which is the ratio of security holdings to assets.[47] Here, we assume that securities were relatively safe assets, since they were mainly government bonds and debentures issued by major companies. However, the indications of this coefficient are not clear *a priori*, because its value depends on the relative average returns of loans and securities. Indeed, it is quite possible that when overall corporate performance slowed down after the collapse of the wartime boom in 1920, the profitability of a bank holding more safe assets would have been higher than that of a bank holding more risky assets. Actually, Hoshi confirmed that banks forced to close in 1927 and 1930-1932 had relatively low proportions of security holdings.[48] It is also necessary to take into account the effect of the capital structure. We use the variable, LEVERAGE, indicating the financial leverage of a bank, following Modigliani and Miller's Proposition Ⅱ, which states that the expected return on equity increases relative to increasing financial leverage.[49]

(4) Economies of scale (*ES*). Most studies on bank profitability use bank size to capture economies of scale. Because depositors were not protected by a deposit insurance system in pre-war Japan, large banks might have benefited from their greater credibility when it came to attracting deposits. To capture the effect of bank size, we use the variable, SIZE, indicating the natural log value of the bank assets. If a large bank benefited from economies of scale, the coefficient of SIZE would be positive. In sum, the equation to be estimated is as follows:

$$ROE_i = \beta_0 + \beta_1 * LN(INTERLOCK_i) + \beta_2 * EQ_i + \beta_3 * MARKET_i + \beta_4 * SECURITY_i$$

[47] Imuta,"Taishoki" confirmed that stocks accounted for only 10.9% of total security holdings on average, in respect of 60 banks whose data for 1925 was available.
[48] Hoshi, "Back to the Future".
[49] See Brealey and Myers, *Principles of Corporate Finance*, Chapter 17.

$$+\beta_5 * \text{SIZE}_i + \beta_6 * \text{LEVERAGE}_i + \varepsilon_i \qquad (2)$$

where LN(INTERLOCK) is the natural log value of INTERLOCK.[50] ε_i is the error term, and the other variables are as defined above. We estimated Equation (2) by the TOBIT model, as the profit data available from the Ministry of Finance archives were censored at zero.[51] That is, even when a bank's profitability was negative, we had only value, zero.

In addition to the estimation using full samples, we estimated Equation (2) using sub-samples grouped by bank size. This is because the functions and performance of banks in pre-war Japan differed significantly according to size.[52] Furthermore, bank size could have been associated with the organ bank relationship. Shibagaki stressed that banks affiliated to major zaibatsu (Mitsui, Mitsubishi, Sumitomo, Yasuda), which were the largest banks, had a policy of not making substantial loans to companies within the same zaibatsu group.[5354] From the contributions of Imuta and Sugiyama there has come to be a consensus that, apart from certain exceptional periods, the banks of major zaibatsu were not organ banks as defined by Kato.[5556] In contrast, Teranishi pointed out that small and medium-sized banks in rural areas were closely connected with regional industries, because most were established to

[50] The natural log value of INTERLOCK plus one is used in the estimation, since INTERLOCK sometimes takes the value zero.
[51] Ministry of Finance , *Ginkokyoku Nenpo,* 1926 issue.
[52] This structure is sometimes called a multi-layered financial structure.See Kato, *Honpo Ginkoshi Ron* ;Imuta, "Nihon"; Teranishi, *Nihon no Keizai Hatten.*
[53] Shibagaki, *Nihon Kin'yu.*
[54] "Zaibatsu banks" usually refer to Mitsubishi Bank, Mitsui Bank, Sumitomo Bank, and Yasuda Bank. We also found that all of the 19 largest banks with assets of more than one hundred million yen, including zaibatsu banks, had their headquarters in the urban area (Tokyo, Kanagawa, Aichi, Kyoto, Osaka, and Hyogo prefectures).
[55] Hoshi, "Back to the Future" found that the percentage of loans by zaibatsu banks to companies within the same business groups was lower than that of typical organ banks which closed during the Showa Financial Crisis, according to data of Mitsui, Mitsubishi and Sumitomo Banks covering the period 1921-43.
[56] Imuta, "Taishoki"; Sugiyama, "Gomeigaisha"; Murakami, "*Futsu Ginko"*.

fund regional industry.[57] Shiratori [2001] showed that most of the banks that failed in the 1920s, due to improper management by the directors, were small and medium-sized banks in rural areas. Therefore, it is worthwhile to estimate Equation (2) separately by bank size. This allows us to check the differences in effect of the organ bank relationship, and also of control variables, between la.rge banks and smaller banks. The total 1,007 observations were divided into three percentile sub-samples, large, medium and small, as seen in Table 3.[58] Percentile criteria are preferable to criteria based on particular asset levels, in order to avoid arbitrariness.[59]

Table 4 presents basic statistics on the banks in our samples (Panel A), as well as on the banks excluded from our samples (Panel B).[60] It is difficult to quantify the sample selection bias precisely, because we have no information on director interlocking among excluded banks, but it is useful to have a comparison between the basic characteristics of our sample banks and those of the excluded banks. As stated above, the data in Tokyo Koshinjo are basically limited to banks whose paid-in capital was greater than two hundred thousand yen.[61] Hence, banks in the samples are much larger in terms of the natural log of assets (SIZE) than excluded banks. As regards profitability, the excluded banks were more profitable than banks in the samples, especially in terms of ROE.[62] Also, the standard deviation of excluded banks is extremely high compared to that of the banks in the samples. This is consistent with Teranishi , who noted that, because smaller banks frequently made unsecured loans or loans based on real

---

[57] Teranishi, *Nihon no Keizai.*

[58] Alternatively, we could have checked the difference in effects of director interlocking by bank size, by adding the interaction term, SIZE*INTERLOCK to Equation (2). However, this formulation is more restrictive, because it assumes a linear relationship between the marginal effect of director interlocking on bank profitability and bank size.

[59] In addition to the sub-sample analyses by bank size, we also conducted several tests, distinguishing urban areas from rural areas. However, since the differences in the estimated results of sub-sample analyses by area were not as pronounced as those by bank size, we report only the latter in the table.

[60] As for the definition of the variables, see Appendix Table 3.

[61] Tokyo Koshinjo, *Ginko Kaisha Youroku*, 1926 issue.

[62] Here, we regard the value of ROE as zero, if a bank's profit is censored at zero.

estate to their customers, their profit structures tended to be high risk/high return. It should be noted that in the case of left censored data, the expected value of a sample with high variance is statistically higher than that of a sample with low variance, even if they have the same mean.[63] Therefore, we cannot rule out the possibility that the higher ROE of excluded banks is due to left censoring, given that the variance in ROE of the excluded banks is higher than that of the banks in the samples. In respect of most of the other variables, we cannot statistically reject the null hypothesis that the banks in the samples equal the excluded banks.[64] In sum, at least there is no strong evidence that our sample selection is pre-biased in order to lend weight to the organ bank hypothesis.[65]

Table 5 presents the estimation results of Equation (2). Columns 1 and 2 report the results for the full samples. It can be confirmed from Column 1 that the coefficient of LN(INTERLOCK) is negative and statistically significant, indicating that director interlocking between banks and non-banking companies had a negative effect on bank profitability. The positive coefficient of SIZE implies the economies of scale. As we expected, the earthquake dummy (EQ) had a negative effect on bank profitability. The effect of market concentration (MARKET) is positive, as standard oligopoly theory predicts, but its statistical significance is not high. Finally, banks that ranked higher on proportion of security holdings were more profitable. One interpretation is that this reflects the low return on loans due to the poor performance of industrial companies during the long depression that followed World War I.

In Column 2, we include the variable of LEVERAGE. The coefficient of LN(INTERLOCK) still showed a strong negative effect on bank profitability. Consistent with MM's proposition Ⅱ, the

[63] See Green *Econometric Analysis*, Chapter 20. It is shown that the expected value of a left (right) censored variable increases (decreases) with its variance.
[64] We conducted both t-test and Wilcoxon rank sum test. In both tests, SECURITY is statistically not equal between banks in the samples and excluded banks.
[65] We estimated Equation (2) by sample selection model, where the selection equation included SIZE, SECURITY and area dummies. Then, it was confirmed that the results were fairly similar to those of the baseline analysis (Table 5).

coefficient of LEVERAGE is positive. Alternatively, this positive effect could be explained by differences in individual funding costs of deposits, given that high financial leverage reflects strong ability to attract deposits. Actually, it is noted that banks that were less able to attract deposits offered higher interest rates on deposits, in order to prevent an outflow of their existing deposits.[66] On the other hand, the positive effect of bank size is no longer significant. This may be because LEVERAGE is highly correlated with SIZE (ρ =0.49). Hence, it is likely that LEVERAGE partially absorbs the effect of bank size. As for other variables, the estimated results are qualitatively the same as those of Column 1.

These results support the organ bank hypothesis. From the coefficient of LN(INTERLOCK) in column [2] and the average number of interlocks in Table 3, we can calculate that director interlocking lowered the ROE of a bank by 1.66% on average.[67] Interlocked directors tended to make a bank lend to the related firms beyond proper financial judgement, as in the cases we saw in the previous section, and consequently lowered the bank profitability[68].

Now, we discuss the estimated results for three sub-samples, grouped by bank size. The results for smaller banks (0-33.3 percentile), medium-sized banks (33.3-66.7 percentile), and large banks (66.7-100 percentile) are reported in Columns 3-4, 5-6, and 7-8, respectively. The coefficient of LN(INTERLOCK) is negative and statistically significant for smaller and medium-sized banks. On the other hand, director interlocking had no significant effect on large banks. Furthermore, the magnitude of the effect is substantially greater for the smaller and medium-sized banks than for the large banks. These results indicate that the unfavourable nature of director interlocking with non-banking companies was specific to

[66] Teranishi, *Nihon no Keizai Hatten.*

[67] It is calculated from the difference of the predicted values when the value of INTERLOCK is changed from zero to mean, evaluated at the means of the other variables .

[68] We conducted a multivariate outlier test (Hadi, "Identifying"), and identified 22 outliers. After eliminating these outliers, the estimated results indicated that the negative effect of INTERLOCK was slightly attenuated, but still statistically significant at the 5% or 1% levels, while the effects of other variables were not substantially changed.

medium-sized and smaller banks.[69]

Finally, we address some problems potential to the above results to check the robustness. First, it is possible that non-banking companies might have seconded directors and auditors to poor-performing banks in an attempt to rescue and restructure them.[70] However, none of the many case studies of organ banks report that non-banking companies seconded directors and auditors to banks in order to rescue them. Bank of Japan reports the histories, from establishment to bankruptcy, of the twenty banks that closed during the Showa Financial Crisis.[71] Twelve of the twenty banks failed due more or less to unsound loans related to their directors, and that in none of these twelve cases had the related non-banking companies seconded directors to those banks when their performance changed for the worse.[72]

Second, it is useful to check the results using alternative measures of director interlocking. In the previous analyses, we used the number of director interlocks (INTERLOCK), i.e., the total number of director or auditor positions held in non-banking companies by the directors and auditors of each bank, as a proxy of the strength of connection between banks and companies. Here, we consider two other proxies. The first candidate is the number of non-banking companies related to each bank via director

---

[69] Alternatively, we can add the interaction term of INTERLOCK and SIZE in Equation (2), in order to examine the relationship between the effect of director interlocking and bank size. If, as bank size increased, the negative effect of director interlocking were attenuated, the coefficient of the interaction term should be positive. The estimated results indicate that the coefficient of INTERLOCK*SIZE was positive in all specifications, but statistically insignificant in some cases. Therefore, it is likely that bank size had some relationship to the nature of director interlocking, but the continuous relationship is not robust. Furthermore, we re-estimated Equation (2), adding the square of INTERLOCK to account for potential non-monotonicity. We found that the relation between ROE and INTERLOCK was U-shaped (decreasing for low values of INTERLOCK and increasing for relatively high values of INTERLOCK). However, this relationship disappeared when we added the interaction term, INTERLOCK*SIZE.

[70] In other words, director interlocking might be endogenous. Taking this possibility into account, we conducted two stage estimation of Equation (2). See Appendix .

[71] Bnak of Japan, "Sho Kyugyo".

[72] Shibuya, "Ginko Jiko" investigated the causes of 213 bank failures in the period 1910-15, using *Ginko Jiko Shirabe* (*Investigation into Bank Accidents*) by the Ministry of Finance. According to Shibuya,"Ginko Jiko", one fourth of those bank failures were related to unsound activities by the directors of the banks.

interlocking (FIRM). The second candidate is the number of interlocks per director (INTDIRC), which means that we normalized the number of interlocks by the total number of directors.[73] Table 6a, 6b reports the estimated results of Equation (2) using these two other proxies in place of LN(INTERLOCK). Panel A reports the results of estimation when we replaced LN(INTERLOCK) by the natural log of FIRM (LN(FIRM)).[74] It shows that the results are qualitatively the same as those for the baseline regressions.[75]

4.2 Interlocking and bank closure

Next, we focus on evaluation of banks in the financial market. As stock price data are available for only a small number of banks, we use the data on bank runs and closures, which were analyzed by Yabushita and Inoue.[76] They proposed a simple model in which the probability of closure principally increased with a fall in the net liquidity position of a bank. Using this model, they investigated the relationship between individual banks' financial positions and the probability of closure during the Showa Financial Crisis. They confirmed the fundamental bank runs view that the poor performance of bank portfolios increased the probability of closure due to bank runs.[7778] Based on their model, we estimate the cumulative distribution function F of the probability of bank runs by the LOGIT model.[79]

---

[73] We also ran regressions using the number of interlocks normalized by bank assets and the natural log of bank assets, and confirmed that the effects of these two variables were still negative and statistically significant at the 5% level or the 1% level.
[74] In estimation, we used LN(FIRM+1).
[75] We also estimated equation (2), substituting ROA (the ratio of profit to total deposit plus the book value of capital) and the loan deposit ratio for ROE. LN(INTERLOCK) had a negative effect on ROA and a positive effect on loan-deposit ratios.
[76] Yabushita and Inoue, "The Stability".
[77] Gorton, "Bank Suspension."
[78] During the Showa Financial Crisis, two waves of bank runs occurred. Korenaga, Nagase, and Teranishi. "1927 nen" foundthat bank runs in the first wave were information-based but that the second was triggered by self-fulfilling beliefs of depositors, using the data of deposit growth. However, with respect to bank closures, they could not provide evidence of self-fulfilling bank runs.
[79] We also conducted ordered LOGIT regressions, considering the possibility that a closure was worse than a run. The result was similar to that in Table 7.

$$\text{Prob}(RC_i) = F[\beta_0 + \beta_1 * LN(INTERLOCK_i) + \beta_2 * EQ + \beta_3 LN(ASSET_i) \beta_4 * CAPDEPO_i + \beta_5 * RESDEPO_i + \beta_6 * LOANDEPO_i + \beta_7 * ROE_i] \quad (3)$$

The dependent variable, RC, is a dummy variable, which equals 1 if the bank was closed or faced with a run in the period 1927-29, or zero, otherwise.[80] The information on bank closures and runs was from various issues of *Ginko Jiko Geppo* (*Monthly Report on Bank Issues*) by the Bank of Japan, reprinted in the Bank of Japan.[81]

CAPDEPO is defined as the book value of capital divided by total deposits. A high value for this ratio means that the ratio of liability exposed to withdrawal by depositors is low. Hence, we expect that CAPDEPO would have negative effects on the probability of a run or closure. RESDEPO and LOANDEPO are defined as bank deposit reserves, and total loans divided by total deposits, respectively. These two ratios are directly related to the liquidity position of a bank. If a bank has sufficient bank deposit reserves, it is unlikely to be faced with a run or closure, because it can accommodate withdrawal demands by depositors. On the other hand, because it is not easy to liquidate bank loans immediately, a bank with a high LOANDEPO is likely to be exposed to a run or closure even in the event of minor liquidity shocks.

The other independent variables are the same as those defined in Section 4.1. A bank with a high value of ROE is unlikely to be exposed to a run or closure. SIZE and EQ are included to control the credit risk factor, which could increase a bank's probability of a run or closure. The larger the bank, the more likely it is to diversify its loan portfolio or be able to withstand certain negative shocks. Therefore, large

[80] Unlike Yabushita and Inoue, "The Stability", we focused not only on bank closures during the Showa Financial Crisis in 1927, but also on bank closures and runs in ordinary years (1928 and 1929), in order to obtain a broad perspective on evaluation of the financial market.
[81] Bank of Japan. "Ginko Jiko Geppo".

banks are generally considered to have low credit risk, compared to smaller banks. As for EQ, banks operating in the area damaged by the Great Kanto Earthquake in 1923 were expected to suffer from bad loan problems. Hence, such banks were considered to have high credit risk. In sum, we predicted that the coefficient of SIZE would be negative and that of EQ would be positive[82]. Finally, LN(INTERLOCK) was included to test the organ bank hypothesis. If the market perceived director interlocking between a bank and companies as unfavourable, the coefficient of LN(INTERLOCK) would be positive.

Table 7 reports the results of the LOGIT estimation. Columns 1 and 2 are the results for all banks. In Column 1, the coefficient of LN(INTERLOCK) is positive but not significant. Furthermore, Column 2 shows that this coefficient is positive but statistically insignificant, after we adjust for the four financial ratios. Therefore, in respect of all banks, we could not obtain strong evidence that the market negatively assessed the connection of banks with non-banking companies. As for other control variables, whereas the coefficient of SIZE is positive in Column 1, this positive effect disappears after adjusting for financial ratios (Column 2). EQ shows no significant effect. On the other hand, the indications of all the coefficients of the financial ratios were as expected, and the coefficients of CAPDEPO and LOANDEPO were statistically significant. These results imply that, basically, the financial position of a bank better explains the probability of closure or a run than other factors, which is consistent with Yabushita and Inoue.[83]

Columns 3 and 4 report the results for smaller banks. In Column 3, it is confirmed that the coefficient of LN(INTERLOCK) is positive and statistically significant. Also, the magnitude is much greater compared with that of Column 1. In Column 4, the positive effect of LN(INTERLOCK) is still significant after adjusting for financial ratios. These results indicate that, for smaller banks, director

[82] Yabushita and Inoue "The Stability" used the Tokyo area dummy instead of EQ. However, the Tokyo area dummy was positive but statistically insignificant in cases where we substitute it for EQ.
[83] Yabushita and Inoue "The Stability".

interlocking was evaluated as negative information by the market, in addition to poor financial position. On the other hand, it is confirmed in Columns 5-8 that director interlocking had no effect on the probability of closure or a run in respect of medium-sized and large banks. In sum, the finding that the effects of director interlocking were harmful to smaller banks, but to larger banks, is still robust, even if we use probability of closure or a run as a performance measure.

5. Concluding remarks

More than forty years ago, Kato proposed the organ bank hypothesis: that in pre-war Japan many banks controlled by industrial companies through capital and personal relationships, engaged in unsound lending to their related companies, which damaged the banks' financial positions, and consequently destabilized the financial system.[84] This view has become one of the fundamental hypotheses on Japanese financial history, but has not been examined quantitatively.

In this paper, we examined the organ bank hypothesis, using the data on director interlocking between banks and non-banking companies. We found that more than 80% of ordinary banks had at least one director or auditor who was also a director or auditor of a non-banking company. Also, through regression analyses, we confirmed that director interlocking had negative effects on bank performance, and that these effects were serious, especially for smaller banks. Our findings support the organ bank hypothesis.

As stated in section 1, the organ bank relationship can be regarded as a case of related lending suffered from "looting," which is widely observed in present developing countries.[85] This perception leads us to an interesting future research topic. That is the fate of the organ bank relationship in the

[84] Kato, *Honpo Ginkoshi Ron.*
[85] La Porta, Rafel, Lopez-Silanes, and Zamarrip, "Related Lending."

process of economic and financial development. Did the organ bank relationship disappear after the 1920s? If so, how did that come about? One hypothesis we have in mind is a "natural selection" hypothesis.[86] Given that the organ bank relationship compromised the soundness of bank loans, we can expect that organ banks would be more likely to be forced out of the market than other banks. In other words, if the mechanism of selection by market forces was effective, surviving banks would be expected to demonstrate fewer characteristics of organ banks. Because there were many banks in pre-war Japan, this is a good opportunity to examine whether such "natural selection" actually worked or not, which would have a substantial implication to understand the evolution of institutions. At the same time, if the natural selection did not work effectively, it might imply that some government regulation on related rending is needed in present developing countries. These issues remain to be addressed by future studies.

References

Allen, Franklin, and Douglas Gale. *Comparing Financial systems.* Cambridge, MA: MIT Press, 2000.

Aoki, Masao. *Towards A Comparative Institutional Analysis*. Cambridge, MA: MIT Press, 2001.

Aoki, Masao, Paul Sheard, and Hugh Patrick. "The Japanese Main Bank System: An Introductory Overview." in *The Japanese Main Bank System: Its Relevance for Developing and Transforming Economies*, edited by M. Aoki and H. Patrick, 3-50. New York: Oxford University Press, 1994.

Asakura, Kokichi. *Shinpen Nihon Kin'yu Shi* [*Japanese Financial History*]. Tokyo: Nihon Keizai Hyoronsha, 1988.

Bank of Japan. "Sho Kyugyo Ginko no Hatan Genin oyobi sono Seiri [Causes and Liquidation of the Failed Banks]." in *Nihon Kin'yushi Shiryo* [*Materials on Japanese Financial History*], Showa

[86] Okazaki, "Selection".

edition, volume 24, edited by Bank of Japan, 168-529 . Printing Bureau of the Ministry of Finance, 1969.

Bank of Japan. "Ginko Jiko Geppo [Monthly Report Bank Issue]." in *Nihon Kin' yu shi Shiryo* [*Material on the Japanese Financial Histor*] Showa edition, volume 9, edited by Bank of Japan, 293-724, Printing Bureau of the Ministry of Finance, 1928.

Bank of Japan. *Nihon Ginko Hyakunen Shi* [*100 Years History of the Bank of Japan*], volume.2, Tokyo: Bank of Japan, 1983.

Bank of Japan. *Nihon Ginko Hyakunen Shi* [*100 Years History of the Bank of Japan*], volume.3, Tokyo: Bank of Japan,1983.

Beim, David, and Charles W. Calomiris. *Emerging Financial Markets,* New York: Irwin/Mac-Graw Hill, 2001.

Berger, Allen N. "The Profit-Structure Relationship in Banking: Test of Market Power and Efficiency Structure Hypothesis." *Journal of Money, Credit and Banking* 27, no.2 (1995): 404-431.

Bouke, Philip. "Concentration and Other Determinant of Bank Profitability in European, North America and Australia." *Journal of Banking and Finance* 13, no.1 (1989): 65-79.

Brealey, Richard A., and Stewart C. Myers. *Principles of Corporate Finance*, 7th edition. New York: Irwin /McGraw Hill, 2002.

Calomiris, Charles W. *U.S. Bank Dereguration in Historical Perspective*. New York: Cambridge University Press, 2000.

Goddard, John, Phil Molyneux , and John O.S.Wilson. *European Banking: Efficiency, Technology and Growth,* Chichester: Wiley, 2001.

Goddard, John, Phil Molyneux, and John O.S.Wilson. "The Profitability of European Banks: A

Cross-Sectional and Dynamic Panel Analysis" *The Manchester School* 72, no.3 (2004):363-381.

Gorton, Gary. "Bank Suspension of Convertibility." *Journal of Monetary Economics* 15, no.2 (1995):177-193.

Goto, Shinichi, *Nihon no Kin'yu Tokei* [*Financial Statistics of Japan*]. Tokyo: Toyo Keizai Shinposha, 1970.

Goto, Sinchi. *Ginko Godo no Jisshoteki Kenkyu* [*Empirical Studies on Bank Mergers*]. Tokyo: Nihon Keizai Hyoronsha, 1991.

Green, William H. *Econometric Analysis*, 4th edition. New Jersey: Prentice Hall, 2000.

Hadi, Ali S. "Identifying Multiple Outliers in Multivariate Data." *Journal of the Royal Statistical Society, Series (B)* 54, (1992): 761-771.

Hoshi, Takeo. "Back to the Future: Universal Banking in Japan." in *Financial System Design: The Case for Universal Banking*, edited by A. Saunders and I. Walter, 205-243. IL: Irwin/Burr Ridge, 1996.

Hoshi, Takeo, and Anil Kashyap. *Corporate Financing and Governance in Japan*. Cambridge, MA:MIT Press, 2001.

Ishii, Kanji "Hyaku Sanju Ginko to Matsumoto Jutaro [Hyaku Sanju Bank and Jutaro Mastumoto)]." in *Kindai Nihon Kin'yu Shi Josetsu* [*Towards the Modern Financial History of Japan*], edited by K. Ishii, 309-367.Tokyo: The University of Tokyo Press, 1999.

Imuta, Toshimitsu. "Shohyo: Kazuo Shibagaki, Nihon Kin'yu Shihon Bunseki [Book Review of Kazuo Shibagaki's Analysis of the Japanese Financial Capital]." *Keizaigaku Zasshi* (Osaka Municipal University) 54, no.2 (1966) :83-100.

Imuta, Toshimitsu. "Taishoki niokeru Kin'yu Kozo [Introduction of the Analysis of the Financial Crisis in 1927]." In *Gendai no Zaisei Kin'yu* [*Contemporary Fiscal and Financial Issues*], edited by

R.Ouchi, 273-290. Tokyo: The University of Tokyo Press, 1976.

Imuta, Toshimitsu. "Nihon no Kin'yu Kozo no Saihen to Chiho Ginko [Reorganization of Financial System and Regional Banks]." in *Ryo Taisenkan niokeru Kin'yu Kozo* [*Structure of financial system during wartime*], edited by K. Asakura, 3-114. Tokyo:Ochanomizu Shobo, 1980.

Kato, Toshihiko. *Honpo Ginkoshi Ron* [*History of Banks in Japan*]. Tokyo: The University of Tokyo Press, 1957.

Korenaga,Takafumi, Takeshi Nagase, and Juro Teranishi. "1927 nen Kin'yu Kyoko kano Yokin Toritsuke Ginko Kyugyo nikansuru Suryo Bunseki [The Quantitative Analysis about Bank Cosures and Runs under the Showa Financial Crisis]." *Keizai Kenkyu* 52, no.4 (2001): 315-332.

Lamoreaux, Naomi. *Insider Lending: Banks, Personal Connections, and Economic Development in Industrial New England*, New York:Cambridge University Press, 1994.

La Porta, Rafel. "Legal Determinants of External Finance." *Journal of Finance* 52, no.3 (1997):1131-50.

La Porta, Rafel, Florencio Lopez-Silanes, and Guillerno Zamarrip, "Related Lending" *Quarterly Journal of Economics* 118, no. 1 (2003):231-268.

Minami,Ryoshin, and Akira Ono. "Senzen Nihon no Shotoku Bunpu(The Income Distribution of Pre-war Japan)" *Keizai Kenkyu,* 38, no.4 (1987):333-352.

Ministry of Finance. *Ginkokyoku Nenpo* [*Year Book of the Bank Bureau of the Ministry of Finance*] 1926 issue, 1928.

Miyamoto, Matao. "Sangyo to Kaisha Seido no Hatten [Industrialization and the Evolution of the Corporate System]." in *Sangyoka no Jidai* [*The Era of Industrialization*] volume.1, edited by S. Nishikawa and T. Abe, 351-396. Tokyo: Iwanami Shoten, 1990.

Miyamoto, Matao, and Takeshi Abe "Kogyoka Shoki ni okeru Nihon Kigyo no Koporeito Gabanansu

[Corporate Governance of Japanese Firms in the Early Stage of Industrialization].” *Osaka Daigaku Keizaigaku* 48, no.3-4 (1999):176-197.

Mizoguchi,Toshiyuki. “Nihon no Shotoku Bunnpu no Choki Hendo [The Long-term Fluctuation of Income Distribution in Japan]” *Keizai Kenkyu* 37, no.2 (1986):152-158.

Morikawa, Hidemasa. *Nihon Keieishi* [*Japanese Business History*]. Tokyo: Nihon Keizai Shinbunsha, 1981.

Murakami, Hatsu. “Futsu Ginko,[Ordinary Banks]”, in *Nihon Kin'yu Ron no Shiteki Tenkai* (*History of Research on the Japanese Financial System*), edited by T. Kato, 383-439. Tokyo: The University of Tokyo Press, 1983.

Newey, Whitney K. “Efficient Estimation of Limited Dependent Variable Model with Edogenous Explanatory Variables” *Jorunal of Econometrics* 36, no3. (1987): 231-250.

Okazaki, Tetsuji. “Corporate Governance.” in *The Japanese Economi System and Its Historical Origins*, edited by T.Okazaki and M. Okuno-Fujiwara, 97-144, New York: Oxford University Press, 1999.

Okazaki, Tetsuji. *Mochikabu Gaisha no Rekishi* [*History of Holding Companies in Japan*]. Tokyo: Chikuma Shobo, 1999.

Okazaki, Tetsuji. “The Role of Holding Companies in Pre-war Japanese Economic Development: Rethinking Zaibatsu in the Perspective of Corporate Governance.” *Social Science Japan.*4, no.(2001):243-268.

Okazaki, Tetsuji. “Ginkogyo niokeru Kigyo Tota to Keiei no Koritsusei [Selection, Exits and Efficiency in the Japanese Banking Industry: An Historical Perspective]” in *Kin'yu Shhisutemu no Saisei* [*Revival of the Financial System*], edited by M. Saito, 207-236. Chuo Keizaisha, 2002.

Okazaki, Tetsuji. “Selection and Imitation in Institutional Evolution: Analysis of Institutional Change in

Japan, 1960-1999." CIRJE Discussion Paper Series, F-256, The University of Tokyo, 2004.

Okazaki,Tetsuji, and Kazuki Yokoyama, "Measuring the Extent and Implications of Director Interlocking in the Pre-war Japanese Banking Industry." CIRJE Discussion Paper Series, F-138, The University of Tokyo, 2002.

Patrick, Hugh. "Japan, 1968-1914" in *Baking in the Early Stage of Industrialization. A Comparative Study,*edited by R. Cameron. New York: Oxford University Press, 1967.

Shibuya, Ryuichi, "Ginko Jiko Shirabe Kaidai [Bibliographical Inroduction to *Investigation into Bank Accident,*]." *Keizaigaku Ronshu* (Komazawa University) (1975):1-166.

Shiratori, Keishi. "1920 Nendai niokeru Ginko Kisei no Keisei [The Formation of Regulations of Bank Management in the 1920s]." *Keiei Shigaku.*36, no.3 (2001):25-50.

Smirlock, Michael. "Evidence of the (non) Relationship Between Concentration and Profitability in Banking." *Journal of Money, Credit and Banking* 17, no.1 (1985):69-83.

Shibagaki, Kazuo. *Nihon Kin'yu Shihon Bunseki* [*Analysis of the Financial Capital in Japan*]. Tokyo: The University of Tokyo Press, 1965.

Sugiyama, Kazuo. "Gomeigaisha Mitsui Ginko no Kikan Ginko teki Seikaku. [Attributes of the Organ Bank Observed in Mitsui Bank]." in *Gendai Kin'yu* [*Contemporary Finance*],edited by T.Ouchi, 239-254. Tokyo: The University of Tokyo Press, 1976.

Takahashi, Kakemichi and Sunao Morigaki. *Showa Kinyu Kyoko Shi* [*History of the Showa Financial Crisis*]. Tokyo: Shinminkai Shuppanbu, 1968.

Teranishi, Juro. *Nihon no Keizai Hatten to Kin'yu* [*Japanese Economic Development and Finance*]. Tokyo: Iwanami Shoten, 1982.

Teranishi, Juro. "The main bank system" in *The Japanese Economic System and Its Historical Origins*,

edited by T.Okazaki and M. Okuno-Fyjiwara, 63-96. New York: Oxford University, 1999.

Teranishi, Juro. "The Fall of the Taisho Economic System" in *Finance, Governance, and Competitiveness in Japan*, edited by M. Aoki and G. R. Saxonhouse, 43-63. Oxford: Oxford University Press, 2000.

Tokyo Koshinjo. *Ginko Kaisha Yakuinroku* [*Directory of the Banks and Firms Directors of Japan*]. 1926 issue, Tokyo: Tokyo Kishinjo, 1926.

Toyo Keizai Shinposha. *Kabushiki Gaisha Nenkan*, [*Year Book of Joint-stock Companies*)] volume4. Tokyo: Toyo Keizai Shinposha, 1926.

Toyo Keizai Shinposha. *Kanketsu Showa Kokusei Soran* [*Final Version of the Collected Statistics of the Showa Era*]. volume 2. Tokyo: Toyo Keizai Shinposha, 1991.

Yamazaki, Hiroaki. *Showa Kin'yu Kyoko* [The *Showa Financial Crisis*]. Tokyo: Toyo Keizai Shiposha., 2000.

Yabushita, Shiro, and Atsushi Inoue. "The Stability of the Japanese Banking System: A Historical Perspective." *Journal of the Japanese and International Economies* l.7, no.4 (1993):387-407.

Appendix : Two stage estimation of Equation (2)

In order to deal with the potential endogeneity, we estimated Equation (2) by two stage least square method, using the age of a bank and the prefecture dummies as instrumental variables for INTERLOCK. The basic idea is that since an organ bank was, by definition, established to fund related non-banking companies, arguably an organ bank in its early stages would have been firmly controlled by its founders, who were bank directors. Then, as the banks matured, the influence of the founders generally would be attenuated, as compared with the early stage situation.[87] Hence, bank age was expected to have a negative effect on INTERLOCK. In respect of prefecture dummies, we considered that director interlocking between banks and non-banking companies was affected to greater or lesser extent by the structures of individual regional economies.[88] In the first stage, INTERLOCK was regressed on bank age

[87] Morikawa, *Nihon Keieishi* defined a professional manager as a manager who was not a major shareholder of the company where he worked, but was expected to play only a management role, and investigated the ratio of professional managers among the board members, in respect of large companies, including banks, in 1905, 1912 and 1930. According to his calculations, the number of professional managers gradually increased during this period.

[88] According to Shiratori, Shiratori, "1920 Nendai", the reason for the Bank Law of 1927 not completely

and prefecture dummies and other exogenous variables by OLS. The coefficient of bank age was negative and statistically significant. In the second stage, we estimated Equation (2), using the result of the first stage regression.[89] Appendix Table 2 reports the results of the second stage regressions. In respect of the results for all banks (Columns 1 and 2), the coefficients of LN(INTERLOCK) are still negative and statistically significant. Also, the effect of interlocking was particularly negative for smaller banks.

prohibiting director interlocking between banks and companies was that the government took account of the situation in some rural areas, where it was unavoidable that some powerful and reputable persons held directorships in banks as well as in non-banking companies.

[89] In the second stage estimation of tobit model, we use the asymptotically efficient estimator proposed by Newey, "Efficient Estimation".

Table1 Distribution of the number of directors of the sample banks

	Number of directors																	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16～	Total
Total number of directors	0	9	3	5	30	75	97	146	189	142	115	75	35	21	21	14	30	1007
Top executive	94	891	20	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1007
Executive directors	523	362	91	22	6	1	0	1	1	0	0	0	0	0	0	0	0	1007
Ordinary directors	18	41	128	214	241	157	103	47	25	12	6	8	4	0	1	1	1	1007
Auditors	17	69	321	389	120	63	20	5	1	1	0	1	0	0	0	0	0	1007

Source: Our data base (see the text).

Table 2 Interlocking of directors and auditors between banks and non-banking companies

Positions in the non-banking companies	Number of banks with interlocking	Ratio to all sample banks	Number of interlocks	Average per bank
Panel A: ALL directors and auditors of 1007 banks				
Total	836	83.0	7,314	7.26
Top executive	407	40.4	962	0.96
Executive directors	157	15.6	205	0.20
Ordinary directors	753	74.8	4,160	4.13
Auditors	637	63.3	1,987	1.97
Panel B: Top executives of 1007 banks				
Total	483	48.0	1,486	1.48
Top executive	175	17.4	283	0.28
Executive directors	26	2.6	29	0.03
Ordinary directors	364	36.1	841	0.84
Auditors	203	20.2	333	0.33
Panel C: Executive directors of 1007 banks				
Total	205	20.4	524	0.52
Top executive	30	3.0	44	0.04
Executive directors	16	1.6	19	0.02
Ordinary directors	149	14.8	279	0.28
Auditors	115	11.4	182	0.18
Panel D: Ordinary directors of 1007 banks				
Total	690	68.5	3,509	3.48
Top executive	238	23.6	426	0.42
Executive directors	80	7.9	94	0.09
Ordinary directors	588	58.4	2,078	2.06
Auditors	424	42.1	911	0.90
Panel E: Auditors of 1007 banks				
Total	525	52.1	1,795	1.78
Top executive	131	13.0	209	0.21
Executive directors	56	5.6	63	0.06
Ordinary directors	419	41.6	962	0.96
Auditors	302	30.0	561	0.56

Source: Our database (see the text).

Table 3 Interlocking of directors and auditors between banks and non-banking companies by scale of banks

Positions in the non-banking companies	Bank sizes	Number of observations	Number of banks with interlocking	Ratio to the all sample	Average per bank
Total	Total	1,007	836	83.0	7.26
	Small-sized	335	235	70.1	3.27
	Medium-sized	336	278	82.7	4.82
	Large-sized	336	323	96.1	13.70
Top executive	Total	1,007	407	40.4	0.96
	Small-sized	335	67	20.0	0.36
	Medium-sized	336	112	33.3	0.51
	Large-sized	336	228	67.9	2.00
Executive directors	Total	1,007	158	15.7	0.20
	Small-sized	335	23	6.9	0.08
	Medium-sized	336	41	12.2	0.14
	Large-sized	336	93	27.7	0.39
Ordinary directors	Total	1,007	753	74.8	4.13
	Small-sized	335	193	57.6	1.85
	Medium-sized	336	256	76.2	2.94
	Large-sized	336	304	90.5	7.59
Auditors	Total	1,007	637	63.3	1.97
	Small-sized	335	165	49.3	0.97
	Medium-sized	336	192	57.1	1.23
	Large-sized	336	280	83.3	3.72

Source: Our database (see the text).

Table4 Basic statistics

PanelA Banks in the sample

	Observations	Mean	Std. Dev.	Min	Max
ROE	1,007	13.28	7.92	0.00	73.22
LOANDEPO	1,007	2.11	11.13	0.00	310.45
CAPDEPO	1,007	1.04	7.06	0.04	195.10
RESDEPO	1,007	0.20	1.65	0.00	52.14
LEVARAGE	1,007	3.03	2.77	0.01	27.75
SECURITY	1,007	0.11	0.15	0.00	1.87
MARKET	1,007	29.6	13.8	11.3	100.0
KANTO	1,007	0.1	0.4	0.0	1.0
URBAN	1,007	0.26	0.44	0.00	1.00
AGE	1,007	26.72	11.56	0.00	53.00
SIZE	1,007	14.75	1.36	10.95	20.46
INTERLOCK	1,007	7.26	10.00	0.00	88.00
FIRM	1,007	5.59	7.70	0.00	66.00
INTDIRC	1,007	0.84	1.05	0.00	7.44

PanelB Banks excluded from the sample

	Observations	Mean	Std. Dev.	Min	Max
ROE	391	16.07	12.36	0.00	83.09
LOANDEPO	391	2.01	6.95	0.00	131.81
CAPDEPO	391	2.06	13.41	0.01	182.46
RESDEPO	391	0.58	7.17	0.00	141.22
LEVARAGE	391	3.70	7.57	0.01	122.78
SECURITY	391	0.08	0.11	0.00	0.76
MARKET	391	28.11	13.84	11.31	94.59
KANTO	391	0.13	0.34	0.00	1.00
URBAN	391	0.25	0.44	0.00	1.00
AGE	389	29.04	8.02	0.00	52.00
SIZE	391	12.94	1.03	9.93	16.66

Source: Ministry of Finance[1926].

Table5 Baseline regression results

Bank Size	Dependent variable: ROE							
	All banks		Small-sized banks		Medium-sized banks		Large-sized banks	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
LN(INTERLOCK)	-1.2689 a	-1.0569 a	-1.533 a	-1.3159 b	-1.3229 a	-1.0989 a	-0.6336	-0.3449
	(0.3205)	(0.3162)	(0.5814)	(0.5844)	(0.4273)	(0.4173)	(0.63)	(0.6147)
SIZE	1.0654 a	0.283	4.2841 a	2.451 b	0.5009	-1.0393	0.1077	-0.3337
	(0.2373)	(0.2595)	(1.1065)	(1.2462)	(1.2268)	(1.1554)	(0.4689)	(0.4864)
EQ	-3.255 a	-3.455 a	-4.9466 a	-4.9019 a	-2.411 c	-2.2545 c	-1.7702	-2.4742
	(0.8557)	(0.8342)	(1.6364)	(1.6181)	(1.2432)	(1.2045)	(1.6054)	(1.5322)
MARKET	0.0289	0.0141	0.1032 b	0.0806	-0.0358	-0.036	0.0292	0.0059
	(0.0243)	(0.0223)	(0.0502)	(0.0508)	(0.0292)	(0.0286)	(0.0435)	(0.0363)
SECURITY	6.4584 a	7.0533 a	8.0673 a	8.4407 a	3.0993	3.155	6.0402	7.0559
	(2.0859)	(2.08)	(2.4776)	(2.4133)	(3.1421)	(2.9457)	(4.4493)	(4.4403)
LEVARAGE		0.6877 a		1.6185 a		0.8192 a		0.5542 a
		(0.1519)		(0.5488)		(0.2083)		(0.1975)
INTERCEPT	-1.7845	7.7472	-47.281 a	-24.748	9.0704	28.8047 c	12.0082	16.6261 b
	(3.3631)	(3.4345)	(15.2358)	(16.6949)	(17.5915)	(16.693)	(7.4171)	(7.234)
Log likelihood	-3395.45	-3374.97	-1096.8	-1091.2	-1072.2	-1060.5	-1185.67	-1178.44
NOB	1007	1007	335	335	336	336	336	336
Censored	64	64	41	41	9	9	14	14

Notes: Significance at 1%,5% and 10% level are denoted by "a" "b" and "c". The figures in parentheses are the White heteroscedasticity robust standard errors. Significance levels are reported for two-tailed tests. Definitions of the variables can be found in the appendix.

Table6 Test of other proxies for connection between banks and firms

Panel A: Number of firms connected with bank through director interlocking

Bank Size	Dependent variable: ROE							
	All banks		Small-sized banks		Medium-sized banks		Large-sized banks	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
LN(FIRM)	-1.6491 a	-1.4059 a	-1.693 a	-1.4463 b	-1.7785 a	-1.4844 a	-1.1339	-0.8364
	(0.3727)	(0.369)	(0.641)	(0.6453)	(0.478)	(0.4667)	(0.7796)	(0.7695)
SIZE	1.1785 a	0.4015	4.2262 a	2.4047 c	0.7957	-0.7501	0.3131	-0.1226
	(0.2497)	(0.2742)	(1.102)	(1.2404)	(1.2265)	(1.159)	(0.4848)	(0.5037)
EQ	-3.236 a	-3.4352 a	-4.9434 a	-4.9005 a	-2.4844 b	-2.32 c	-1.7213	-2.4175
	(0.8529)	(0.8309)	(1.6349)	(1.6181)	(1.2425)	(1.2048)	(1.5949)	(1.5147)
MARKET	0.0296	0.015	0.1041 b	0.0814	-0.0365	-0.0366	0.0315	0.0088
	(0.0242)	(0.0221)	(0.0503)	(0.0509)	(0.0288)	(0.0283)	(0.0429)	(0.0356)
SECURITY	6.5298 a	7.1083 a	8.1946 a	8.5477 a	3.2584	3.287	6.1341	7.1604
	(2.0966)	(2.0861)	(2.4693)	(2.4034)	(3.1068)	(2.9117)	(4.473)	(4.4579)
LEVARAGE		0.6767 a		1.6137 a		0.7959 a		0.5423 a
		(0.153)		(0.5502)		(0.211)		(0.1999)
INTERCEPT	-3.1433	6.326 c	-46.5331 a	-24.1525	5.1452	24.9747	9.4808	14.0845 b
	(3.466)	(3.5704)	(15.189)	(16.6294)	(17.5623)	(16.7084)	(7.3274)	(7.1518)
Log likelihood	-3392.11	-3372.18	-1096.77	-1091.18	-1069.92	-1058.78	-1184.76	-1177.79
NOB	1007	1007	335	335	336	336	336	336
Censored	64	64	41	41	9	9	14	14

Notes: Significance at 1%,5% and 10% level are denoted by "a" "b" and "c". The figures in parentheses are White heteroscedasticity robust standard errors. Significance levels are reported for two-tailed tests. Definitions of the variables can be found in the appendix.

Table6 Test of other proxies for connection between banks and firms

Panel B Number of interlocks per director

Bank Size	Dependent variable: ROE							
	All banks		Small-sized banks		Medium-sized banks		Large-sized banks	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
INTDIRC	-0.9367 a	-0.8711 a	-2.1622 a	-2.0098 a	-0.7515	-0.5299	-0.4312	-0.4601
	(0.2921)	(0.2668)	(0.5329)	(0.5486)	(0.4798)	(0.4648)	(0.4252)	(0.3871)
SIZE	0.8471 a	0.106	4.0769 a	2.2657 c	0.1295	-1.4639	0.0233	-0.288
	(0.2196)	(0.2359)	(1.1083)	(1.2375)	(1.2818)	(1.2067)	(0.4413)	(0.4465)
EQ	-2.9737 a	-3.2016 a	-4.7794 a	-4.7385 a	-1.927	-1.8864	-1.6858	-2.3862
	(0.8539)	(0.8336)	(1.6091)	(1.5928)	(1.2121)	(1.1732)	(1.6055)	(1.5328)
MARKET	0.0223	0.0081	0.1042 b	0.0813	-0.046	-0.0446	0.0246	0.0024
	(0.024)	(0.0219)	(0.0501)	(0.0504)	(0.0291)	(0.0283)	(0.0428)	(0.0359)
SECURITY	6.7917 a	7.4093 a	9.503 a	9.7988 a	3.3148	3.3559	6.1367	7.3471 c
	(2.0815)	(2.0672)	(2.7444)	(2.5807)	(3.2707)	(3.0682)	(4.4539)	(4.4431)
LEVARAGE		0.7166 a		1.6512 a		0.8558 a		0.5667 a
		(0.1515)		(0.5365)		(0.2077)		(0.1975)
INTERCEPT	0.3469	9.4457 a	-45.2678 a	-22.9128	13.2998	33.8482 c	12.6696 c	15.7531 b
	(3.238)	(3.2428)	(15.2477)	(16.6028)	(18.3715)	(17.4279)	(7.3966)	(7.1379)
Log likelihood	-3398.72	-3376.336	-1095.35	-1089.38	-1076.38	-1063.79	-1185.71	-1178.02
NOB	1007	1007	335	335	336	336	336	336
Censored	64	64	41	41	9	9	14	14

Notes: Significance at 1%,5% and 10% level are denoted by "a" "b" and "c". The figures in parentheses are White heteroscedasticity robust standard errors. Significance levels are reported for two-tailed tests. Definitions of the variables can be found in the appendix.

Table7 Determinants of bank runs or closures in 1927-1929

Bank Size	All banks		Small-sized banks		Medium-sized banks		Large-sized banks	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
LN(INTERLOCK)	0.1894	0.2229	0.8522 c	0.7079 c	-0.009	0.0023	0.1335	0.1848
	(0.1794)	(0.178)	(0.4397)	(0.3908)	(0.2881)	(0.324)	(0.2327)	(0.2375)
SIZE	0.3581 a	0.1455	-0.2906	-0.4145	1.3116	0.8281	0.1202	-0.025
	(0.1107)	(0.1205)	(0.9116)	(0.8884)	(0.8105)	(0.8486)	(0.1702)	(0.1878)
EQ	0.3001	0.3384	0.3408	0.0248	0.5508	0.5568	0.2748	0.2515
	(0.331)	(0.3397)	(1.1403)	(0.9417)	(0.5969)	(0.7372)	(0.3972)	(0.4198)
CAPDEPO		-2.3687 a		-1.4155 c		-2.9971 a		-3.0579 a
		(0.7884)		(0.8454)		(0.9519)		(1.1041)
LOANDEPO		0.0741 b		0.2951 b		0.0786 b		0.0819 c
		(0.0292)		(0.1268)		(0.0367)		(0.0494)
RESDEPO		-1.0164		2.8106		-0.1051		-4.1358 b
		(1.6613)		(2.2384)		(2.3658)		(2.0337)
ROE		-0.0335		-0.1407 a		-0.0529		-0.0154
		(0.0297)		(0.0524)		(0.0665)		(0.0302)
INTERCEPT	-8.4469 a	-3.8038 b	-1.2971	2.191	-22.0859 c	-13.1694	-4.2284 c	-0.5059
	(1.4502)	(1.6987)	(11.9144)	(11.7678)	(11.7577)	(12.3022)	(2.4847)	(2.7993)
Pseudo	0.0689	0.1107	0.0609	0.1959	0.021	0.0791	0.0112	0.0616
Log likelihood	-231.778	-221.369	-28.2488	-24.1885	-68.7132	-64.6369	-128.968	-122.402
NOB	1007	1007	335	335	336	336	336	336

Notes: Significance at 1%,5% and 10% level are denoted by "a" "b" and "c". The figures in parentheses are White heteroscedasticity robust standard errors. Significance levels are reported for two-tail tests. Definitions of the variables can be found in the appendix.

Appendix Table 1 Characteristics of loans of the closed banks under the Showa Financial Crisis in 1927

Panel A: Size of the loans to related borrowers

Bank Name	Capital (million Yen)	Assets (million Yen)	(1)Loans to related group	(2)All loans	Ratio of loans to related borrowers
Imabari Shogyo	2.50	17.5	4,957	17,270	28.7%
Tokushima	0.70	8.6	1,092	2,694	40.6%
Tokyo Watanabe	2.00	40.4	35,045	47,457	73.8%
Nakai	5.00	53.0	8,072	41,423	19.5%
Murai	5.13	68.6	16,293	63,214	25.8%
Souda	2.50	24.2	9,544	23,668	40.3%
Nakazawa	1.25	10.3	11,509	12,176	94.5%
Hachijuyon	2.30	20.9	3,296	17,441	18.9%
Toukatsu	0.40	2.4	415	1,372	30.2%
Dai Rokujugo	6.25	36.3	8,260	29,166	28.3%
Kurita	0.80	7.5	1,209	5,920	20.4%
Oumi	9.38	147.2	10,017	130,560	7.7%
Nishi Ehara	0.40	3.1	440	2,679	16.4%
Jugo	49.75	450.6	141,786	396,049	35.8%
Kasen	0.25	2.1	805	1,642	49.0%

Panel B: Comparison of loan terms between related loans and all loans

Bank Name	(1)Loans to related borrowers		(2) All loans		Unsecured Ratio(%)	
	Unsecured loans	Total amount	Unsecured loans	Total amount	(1)Loans to related borrowers	(2)All loans
Imabari Shogyo	3,566	4,435	8,378	17,270	80.4%	48.5%
Tokushima	–	–	–	–	–	–
Tokyo Watanabe	–	–	–	–	–	–
Nakai	–	–	–	–	–	–
Murai	–	–	–	–	–	–
Souda	7,324	9,544	16,512	23,668	76.7%	69.8%
Nakazawa	10,158	11,509	10,378	12,176	88.3%	85.2%
Hachijuyon	–	–	–	–	–	–
Toukatsu	396	415	934	1,372	95.5%	68.1%
Dai Rokujugo	–	–	–	–	–	–
Kurita	751	1,209	1,718	5,920	62.1%	29.0%
Oumi	–	–	–	–	–	–
Nishi Ehara	400	440	1,021	2,679	90.9%	38.1%
Jugo	–	–	–	–	–	–
Kasen	–	–	–	–	–	–
Total	22,596	27,551	38,941	63,085	82.0%	61.7%

Panel C: Comparison of loan performance between relate loans and all loans

Bank Name	(1)Loans to related borrowers		(2) All loans		Irrevocable Ratio(%)	
	Irrecoverable loans	Total amount	Irrecoverable loans	Total amount	(1)Loans to related borrowers	(2)All loans
Imabari Shogyo	1,978	5,636	4,122	17,270	35.1%	23.9%
Tokushima	352	832	1,127	2,694	42.3%	41.8%
Tokyo Watanabe	–	–	–	–	–	–
Nakai	–	–	–	–	–	–
Murai	13,383	16,293	36,820	63,213	82.1%	58.2%
Souda	8,206	9,544	16,263	23,668	86.0%	68.7%
Nakazawa	10,896	11,509	11,032	12,176	94.7%	90.6%
Hachijuyon	3,096	3,296	8,957	17,441	93.9%	51.4%
Toukatsu	–	–	–	–	–	–
Dai Rokujugo	–	–	–	–	–	–
Kurita	–	–	–	–	–	–
Oumi	–	–	–	–	–	–
Nishi Ehara	–	–	–	–	–	–
Jugo	–	–	–	–	–	–
Kasen	445	804	489	1,642	55.3%	29.8%
Total	38,356	47,914	78,811	138,104	80.1%	57.1%

Source: Bank of Japan[1964] and Teranishi[1982].
Unit of loans: Thousand Yen

Appendix Table 2 2SLS regression results

Bank Size	Dependent variable: ROE							
	All banks		Small-sized banks		Medium-sized banks		Large-sized banks	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
LN(INTERLOCK)	−2.0006 b	−1.9094 b	−4.3484 a	−3.4719 a	−1.0846	−1.1396	−0.3331	0.6067
	(0.8944)	(0.8845)	(1.2497)	(1.2163)	(2.3873)	(5.0504)	(1.9969)	(2.3072)
SIZE	1.3846 a	0.6861	5.8573 a	4.2115 a	0.658	0.6897	0.1113	−0.332
	(0.4419)	(0.4766)	(1.1342)	(1.2712)	(3.3524)	(7.7504)	(0.9778)	(1.1808)
EQ	−3.2228 a	−3.4035 a	−4.5511 a	−4.5526 a	4.8289	5.0488	5.3644	7.1219 c
	(0.7612)	(0.7392)	(1.4726)	(1.4639)	(3.6603)	(5.9221)	(3.7639)	(3.9501)
MARKET	0.0332 c	0.0197	0.0845 b	0.0659 c	−3.0867 b	−2.3849 c	−1.6774	−2.418
	(0.0197)	(0.0194)	(0.0375)	(0.0379)	(1.3166)	(1.299)	(1.8345)	(1.8795)
SECURITY	6.5589 a	7.1368 a	8.5491 a	8.6969 a	−2.8169	−0.0718	0.084	0.1479
	(1.7844)	(1.731)	(3.1905)	(3.1745)	(6.3197)	(14.0578)	(3.4839)	(4.1831)
LEVARAGE		0.6551 a		1.217 b		−1.3743		−0.2361
		(0.1077)		(0.4705)		(1.0078)		(0.6701)
INTERCEPT	−5.4726	3.0745	−65.1718 a	−45.2944 a	0.7505	0.6872	9.3543	14.0758
	(5.4242)	(5.8237)	(14.9189)	(16.4435)	(47.3908)	(109.0543)	(12.6532)	(15.2664)
NOB	1007	1007	335	335	336	336	336	336
Censored	64	64	41	41	9	9	14	14

Notes: Significance at 1%,5% and 10% level are denoted by "a" "b" and "c". The figures in parentheses are standard errors proposed by Newey(1987). Significance levels are reported for two-tailed tests. Definitions of the other variables can be found in the appendix.

Appendix Table 3: Definitions of the variables

Variables	Definition
INTERLOCK	Number of interlocks. That is, the total number of the positions of directors and auditors of non-banking companies, held by the directors and auditors of each bank.
FIRM	Number of the non-banking firms connected with the bank through director interlocking.
INTDIRC	Number of interlocks per director. That is, INTERLOCK 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
URBAN	Dummy variable which equals 1, if the bank's head office was located in Tokyo, Kanagawa, Aichi, Osaka, Kyoto, or Hyogo prefecture, and 0, otherwise.
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.
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
LOANDEPO	Ratio of total loans to total deposits.
RESDEPO	Ratio of bank deposit reserve to total deposits.
CAPDEPO	Ratio of the book value of capital to total deposits.
SECURITY	Ratio of security holdings to total deposit plus the book value of capital.
LEVARAGE	Ratio of total deposits to the book value of capital. Capital is the sum of paid-in capital, reserved fund and profit
RC	Dummy variable which equals to 1, if the bank was closed or faced with run in 1927-1929, and 0 otherwise.
AGE	1926 minus the year when the bank was established.