Effects of Main Bank Switch on Small Business Bankruptcy

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Abstract

This paper examines the effects of main bank switching on the probability of small business bankruptcy by employing a propensity score matching estimation approach. We use a unique firm-level data set of more than 1,000 small and medium-sized enterprises (SMEs) incorporated in Japan; the firms are young and unlisted SMEs just after incorporation. We find that main bank switching increases the probability of firm bankruptcy. In addition, the result suggests that switching increases the probability of bankruptcy when firms switch to financial institutions with which they have not previously transacted. This result may be because such switching worsens the financial conditions of client firms. We also find that the result holds only when the ex-post main banks are not descendants of their ex-ante main banks.

1. Introduction

The aim of this paper is to examine whether the switching of firm–main bank relationships increases the probability of firm bankruptcy. For small and medium-sized enterprises (SMEs), firm–bank relationships are quite important because such firms largely depend on indirect finance. Thus, numerous studies in banking have examined how the continuation of firm–bank relationships affects lending terms and conditions (e.g., Petersen and Rajan 1994, Berger and Udell 1995, Cole 1998, Degryse and Cayseele 2000, Hernández-Cánovas and Martínez-Solano 2006). In this strand, some studies argue that relationship lending leads to a flexible supply of funds to firms in financial distress and serves as insurance against a temporary shortage of liquidity (e.g., Chemmanur and Fulghieri 1994, Berlin and Mester 1998). In addition, other studies suggest that banks play important roles in avoiding the bankruptcy of client firms (e.g., Mayer 1988, Hoshi et al. 1990, Grunert and Weber 2009, Shimizu 2012, Ogane 2016). Hence, based on these studies, the continuation of firm–bank relationships may improve business performance, and thus may reduce the bankruptcy of SMEs.

Because young SMEs are the most vulnerable and prone to bankruptcy among all firms, most firm bankruptcies occur when firms are young and small. For example, the 2006 White Paper on Small and medium-sized enterprises in Japan reports that the first five- and ten-year survival rates of startup companies in Japan are 41.8% and 26.1%, respectively. This report indicates that most young firms exit during the early stages of the entrepreneurial process, and that the exit rate of startup companies gradually diminishes as they grow. In addition, some studies argue that entrepreneurial activity contributes to economic growth (e.g., Stel et al. 2005, Wong et al. 2005). Hence, it is important to verify whether the termination of firm–bank relationships increases the bankruptcy of young SMEs. However, to the best of our knowledge, no study has empirically examined the impact of the switching of such relationships on the probability of firm bankruptcy.

Against this background, this paper is the first to examine the effects of the switching of firm–bank relationships on the probability of firm bankruptcy while focusing on firm–main bank relationships. In addition, we focus on young and unlisted SMEs because most firm bankruptcies occur during the early stages of the entrepreneurial process.[1] To deal with possible biases caused by omitted variables and/or reverse causality, we employ a propensity score matching estimation approach. Moreover, we divide the switching of firm–main bank relationships into "transfer" and "new transaction." The former is the case in which firms switch their main banks to other financial institutions with which they have already previously transacted. On the other hand, the latter is the case in which we cannot confirm that firms switch their main banks to other financial institutions with which they have previously transacted.

The major findings of this paper are as follows. We find that the switching of firm–main bank relationships increases the probability of firm bankruptcy. In addition, this probability increases only when the switching is a "new transaction," as mentioned above. This result may be because the switching of such relationships worsens the financial conditions of client firms. We also find that the result holds only when the ex-post main banks are not descendants of their ex-ante main banks.

The contributions of this study are summarized as follows. First, we examine the effect of the termination of firm–main bank relationships on firm bankruptcy. Previous studies that investigated the effects of the continuation of firm–bank relationships on business performance could not reveal this effect. Hence, this study contributes to future research on the effects of the continuation of such relationships on client firms. Second, we focus on young and unlisted SMEs as a sample. Gambini and Zazzaro (2013), who may have been the only ones to use a sample of small firms to investigate the effect of long-lasting relationship lending on firm performance, do not reveal the effect of switching on the bankruptcy of client firms. Young and unlisted SMEs are faced with the most severe financial constraints among all enterprises because they generally do not have other

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[1] The probability of bankruptcy per year among these firms is much higher than among other enterprises.

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sources of financing. Hence, revealing the effects on bankruptcy contributes to draw implications for supporting the survival of these firms. Finally, we divide the switching of firm–main bank relationships into "transfer" and "new transaction." The characteristics of these two switching types differ; therefore, it is important to distinguish between them to grasp the effects in more detail. This division is not made by previous studies.

The remainder of the paper is organized as follows. Section 2 reviews previous literature. Section 3 develops our empirical hypotheses. Section 4 provides our data set, the definitions of switching and bankruptcy, and the variables. Section 5 presents the empirical methodology and results. Section 6 concludes the paper.

2.   Literature review

Because the continuation of firm–main bank relationships is important, many studies have investigated the switching of firm–bank relationships. This paper is closely related to the following three strands of literature.

First, we review the literature on the switching of firm–bank relationships and the establishment of new bank relationships. Ongena and Smith (2001) empirically examine the duration of firm–bank relationships using hazard models and show that firms are more likely to switch their main banks as the duration of the relationships increases.[2] This result suggests that banking transactions are immune from the lock-in effect. In addition, Ioannidou and Ongena (2010) find that a bank offers a lower interest rate to a firm when the firm establishes a new bank relationship. Furthermore, Gopalan et al. (2011) argue that small public firms that do not transact with larger banks are more likely to build new banking relationships.

Second, we review the literature on how firm–main bank relationships affect business

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[2] According to the theoretical models presented by Sharpe (1990) and Rajan (1992), close firm–bank relationships increase the cost of switching main banks.

performance, particularly in Japanese cases.[3] These studies mainly target large and listed companies and often regard firms that are members of corporate groups (*keiretsu*) as having main banks.[4] Some studies argue that there is no evidence that firm–main bank relationships improve corporate performance. For example, Prowse (1992) shows that there is no significant difference in net profits between *keiretsu* members and independent firms. In addition, Kang and Shivdasani (1999) argue that the operating profits of independent firms are larger than those of firms with group affiliations. Moreover, Weinstein and Yafeh (1998) do not find evidence that the existence of main bank relationships affects firm growth, but find that the existence of the relationships decreases firm profitability. Furthermore, Hanazaki and Horiuchi (2000) show that there is no evidence that stable firm–main bank relationships affect firms' total factor productivity (TFP) in 1980 or earlier, but show that such relationships significantly reduce TFP in the 1980s and 1990. In contrast, Lichtenberg and Pushner (1994) show the opposite result (i.e., main bank relationships improve corporate performance). More specifically, Lichtenberg and Pushner (1994) examine the relationship between TFP and financial institution shareholding using data on listed manufacturing firms and find that equity ownership by financial institutions increases firm productivity.

Third, this paper is closely related to the literature on how the switching or continuation of firm–main bank relationships affects firm performance. However, few studies have examined the effects of the continuation of such relationships on SMEs' business performance. Hori (2005) examines the effects of the Hokkaido Takushoku Bank (HTB) failure on the ex-post profitability of the bank's client firms, but does not find evidence that the bank's failure significantly affects the client firms' profitability. In addition, Gambini and Zazzaro (2013) investigate the correlation between long-lasting relationship lending and firm growth using a sample of Italian manufacturing firms, and

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[3] The role of main banks in Japan is broad (Sheard 1994). Thus, in Japanese cases, the definition of "main bank" differs in each study.

[4] *Keiretsu* firms and their main banks have very close relationships (Hoshi et al. 1991, Wu and Yao 2012). For details on the *keiretsu*, see Miwa and Ramseyer (2002).

find a negative correlation between them. Moreover, Tsuruta (2014) argues that ex-post firm performance improves after the switching of firm–main bank relationships when firms that have distressed main banks switch their main bank relationships. Except for Gambini and Zazzaro (2013), these studies employ a sample of large and listed companies.[5]

3. Empirical hypotheses

In this paper, we posit the following three hypotheses:

Hypothesis 1: The switching of firm–main bank relationships increases the probability of ex-post firm bankruptcy.

Hypothesis 2: In the switching patterns, the effect of the transfer of firm–main bank relationships on the probability of ex-post firm bankruptcy is statistically insignificant, whereas switching to a bank with which a firm has not previously transacted significantly increases the probability of ex-post firm bankruptcy.

Hypothesis 3: Hypothesis 1 is supported only when a firm switches its main bank relationship to another financial institution that is not a descendant of its ex-ante main bank.

Hypotheses 1–3 are based on the "relationship lending hypothesis." Previous literature on relationship lending shows that the continuation of firm–bank relationships benefits client firms. It predicts that the switching of firm–main bank relationships is detrimental for firms. Hence, we expect that the switching of such relationships increases the

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[5] As previously mentioned, as far as we know, no study except for Gambini and Zazzaro (2013) conducts a direct empirical analysis on the effects of the continuation of firm–main bank relationships on the performance of small firms.

probability of firm bankruptcy (Hypothesis 1).

In addition, the "relationship lending hypothesis" suggests that the transfer of firm–main bank relationships does not affect the probability of firm bankruptcy. The transfer of such relationships does not fall under the termination of firm–bank relationships because the firms have transacted with the ex-post main banks before switching. In contrast, for switching to a bank with which a firm has not previously transacted, this switching indicates the termination of the relationship. Hence, we expect that switching, except for the transfer of relationships, increases the probability of firm bankruptcy (Hypothesis 2).

Furthermore, the continuation of firm–main bank relationships is not terminated when a firm switches its main bank relationship to another financial institution that is a descendant of its ex-ante main bank. As with a transfer, switching to a descendant bank does not fall under the termination of the relationship. Hence, we expect that Hypothesis 1 is supported only when a firm switches its main bank relationship to another financial institution that is not a descendant of its ex-ante main bank (Hypothesis 3).

Based on previous studies of relationship lending, there are several reasons why the switching leads to bankruptcy. First, switching worsens client firms' financial conditions. Specifically, reductions in loans from main banks are likely to significantly deteriorate business performance, and thus increase the probability of bankruptcy. Second, switching reduces the support from main banks, including non-financial support such as management advice. Third, these two phenomena occur simultaneously, and thus the probability of bankruptcy increases.

4. Data, definitions, and variables

4.1. Data

We construct a unique firm-level data set from the following sources. First, we employ

the firm-level database provided by the Tokyo Shoko Research, Ltd. (TSR), one of the largest credit reporting agencies in Japan. This data set comprises three types of files: the TSR Enterprise Information File, the TSR Bankrupt Information File, and the TSR Stand-Alone Financial Information File. Our original sample contains firms incorporated in Japan between April 2003 and June 2008 as unlisted companies with startup capital less than 50 million yen.[6] This data set consists of 887 continuing firms and 121 bankrupt firms. Moreover, this data set includes only information on the first settlement of accounts. These 1,008 firms represent almost all firms that meet the above data extraction conditions in the TSR database. Thus, the bias associated with the sample extraction is likely to be small.

In addition, we use the following aggregate data for each prefecture: *Nihon Kinyu Meikan* (directory of Japanese financial institutions), published by *Nihon Kinyu Tsushin Sha*; the Report on Prefectural Accounts, produced by the Cabinet Office; the Number of Prefectural Sorted Ordinary Corporation, published by the National Tax Agency; and Orbis, provided by Bureau van Dijk.

4.2. *Switching of main bank relationships*

Following widely accepted convention, we define a main bank as the financial institution at the head of the bank name list in the TSR Enterprise Information File.[7] In this file, financial institutions are generally arranged in descending order of their loan amounts. Hence, in this paper, the main bank is almost the same as the financial institution with the largest amount of lending of a firm's correspondent financial institutions. In addition, we judge the switching of firm–main bank relationships by checking whether we can confirm such a switch at least once between the first settlement of accounts and five years later.

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[6] According to the Annual Report of Bankrupt Enterprises (published by the Organization for Small & Medium Enterprises and Regional Innovation, Japan), approximately 95% of bankrupt firms in Japan are firms with capital of less than 50 million yen.

[7] Previous studies focusing on SMEs generally define main banks as banks at the head of firms' correspondent bank name lists and, in these studies, such banks are often the largest lending banks for client firms.

For simplicity, we call the first settlement of accounts the "first term" and the period five years later the "second term." [8] Moreover, in this paper, we employ two types of definitions of the switching of firm–main bank relationships: one is narrow and the other is broad.

In a narrow sense, the switching of main bank relationships includes only the case in which a firm switches its main bank to another financial institution in a completely different group. Thus, this case completely eliminates the possibility that a firm's ex-post main bank is a descendant of its ex-ante main bank.

In contrast, in a broad sense, the switching of main bank relationships includes almost all switching patterns.[9] In this definition, we judge the switching only by whether the name of a firm's main bank changes between the first and the second terms. For this reason, this definition includes the case in which the name change results from the merger of the banks, and thus the main bank of a firm in the second term may be a descendant of its main bank in the first term.

As noted above, we divide the switching of firm–main bank relationships into "transfer" and "new transaction." These two types of switching are used as the variables TRANSFER and NEW_TRANSACTION, and the definitions of these variables and the difference between the two are discussed in subsection 4.4.

4.3. Firm bankruptcy

To examine the effects of the switching of firm–main bank relationships on the probability of firm bankruptcy, we focus on firm bankruptcy occurring within one year from the second term. Hence, the aim of this paper is almost the same as investigating how the switching of firm–main bank relationships within the past five years affects the

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[8] Note that the data on bankrupt firms comprise information on the first settlement term and the term immediately before bankruptcy because these firms went bankrupt within five years of the first settlement. Hence, for bankrupt firms, we call the term immediately before bankruptcy the "second term."
[9] In a broad sense, the number of switches is 135.

probability that a client firm will go bankrupt in the following year. The timeline of the switching of firm–main bank relationships and the bankruptcy of firms is shown in Fig. 1. The bankruptcy rate of the switching group is 3.3%, whereas that of the non-switching group is 1.5% (not reported). The differences between the two groups are statistically insignificant at the 10% level. It should also be noted that the bankruptcy rate of all the firms is 1.7%.[10]

4.4. *Variables*

Table 1 shows the variable definitions and Table 2 presents the descriptive statistics.[11] BANKRUPTCY is the dependent variable that is equal to one if a firm goes bankrupt within one year from the second term. SWITCH, TRANSFER, and NEW_TRANSACTION are our key explanatory variables. These variables are the dummies with respect to the switching of firm–main bank relationships. More specifically, SWITCH equals one if a firm switches its main bank between the first and second terms. TRANSFER and NEW_TRANSACTION are derived from SWITCH. TRANSFER means switching of a main bank to another financial institution with which a firm has already transacted in the first term. NEW_TRANSACTION means switching of a main bank to another institution with which a firm does not transact in the first term.

Other explanatory variables are as follows, and these are mainly based on Shumway (2001), Chava and Jarrow (2004), and Campbell et al. (2008).[12] First, we employ the following firm characteristic variables: the number of employees (EMPLOYEES), the number of correspondent financial institutions (BANKS), firm age (FIRM_AGE), manager age (MANAGER_AGE), a dummy indicating whether the manager of the firm is male (MALE), and the normalized credit score from TSR (SCORE). These variables

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[10] Because our sample is unique, the percentage of firm bankruptcies per year is smaller than usual.
[11] Coincidentally, the number of switching firms equals the number of bankrupt firms.
[12] As the determining factors in the probability of firm bankruptcy, they control for firm size, liquidity, sales, profit, and so forth.

are taken from the TSR Enterprise Information File.[13]

Second, we also use the following firm financial information variables: total liquid assets (LIQUID_ASSETS), quick assets (QUICK_ASSETS), cash and cash in the bank (CASH), total assets (TOTAL_ASSETS), total current liabilities (CURRENT_LIABILITIES), total borrowings (BORROWING), the ratio of short-term borrowings to total borrowings (SHORT_RATIO), total liabilities (TOTAL_LIABILITIES), the capital adequacy ratio (CAPITAL_ADEQUACY_RATIO), return on assets (ROA), return on equity (ROE), capital (CAPITAL), total accumulated profit (ACCUMULATED_PROFIT), sales (SALES), and profit (PROFIT).[14] These variables are taken from the previously mentioned TSR Stand-Alone Financial Information File.

Finally, the following are aggregate data for each prefecture: the Herfindahl index of the number of financial institutions (HHI), the ratio of the number of financial institutions to the number of ordinary corporations (BANKS_RATIO), the real gross prefectural product (GPP), the number of ordinary corporations (FIRMS), the growth rate of the real gross prefectural product (GROWTH_RATE), and the startup rate of small and unlisted enterprises (STARTUP_RATE). HHI is taken from *Nihon Kinyu Meikan*. BANKS_RATIO is taken from *Nihon Kinyu Meikan* and the Number of Prefectural Sorted Ordinary Corporation. GPP and GROWTH_RATE are taken from the Report on Prefectural Accounts. FIRMS is taken from the Number of Prefectural Sorted Ordinary Corporation. STARTUP_RATE is taken from Orbis. Dummy variables for accounting year, industry, and type of main bank are also included in the regressions.[15]

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[13] Firm age is the number of years from establishment. However, for firms whose establishment dates are unclear, we substitute the time from incorporation for the number of years from establishment.

[14] Short-term borrowing represents the borrowing that a firm has to repay within one year from the day following the date of the account closing day. To calculate the SHORT_RATIO, we substitute 0.0001 for zero if borrowings are zero.

[15] Based on Ogura (2007), the dummy variable for industry takes the value of one if a firm is classified as a business type with many opportunities to receive advice from its main bank; such business types include wholesale, real estate, accommodations, some service industries (e.g., food and beverage), manufacturing (other than wooden products), chemical products, and electric machinery and appliances.

5. Empirical methodology and results

5.1. Methodology

Using the data set and variables just described, we employ switching in a narrow sense and examine the effects of the switching of firm–main bank relationships on the probability of firm bankruptcy. To investigate these effects, we should address a possible selection bias because we cannot deny the possibility that a firm that switches its main bank relationship may innately tend to go bankrupt. For this reason, in this paper, we use the propensity score matching estimation approach. The procedure for this approach is as follows.

First, to calculate the propensity scores, we conduct a probit estimation that models the probability that a firm switches its main bank conditional on the covariates described in subsection 4.4 other than the SHORT_RATIO because this covariate is only likely to reduce the efficiency of the estimation.[16] Next, for each treatment observation, the matched observation is selected from the sample of non-switching firms that has the "closest" propensity score. In this paper, we employ three matching algorithms (i.e., nearest neighbor matching, 5-nearest neighbor matching, and nearest neighbor matching within a caliper).[17] Finally, we examine the effects of the switching of such relationships on the probability of bankruptcy by employing the matched observations. In this estimation, we use an average treatment effect on the treated (ATT) estimator.

5.2. Results

Table 3 reports the results of the probit regressions whose dependent variables are SWITCH, TRANSFER, and NEW_TRANSACTION. The marginal effects of BANKS

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[16] This is discussed in subsection 5.4.3.
[17] In this paper, we employ nearest neighbor matching for baseline estimations and 5-nearest neighbor matching and nearest neighbor matching within a caliper for robustness checks.

are significantly positive in columns (1) and (2), indicating that firms with many bank relationships are likely to switch their main banks and the switching is likely to be caused by a transfer. This result is natural because these firms have more opportunities to transfer their main banks. MALE has a negative marginal effect in column (3), suggesting that male managers are conservative in switching their main bank relationships to financial institutions with which the firms do not have long relationships. Alternatively, female managers may be likely to be offered loans under favorable terms by financial institutions that become their firms' new main banks. In addition, GPP has negative marginal effects in columns (1) and (3), implying that firms do not switch their main bank relationships if they reside in prefectures with large-scale economies. In contrast, the marginal effects of FIRMS are positive in columns (1) and (3), suggesting that firms that reside in prefectures with many corporations tend to switch their relationships. This result seems to indicate that firm–main bank relationships in these areas are in flux.

Turning to the treatment effects of the switching of firm–main bank relationships, Table 4 reports the results of the unmatched and the ATT estimators. More specifically, rows (1), (2), and (3) report the results of the estimations using SWITCH, TRANSFER, and NEW_TRANSACTION as the variables of interest, respectively. In this estimation, we employ nearest neighbor matching as a matching algorithm. In row (1), SWITCH is statistically insignificant for the unmatched estimator. Thus, we do not find evidence that the switching of firm–main bank relationships increases the probability of firm bankruptcy before dealing with the possible selection bias. In contrast, SWITCH is positive and statistically significant at the 5% level for the ATT estimator, which is consistent with Hypothesis 1. This result also indicates that the switching of firm–main bank relationships increases the probability of firm bankruptcy by 0.033 percentage points. The economic impact of this estimator is not negligible because the percentage of bankrupt firms in our sample is 1.7%. In row (2), TRANSFER has a positive sign but is statistically insignificant for both the unmatched and ATT estimators. Thus, we find no evidence that the transfer of firm–main bank relationships affects the probability of firm

bankruptcy. This result is consistent with Hypothesis 2. In row (3), although NEW_TRANSACTION is statistically insignificant for the unmatched estimator, it is positive and statistically significant at the 10% level for the ATT estimator. This result indicates that the "new transaction" of firm–main bank relationships increases the probability of firm bankruptcy by 0.041 percentage points and is consistent with Hypothesis 2. In addition, as with row (1), the economic magnitude of this estimator is important.

In summary, the results in Table 4 support Hypotheses 1 and 2.

5.3. Robustness checks

Next, we check the robustness of the results in subsection 5.2 by employing 5-nearest neighbor matching as a matching algorithm. Table 5 reports the results of this matching algorithm. The structure of the table is the same as that of Table 4.

In row (1), although SWITCH is statistically insignificant for the unmatched estimator, it is positive and statistically significant at the 10% level for the ATT estimator. This result is also consistent with Hypothesis 1. In addition, as with Table 4, the switching of firm–main bank relationships increases the probability of firm bankruptcy by 0.033 percentage points. The result in row (2) is similar to Table 4; in other words, TRANSFER has a positive sign but is statistically insignificant for the unmatched and ATT estimators, which is consistent with Hypothesis 2. In row (3), NEW_TRANSACTION is indeed statistically insignificant for the unmatched and ATT estimators. However, these estimators are almost statistically significant at the 10% level because their t-values are 1.63 and 1.61, respectively.[18] Moreover, the ATT estimator of NEW_TRANSACTION is significant at the 10% level when employing k-nearest neighbor matching if limited to values of k less than five (not reported). Thus, this result is almost consistent with Hypothesis 2. Furthermore, the "new transaction" of firm–main bank relationships increases the

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[18] In this case, the critical value at the 10% significance level is 1.646.

probability of firm bankruptcy by 0.041 percentage points.

Furthermore, as a robustness check, we also conduct the same analysis as in Table 4 by employing nearest neighbor matching within a caliper, and the results are reported in Table 6.[19] Although we cannot obtain the effect of TRANSFER on the probability of bankruptcy because the sample size is small, the results for SWITCH and NEW_TRANSACTION are robust to those in Table 4. Thus, the results in Table 4 are substantially based on the matching of relatively close propensity scores.

To summarize, the results in Tables 5 and 6 also support Hypotheses 1 and 2.

5.4. Further analyses

Finally, we conduct two analyses: one is an analysis of the effects of switching in a broad sense on the probability of firm bankruptcy, and the other is an analysis of the path to bankruptcy.

5.4.1. Effects of switching in a broad sense on the probability of firm bankruptcy

We employ switching in a broad sense and conduct the same analyses as in subsection 5.2. The estimation in this subsection is conducted to test Hypothesis 3. As mentioned earlier, this definition of switching includes almost all patterns of switching. Unfortunately, however, we cannot use only the firms that switch their main bank relationships to descendants of their ex-ante main banks due to data limitations. Hence, we use switching in a broad sense and investigate how the switching of firm–main bank relationships affects the probability of firm bankruptcy.

Table 7 reports the results for the unmatched and ATT estimators. Although the structure of Table 7 is the same as that of Table 4, the definitions of SWITCH,

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[19] On the basis of Rosenbaum and Rubin (1985), we use a caliper size of 0.023, which is 0.25 * (the standard deviation of the estimated propensity score).

TRANSFER, and NEW_TRANSACTION in Table 7 are different from those of Table 4; SWITCH, TRANSFER, and NEW_TRANSACTION in Table 7 are defined in a broad sense. The ATT estimators are statistically insignificant in all rows, indicating that there is no evidence that switching in a broad sense affects the probability of firm bankruptcy. In addition, this result implies that the switching of firm–main bank relationships has no effect on bankruptcy when the ex-post main banks are descendants of their ex-ante main banks. This result is consistent with Hypothesis 3. However, it should also be noted that SWITCH and NEW_TRANSACTION increase the probability of bankruptcy when we exclude switching to absorbing financial institutions from switching in a broad sense (results not reported). [20] This result implies that the cultures of absorbed financial institutions change to those of absorbing financial institutions, and thus client firms of absorbed financial institutions are not relieved when faced with bankruptcy.

5.4.2. Path to bankruptcy

Finally, we examine the possibility of the path to bankruptcy. As mentioned in Section 3, there are several possibilities for bankruptcy.

Here, we verify whether firms that switch their main bank relationships face financial constraints after switching. Table 8 reports the distribution of total borrowing in the first and second terms. More specifically, Table 8 (A) is classified by switching and non-switching firms, and Table 8 (B) is classified by continuing and bankrupt firms. In Table 8, the number of observations decreases from 1,003 to 688, and most of the bankrupt firms are omitted (from 121 to 17) due to data limitations. Hence, the total borrowing of bankrupt firms is larger than that of continuing firms (see Table 8 (B)). However, this is not important because the purpose of Table 8 is to compare total borrowing between the first and second terms.

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[20] In other words, SWITCH and NEW_TRANSACTION also increase the probability of bankruptcy when we add switching to absorbed financial institutions to switching in a narrow sense.

In Table 8 (A), the mean and median of total borrowing in the second term are larger than those in the first term in both the switching and non-switching firms. This result indicates that funding constraints are mitigated as the firms grow. In addition, in Table 8 (B), the mean and median of borrowing in the second term are larger than those in the first term for both continuing and bankrupt firms. Hence, Table 8 seems to indicate that the switching of firm–main bank relationships does not worsen client firms' financial conditions, let alone increase the probability of bankruptcy.

However, the results in Table 8 do not necessarily deny the possibility that switching does not worsen firms' financial conditions. Table 9 reports the ratio of short-term borrowing to total borrowing.[21] In Table 9 (A), the difference in the ratio of short-term borrowing to total borrowing between the two groups in the first term (44.4% and 44.8%) is statistically insignificant, whereas that in the second term (45.4% and 35.1%) is statistically significant at the 5% level. This result suggests that the continuation of firm–main bank relationships makes it possible for client firms to refinance short-term borrowings with long-term borrowings.

Table 9 (B) indicates that bankrupt firms rely heavily on short-term borrowing, and that this strong dependence on short-term borrowing can lead to firm bankruptcy. Firms must repay the borrowed funds within the term of payment. If they do not, they experience a suspension of business transactions with banks, which substantially means bankruptcy. Therefore, heavy dependence on short-term borrowing is associated with high risk of bankruptcy.

In summary, Table 9 implies that the switching of firm–main bank relationships prevents firms from refinancing with long-term borrowing, and thus increases the probability of firm bankruptcy.

5.4.3. Discussion

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[21] In this paper, we define short-term borrowing as the borrowing that firms must repay within one year.

In subsection 5.4.2, we obtained the results that the switching of firm–main bank relationships prevents firms from refinancing with long-term borrowing. However, in the previous subsection, we compare the ratio of short-term borrowing to total borrowing, including an unmatched control group sample because we cannot identify which firms are selected in the propensity score matching estimations. Hence, in this subsection, we perform the same regressions as those for Tables 3 and 4, including SHORT_RATIO as a covariate.

Table 10 reports the results of the probit regressions. In Table 10, the results other than the marginal effects of SHORT_RATIO are similar to those in Table 3; however, the marginal effects of SHORT_RATIO are statistically insignificant in all rows. More specifically, the z-values of SHORT_RATIO in rows (1)–(3) are 0.14, 0.34, and −0.19, respectively (not reported). Hence, SHORT_RATIO is only likely to reduce the efficiency of the estimation.

On the other hand, Table 11 reports the results of treatment effects for bankruptcy; specifically, (A) reports the results using nearest neighbor matching, and (B) reports those using 5-nearest neighbor matching. Although the results in Table 11 (A) are the same as those in Table 4, the results in Table 11 (B) are different from those in Table 5.[22] Because SHORT_RATIO reduces the efficiency of the estimation, the ATT estimators in Table 11 (B) are statistically insignificant in all rows.

On balance, the results in this subsection do not support the possibility that the ratios of short-term borrowing to total borrowing between the switching and non-switching firms already differ in the first term and thus affect bankruptcy. In addition, the results in this subsection do not deny the path to bankruptcy in subsection 5.4.2, which suggests that the switching of firm–main bank relationships prevents firms from refinancing with long-term borrowing and thus leads to the bankruptcy.

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[22] It should also be noted that we obtain the same results as in Tables 4 and 11 (A) when we employ nearest neighbor matching with a caliper of 0.023 (results not reported).

6. Conclusion

By employing a unique firm-level data set, we examine the effects of the switching of firm–main bank relationships on the probability of firm bankruptcy. We find that the switching of firm–main bank relationships increases the probability of firm bankruptcy. In particular, the results suggest that switching increases the probability of bankruptcy when switching to banks with which client firms have not previously transacted. Furthermore, we find that the result holds only when the ex-post main banks are not descendants of their ex-ante main banks.

This study is unique because it uses a new classification method for the switching of firm–main relationships. Specifically, we use two types of switching (i.e., "transfer" and "new transaction") in combination with two definitions of switching (i.e., in a narrow sense and in a broad sense). To our knowledge, there is no previous study that classifies switching in such detail, including a recent study, such as Ono et al. (2016).

Our findings have important policy implications. For example, avoiding bankruptcy is one of the most important issues for young SMEs. Hence, in terms of continuing their business, firms should avoid switching their main bank relationships, if possible. Moreover, to avoid bankruptcy, the government should closely monitor firms that are forced to switch their main banks due to the absorption of client firms' ex-ante main banks by other financial institutions, and should develop a policy that can mitigate funding constraints for such firms. Furthermore, the government needs to inform SME managers that the switching of firm–main bank relationships that are accompanied by the termination of ex-ante relationships increases the probability of bankruptcy. Following these policies to avoid bankruptcy of young SMEs leads to the maintenance of employment in rural areas with economic activities that are mainly supported by such firms, and thus boosting the economic development of the regions.

This paper has several issues that remain to be addressed in future research. First, due to data limitations, we cannot check the robustness of the finding that the switching of

firm–main bank relationships prevents firms from refinancing with long-term borrowing and thus increases the probability of firm bankruptcy. Second, we cannot identify a case of switching caused by firms and financial institutions because the propensity score matching approach enables us to address a possible selection bias even if the events are endogenous. Although these problems are beyond the scope of this paper, they could be intriguing topics for future research because addressing these two open questions makes it possible to grasp more detailed effects of the switching of such relationships.

References

Berger, A. and G. Udell (1995) "Relationship lending and lines of credit in small firm finance," *Journal of Business* 68, pp. 351-381.

Berlin, M. and L. Mester (1998) "On the profitability and cost of relationship lending," *Journal of Banking & Finance* 22, pp. 873-897.

Campbell, J., J. Hilscher and J. Szilagyi (2008) "In search of distress risk," *Journal of Finance* 63, pp. 2899-2939.

Chava, S. and R. Jarrow (2004) "Bankruptcy prediction with industry effects," *Review of Finance* 8, pp. 537-569.

Chemmanur, T. and P. Fulghieri (1994) "Reputation, renegotiation, and the choice between bank loans and publicly traded debt," *Review of Financial Studies* 7, pp. 475-506.

Cole, R. (1998) "The importance of relationships to the availability of credit," *Journal of Banking & Finance* 22, pp. 959-977.

Degryse, H. and P. Cayseele (2000) "Relationship lending within a bank-based system: Evidence from European small business data," *Journal of Financial Intermediation* 9, pp. 90-109.

Gambini, A. and A. Zazzaro (2013) "Long-lasting bank relationships and growth of firms," *Small Business Economics* 40, pp. 977-1007.

Gopalan, R., G. Udell and V. Yerramilli (2011) "Why do firms form new banking relationships?" *Journal of Financial and Quantitative Analysis* 46, pp. 1335-1365.

Grunert, J. and M. Weber (2009) "Recovery rates of commercial lending: Empirical evidence for German companies," *Journal of Banking & Finance* 33, pp. 505-513.

Hanazaki, M. and A. Horiuchi (2000) "Is Japan's financial system efficient?" *Oxford Review of Economic Policy* 16, pp. 61-73.

Hernández-Cánovas, G. and P. Martínez-Solano (2006) "Banking relationships: Effects on debt terms for small Spanish firms," *Journal of Small Business Management* 44, pp. 315-333.

Hori, M. (2005) "Does bank liquidation affect client firm performance? Evidence from a bank failure in Japan," *Economics Letters* 88, pp. 415-420.

Hoshi, T., A. Kashyap and D. Scharfstein (1990) "The role of banks in reducing the costs of financial distress in Japan," *Journal of Financial Economics* 27, pp. 67-88.

Hoshi, T., A. Kashyap and D. Scharfstein (1991) "Corporate structure, liquidity, and investment: Evidence from Japanese industrial groups," *Quarterly Journal of Economics* 106, pp. 33-60.

Ioannidou, V. and S. Ongena (2010) "Time for a change": Loan conditions and bank behavior when firms switch banks," *Journal of Finance* 65, pp. 1847-1877.

Kang, J.-K. and A. Shivdasani (1999) "Alternative mechanisms for corporate governance in Japan: An analysis of independent and bank-affiliated firms," *Pacific-Basin Finance Journal* 7, pp. 1-22.

Lichtenberg, F. and G. Pushner (1994) "Ownership structure and corporate performance in Japan," *Japan and the World Economy* 6, pp. 239-261.

Mayer, C. (1988) "New issues in corporate finance," *European Economic Review* 32, pp. 1167-1189.

Miwa, Y. and M. Ramseyer (2002) "The fable of the keiretsu," *Journal of Economics & Management Strategy* 11, pp. 169-224.

Ogane, Y. (2016) "Banking relationship numbers and new business bankruptcies,"

Small Business Economics 46, pp. 169-185.

Ogura, Y. (2007) "Lending competition in regional financial market and credit availability for entrepreneurs," in Y. Tsutsui and S. Uemura, eds., *Relationship Banking and Regional Finance*, Nikkei Publishing Inc. (in Japanese)

Ongena, S. and D. Smith (2001) "The duration of bank relationships," *Journal of Financial Economics* 61, pp. 449-475.

Ono, A., Y. Saito, K. Sakai and I. Uesugi (2016) "Does geographical proximity matter in small business lending? Evidence from changes in main bank relationships," HIT-REFINED Working Paper Series No. 40.

Petersen, M. and R. Rajan (1994) "The benefits of lending relationships: Evidence from small business data," *Journal of Finance* 49, pp. 3-37.

Prowse, S. (1992) "The structure of corporate ownership in Japan," *Journal of Finance* 47, pp. 1121-1140.

Rajan, R. (1992) "Insiders and outsiders: The choice between informed and   arm's-length debt," *Journal of Finance* 47, pp. 1367-1400.

Rosenbaum, P. and D. Rubin (1985) "Constructing a control group using multivariate matched sampling methods that incorporate the propensity score," *American Statistician* 39, pp. 33-38.

Sharpe, S. (1990) "Asymmetric information, bank lending and implicit contracts: A stylized model of customer relationships," *Journal of Finance* 45, pp. 1069-1087.

Sheard, P. (1994) "Main banks and the governance of financial distress," in M. Aoki and H. Patrick, eds., *The Japanese Main Bank System*, Oxford University Press.

Shimizu, K. (2012) "Bankruptcies of small firms and lending relationship," *Journal of Banking & Finance* 36, pp. 857-870.

Shumway, T. (2001) "Forecasting bankruptcy more accurately: A simple hazard model," *Journal of Business* 74, pp. 101-124.

Stel, A., M. Carree and R. Thurik (2005) "The effect of entrepreneurial activity on national economic growth," *Small Business Economics* 24, pp. 311-321.

Tsuruta, D. (2014) "Changing banking relationships and client-firm performance: Evidence from Japan for the 1990s," *Review of Financial Economics* 23, pp. 107-119.

Weinstein, D. and Y. Yafeh (1998) "On the costs of a bank-centered financial system: Evidence from the changing main bank relations in Japan," *Journal of Finance* 53, pp. 635-672.

Wong, P., Y. Ho and E. Autio (2005) "Entrepreneurship, innovation, and economic growth: Evidence from GEM data," *Small Business Economics* 24, pp. 335-350.

Wu, X. and J. Yao (2012) "Understanding the rise and decline of the Japanese main bank system: The changing effects of bank rent extraction," *Journal of Banking & Finance* 36, pp. 36-50.

Fig. 1 Timeline of switching and bankruptcy

Some firms
establish before
incorporation

Switch
or not

Bankrupt
or not

5 years or less

Within
1 year

Within
1 year

Foundation

Incorporation

First term

Second term

t
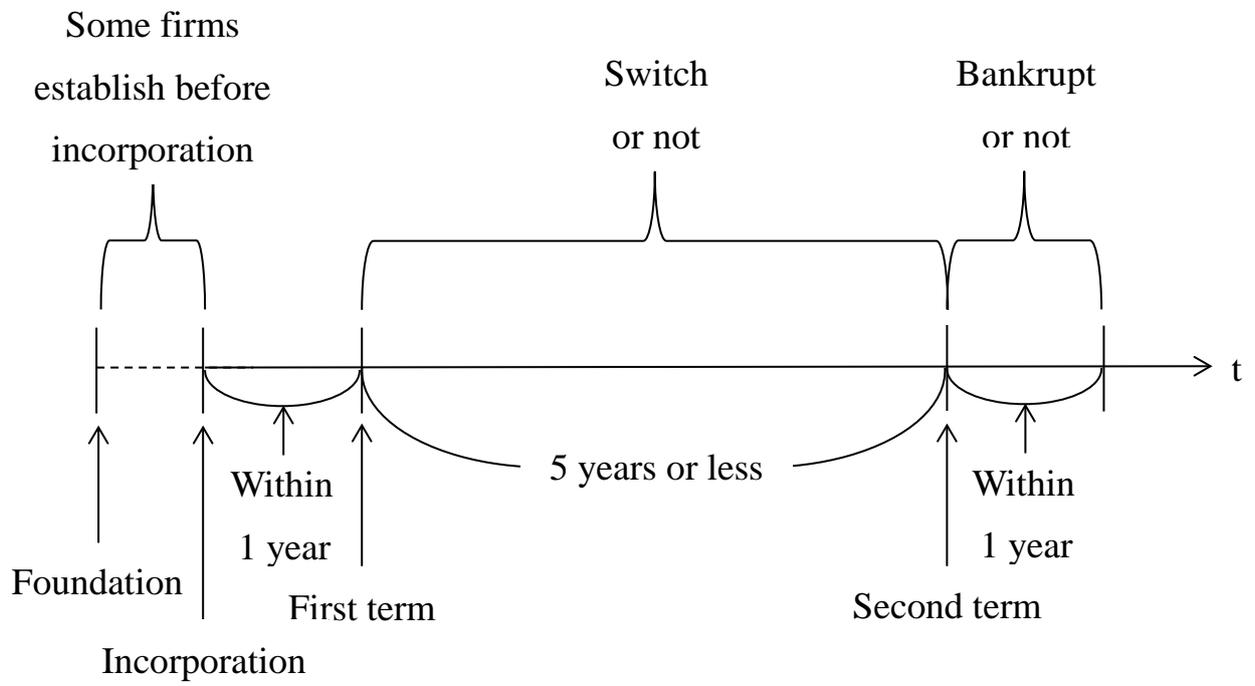
Table 1 Variable definitions

Variable	Definition
Dependent variable	
BANKRUPTCY	1 if the firm goes bankrupt from the second term to the next term, 0 otherwise
Main bank switch	
SWITCH	1 if the firm switches its main bank between the first and second terms, 0 otherwise
TRANSFER	1 if the firm transfers its main bank between the first and second terms, 0 otherwise
NEW_TRANSACTION	1 if the firm builds new banking relationships between the first and second terms, and switches its main bank to the bank between the two terms, 0 otherwise
Firm characteristics	
EMPLOYEES	Number of employees
BANKS	Number of correspondent financial institutions
FIRM_AGE	Age of firms
MANAGER_AGE	Age of managers
MALE	1 if the manager of the firm is male, 0 otherwise
SCORE	Normalized credit score from Tokyo Shoko Research (0-100)
Firm financial information	
LIQUID_ASSETS	Total liquid assets (billion yen)
QUICK_ASSETS	Quick assets (billion yen)
CASH	Cash and cash in bank (billion yen)
TOTAL_ASSETS	Total assets (billion yen)
CURRENT_LIABILITIES	Total current liabilities (billion yen)
BORROWING	Total borrowing (billion yen)
SHORT_RATIO	Ratio of short-term borrowing to total borrowing (%)
TOTAL_LIABILITIES	Total liabilities (billion yen)
CAPITAL_ADEQUACY_RATIO	Capital adequacy ratio: = (total assets - total liabilities) / total assets * 100 (%)
ROA	Return on assets: = current profit / total assets * 100
ROE	Return on equity: = current profit / total shareholders' equity * 100
CAPITAL	Capital (billion yen)
ACCUMULATED_PROFIT	Total accumulated profit (billion yen)
SALES	Sales (billion yen)
PROFIT	Profit (billion yen)
Prefecture characteristics	
HHI	Herfindahl index of the number of financial institutions
BANKS_RATIO	Ratio of the number of financial institutions to the number of ordinary corporations (%)
GPP	Real gross prefectural product (billion yen)
FIRMS	Number of ordinary corporations
GROWTH_RATE	Growth rate of the real gross prefectural product
STARTUP_RATE	Startup rate of small and unlisted enterprises (%)

Table 2 Descriptive statistics

	All						SWITCH = 1						SWITCH = 0					
	N	Mean	S.D.	Min.	Median	Max.	N	Mean	S.D.	Min.	Median	Max.	N	Mean	S.D.	Min.	Median	Max.
Dependent variable																		
BANKRUPTCY	1,008	0.017	0.129	0	0	1	121	0.033	0.180	0	0	1	887	0.015	0.120	0	0	1
Main bank switch																		
SWITCH	1,008	0.120	0.325	0	0	1	121	1.000	0.000	1	1	1	887	0.000	0.000	0	0	0
TRANSFER	1,008	0.046	0.209	0	0	1	121	0.380	0.487	0	0	1	887	0.000	0.000	0	0	0
NEW_TRANSACTION	1,008	0.073	0.261	0	0	1	121	0.612	0.489	0	1	1	887	0.000	0.000	0	0	0
Firm characteristics																		
EMPLOYEES	1,008	11.326	27.253	0	5	543	121	14.620	25.426	0	6	190	887	10.877	27.475	0	5	543
BANKS	1,008	1.844	1.121	1	2	9	121	2.264	1.395	1	2	9	887	1.787	1.066	1	1	9
FIRM_AGE	1,008	8.300	13.932	0	1	73	121	7.238	12.982	0	1	56	887	8.445	14.058	0	1	73
MANAGER_AGE	1,008	47.441	11.169	22	47	84	121	46.611	11.352	22	46	73	887	47.554	11.146	24	47	84
MALE	1,008	0.951	0.215	0	1	1	121	0.917	0.276	0	1	1	887	0.956	0.205	0	1	1
SCORE	1,004	45.838	5.331	16	46	66	121	47.413	4.993	34	47	60	883	45.622	5.342	16	46	66
Firm financial information																		
LIQUID_ASSETS	1,008	0.137	0.561	0.000	0.024	8.641	121	0.231	0.772	0.001	0.036	5.884	887	0.124	0.524	0.000	0.021	8.641
QUICK_ASSETS	1,008	0.078	0.255	0.000	0.018	4.423	121	0.111	0.326	0.000	0.025	2.736	887	0.073	0.244	0.000	0.016	4.423
CASH	1,008	0.030	0.123	0.000	0.006	2.328	121	0.052	0.203	0.000	0.009	2.037	887	0.027	0.107	0.000	0.006	2.328
TOTAL_ASSETS	1,008	0.201	0.832	0.000	0.030	11.713	121	0.285	0.993	0.001	0.049	8.502	887	0.190	0.808	0.000	0.028	11.713
CURRENT_LIABILITIES	1,008	0.120	0.503	0.000	0.016	8.624	121	0.172	0.499	0.000	0.026	3.773	887	0.113	0.503	0.000	0.014	8.624
BORROWING	1,008	0.085	0.492	0.000	0.005	8.000	121	0.130	0.694	0.000	0.007	6.953	887	0.079	0.458	0.000	0.005	8.000
SHORT_RATIO	1,008	57.870	44.963	0.000	84.807	100.000	121	59.245	44.860	0.000	100.000	100.000	887	57.683	45.000	0.000	82.754	100.000
TOTAL_LIABILITIES	1,008	0.173	0.684	0.000	0.025	8.818	121	0.246	0.896	0.000	0.039	8.464	887	0.163	0.650	0.000	0.023	8.818
CAPITAL_ADEQUACY_RATIO	1,008	-25.501	1,398.834	-44,366.670	15.555	99.980	121	22.404	29.083	-89.576	13.797	99.593	887	-32.036	1,491.139	-44,366.670	15.623	99.980
ROA	1,008	-52.495	1,400.011	-44,426.670	0.521	57.826	121	-2.914	20.879	-133.350	0.795	53.022	887	-59.259	1,492.404	-44,426.670	0.496	57.826
ROE	1,008	-12.026	898.585	-22,976.920	7.476	5,476.344	121	44.872	453.830	-1,691.103	10.661	4,645.455	887	-19.788	943.043	-22,976.920	6.919	5,476.344
CAPITAL	1,008	0.008	0.009	-0.019	0.005	0.072	121	0.010	0.010	0.000	0.009	0.051	887	0.008	0.009	-0.019	0.005	0.072
ACCUMULATED_PROFIT	1,008	0.000	0.105	-3.108	0.000	0.498	121	0.009	0.054	-0.089	0.000	0.498	887	-0.001	0.110	-3.108	0.000	0.424
SALES	1,008	0.269	0.767	0.000	0.073	14.543	121	0.416	0.946	0.000	0.111	6.320	887	0.249	0.738	0.000	0.069	14.543
PROFIT	1,007	0.002	0.027	-0.236	0.000	0.424	121	0.002	0.017	-0.089	0.000	0.089	886	0.002	0.028	-0.236	0.000	0.424
Prefecture characteristics																		
HHI	1,008	0.112	0.069	0.035	0.101	0.322	121	0.111	0.067	0.035	0.102	0.276	887	0.112	0.069	0.035	0.101	0.322
BANKS_RATIO	1,008	0.928	0.360	0.388	0.954	1.901	121	0.951	0.366	0.388	0.972	1.901	887	0.925	0.359	0.388	0.954	1.829
GPP	1,008	28,300.000	31,500.000	2,040.349	17,600.000	102,000.000	121	25,400.000	28,300.000	2,040.349	16,500.000	102,000.000	887	28,700.000	31,900.000	2,070.339	17,800.000	102,000.000
FIRMS	1,008	152,504.700	178,531.100	9,416.000	76,524.000	587,825.000	121	138,698.900	165,104.600	9,416.000	72,455.000	587,825.000	887	154,388.000	180,290.400	10,381.000	86,543.000	587,825.000
GROWTH_RATE	1,008	1.206	2.638	-9.149	1.376	8.675	121	1.657	2.463	-6.773	1.740	6.326	887	1.145	2.657	-9.149	1.308	8.675
STARTUP_RATE	1,008	3.258	1.035	1.063	3.118	7.018	121	3.119	0.991	1.538	2.810	7.018	887	3.277	1.040	1.063	3.172	7.018

Table 3 Probit estimations of switching

Dependent variables:	(1) SWITCH	(2) TRANSFER	(3) NEW_ TRANSACTION
Firm characteristics			
EMPLOYEES	-0.000	0.000	-0.000
	(0.001)	(0.000)	(0.001)
BANKS	0.019 **	0.004 ***	-0.004
	(0.008)	(0.005)	(0.005)
FIRM_AGE	-0.001 *	-0.000	-0.001
	(0.001)	(0.000)	(0.001)
MANAGER_AGE	-0.001 *	-0.000	-0.001
	(0.001)	(0.000)	(0.000)
MALE	-0.057	0.001	-0.056 **
	(0.047)	(0.004)	(0.038)
SCORE	0.004 *	0.000	0.002
	(0.002)	(0.000)	(0.001)
Firm financial information			
LIQUID_ASSETS	0.184 *	0.010	0.154
	(0.103)	(0.018)	(0.101)
QUICK_ASSETS	0.012	-0.002	-0.103
	(0.106)	(0.011)	(0.123)
CASH	0.129	0.037 *	-0.420
	(0.173)	(0.047)	(0.320)
TOTAL_ASSETS	-0.241	-0.077	0.007
	(0.161)	(0.097)	(0.140)
CURRENT_LIABILITIES	0.080	0.011	0.001
	(0.102)	(0.018)	(0.152)
BORROWING	0.179 *	0.014	-0.037
	(0.111)	(0.021)	(0.089)
TOTAL_LIABILITIES	-0.086	0.044	-0.106
	(0.177)	(0.072)	(0.252)
CAPITAL_ADEQUACY_RATIO	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
ROA	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
ROE	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
CAPITAL	1.636	0.309 **	0.949
	(1.056)	(0.375)	(0.798)
ACCUMULATED_PROFIT	0.425	0.102	-0.226
	(0.278)	(0.126)	(0.207)
SALES	0.026	0.004	-0.004
	(0.026)	(0.005)	(0.030)
PROFIT	-0.901	-0.101 *	0.046
	(0.530)	(0.117)	(0.515)
Prefecture characteristics			
HHI	-0.223	-0.017	-0.052
	(0.208)	(0.033)	(0.124)
BANKS_RATIO	0.031	0.002	0.002
	(0.039)	(0.005)	(0.023)
GPP	-0.000 **	-0.000	-0.000 **
	(0.000)	(0.000)	(0.000)
FIRMS	0.000 **	0.000	0.000 **
	(0.000)	(0.000)	(0.000)
GROWTH_RATE	0.005	0.001	0.001
	(0.004)	(0.001)	(0.003)
STARTUP_RATE	0.000	-0.001	0.001
	(0.011)	(0.002)	(0.007)
Accounting year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Dummies for main bank type	Yes	Yes	Yes
Pseudo R^2	0.100	0.291	0.086
Log pseudolikelihood	-332.539	-132.319	-241.293
Number of observations	1,003	1,003	1,003

Note: The upper rows are marginal effects and the lower rows are standard errors.

*Significant at the 10% level.

**Significant at the 5% level.

***Significant at the 1% level.

Table 4 Treatment effect estimations for firm bankruptcy (nearest neighbor matching)

	Treatment	Treated	Controls	Difference	S.E.	T-stat
(1)	SWITCH					
	Unmatched	0.033	0.015	0.018	0.013	1.46
	ATT	0.033	0.000	0.033	0.016	2.03 **
(2)	TRANSFER					
	Unmatched	0.022	0.017	0.005	0.020	0.26
	ATT	0.022	0.000	0.022	0.022	1.00
(3)	NEW_TRANSACTION					
	Unmatched	0.041	0.015	0.025	0.016	1.63
	ATT	0.041	0.000	0.041	0.023	1.76 *

Note: The matching algorithm is nearest neighbor matching.

[*]Significant at the 10% level.

[**]Significant at the 5% level.

Table 5 Treatment effect estimations for firm bankruptcy (5-nearest neighbor matching)

	Treatment	Treated	Controls	Difference	S.E.	T-stat
(1)	SWITCH					
	Unmatched	0.033	0.015	0.018	0.013	1.46
	ATT	0.033	0.003	0.030	0.017	1.74 *
(2)	TRANSFER					
	Unmatched	0.022	0.017	0.005	0.020	0.26
	ATT	0.022	0.000	0.022	0.022	1.00
(3)	NEW_TRANSACTION					
	Unmatched	0.041	0.015	0.025	0.016	1.63
	ATT	0.041	0.003	0.038	0.023	1.61

Note: The matching algorithm is 5-nearest neighbor matching.

[*]Significant at the 10% level.

Table 6 Treatment effect estimations for firm bankruptcy (nearest neighbor matching within caliper)

	Treatment	Treated	Controls	Difference	S.E.	T-stat
(1)	SWITCH					
	Unmatched	0.033	0.015	0.018	0.013	1.46
	ATT	0.034	0.000	0.034	0.017	2.03 **
(2)	NEW_TRANSACTION					
	Unmatched	0.041	0.015	0.025	0.016	1.63
	ATT	0.041	0.000	0.041	0.023	1.76 *

Note: The matching algorithm is nearest neighbor matching with a caliper of 0.023.

[*]Significant at the 10% level.

[**]Significant at the 5% level.

Table 7 Treatment effect estimations for firm bankruptcy (in a broad sense of switching)

	Treatment	Treated	Controls	Difference	S.E.	T-stat
(1)	SWITCH					
	Unmatched	0.030	0.015	0.015	0.012	1.23
	ATT	0.030	0.015	0.015	0.021	0.71
(2)	TRANSFER					
	Unmatched	0.021	0.017	0.005	0.019	0.24
	ATT	0.021	0.000	0.021	0.021	1.00
(3)	NEW_TRANSACTION					
	Unmatched	0.034	0.015	0.019	0.014	1.30
	ATT	0.034	0.011	0.023	0.025	0.92

Note: SWITCH, TRANSFER, and NEW_TRANSACTION are in a broad sense.
  The matching algorithm is nearest neighbor matching.

Table 8 Distribution of total borrowing

(A) Classification by switching and not switching firms

| | Number of observations | BORROWING = Total borrowing (in millions of yen) | | | |
| | | Mean | | Median | |
		First term	Second term	First term	Second term
Switching firm	121	129,793.6	310,118.0	6,502.0	78,035.0
Non-switching firm	567	89,711.6	120,329.9	5,016.0	25,070.0
Total	688	96,760.9	153,708.3	96,760.9	153,708.3

(B) Classification by continuing and bankrupt firms

| | Number of observations | BORROWING = Total borrowing (in millions of yen) | | | |
| | | Mean | | Median | |
		First term	Second term	First term	Second term
Continuing firm	671	92,360.3	149,788.1	5,174.0	31,787.0
Bankrupt firm	17	270,455.9	308,441.6	27,673.0	63,285.0
Total	688	96,760.9	153,708.3	96,760.9	153,708.3

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Table 9 Ratio of short-term borrowing to total borrowing

(A) Classification by switching and not switching firms

	Number of observations	First term (%)	Second term (%)	Total (%)
Switching firm	121	44.4	45.4	45.1
Non-switching firm	567	44.8	35.1	39.3
Total	688	44.8	38.8	41.1

(B) Classification by continuing and bankrupt firms

	Number of observations	First term (%)	Second term (%)	Total (%)
Continuing firm	671	41.8	36.5	38.5
Bankrupt firm	17	85.1	82.6	83.8
Total	688	44.8	38.8	41.1

Table 10 Probit estimations of switching (including SHORT_RATIO)

	(1)	(2)	(3)
Dependent variables:	SWITCH	TRANSFER	NEW_ TRANSACTION
Firm characteristics			
EMPLOYEES	-0.000	0.000	-0.000
	(0.001)	(0.000)	(0.001)
BANKS	0.019 **	0.004 ***	-0.004
	(0.008)	(0.005)	(0.005)
FIRM_AGE	-0.001 *	-0.000	-0.001
	(0.001)	(0.000)	(0.001)
MANAGER_AGE	-0.001 *	-0.000	-0.001
	(0.001)	(0.000)	(0.000)
MALE	-0.057	0.001	-0.055 **
	(0.047)	(0.004)	(0.038)
SCORE	0.004 *	0.000	0.002
	(0.002)	(0.000)	(0.001)
Firm financial information			
LIQUID_ASSETS	0.184 *	0.010	0.153
	(0.104)	(0.019)	(0.102)
QUICK_ASSETS	0.012	-0.003	-0.102
	(0.107)	(0.012)	(0.123)
CASH	0.127	0.038 *	-0.415
	(0.174)	(0.049)	(0.319)
TOTAL_ASSETS	-0.241	-0.082	0.010
	(0.162)	(0.103)	(0.143)
CURRENT_LIABILITIES	0.077	0.010	0.008
	(0.106)	(0.018)	(0.159)
BORROWING	0.178	0.015	-0.036
	(0.112)	(0.021)	(0.089)
SHORT_RATIO	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
TOTAL_LIABILITIES	-0.084	0.048	-0.114
	(0.179)	(0.078)	(0.261)
CAPITAL_ADEQUACY_RATIO	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
ROA	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
ROE	0.000	-0.000 **	0.000
	(0.000)	(0.000)	(0.000)
CAPITAL	1.651	0.328	0.928
	(1.064)	(0.395)	(0.801)
ACCUMULATED_PROFIT	0.426	0.108	-0.227
	(0.279)	(0.133)	(0.205)
SALES	0.026	0.004	-0.004
	(0.026)	(0.005)	(0.029)
PROFIT	-0.899	-0.104 *	0.043
	(0.531)	(0.120)	(0.514)
Prefecture characteristics			
HHI	-0.223	-0.017	-0.052
	(0.208)	(0.034)	(0.123)
BANKS_RATIO	0.031	0.002	0.002
	(0.039)	(0.005)	(0.023)
GPP	-0.000 **	-0.000	-0.000 **
	(0.000)	(0.000)	(0.000)
FIRMS	0.000 **	0.000	0.000 **
	(0.000)	(0.000)	(0.000)
GROWTH_RATE	0.005	0.001	0.001
	(0.004)	(0.001)	(0.003)
STARTUP_RATE	-0.000	-0.001	0.001
	(0.012)	(0.002)	(0.007)
Accounting year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
Dummies for main bank type	Yes	Yes	Yes
Pseudo R^2	0.100	0.292	0.086
Log pseudolikelihood	-332.529	-132.262	-241.274
Number of observations	1,003	1,003	1,003

Note: The upper rows are marginal effects and the lower rows are standard errors.

*Significant at the 10% level.

**Significant at the 5% level.

***Significant at the 1% level.

Table 11 Treatment effect estimations for firm bankruptcy (including SHORT_RATIO)

(A) Nearest neighbor matching

	Treatment	Treated	Controls	Difference	S.E.	T-stat
(1)	SWITCH					
	Unmatched	0.033	0.015	0.018	0.013	1.46
	ATT	0.033	0.000	0.033	0.016	2.03 **
(2)	TRANSFER					
	Unmatched	0.022	0.017	0.005	0.020	0.26
	ATT	0.022	0.000	0.022	0.022	1.00
(3)	NEW_TRANSACTION					
	Unmatched	0.041	0.015	0.025	0.016	1.63
	ATT	0.041	0.000	0.041	0.023	1.76 *

[*]Significant at the 10% level.

[**]Significant at the 5% level.

(B) 5-nearest neighbor matching

	Treatment	Treated	Controls	Difference	S.E.	T-stat
(1)	SWITCH					
	Unmatched	0.033	0.015	0.018	0.013	1.46
	ATT	0.033	0.007	0.026	0.017	1.52
(2)	TRANSFER					
	Unmatched	0.022	0.017	0.005	0.020	0.26
	ATT	0.022	0.009	0.013	0.024	0.53
(3)	NEW_TRANSACTION					
	Unmatched	0.041	0.015	0.025	0.016	1.63
	ATT	0.041	0.011	0.030	0.024	1.23