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Lending Competition, Relationship Banking, and Credit Availability for Entrepreneurs

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Lending Competition, Relationship Banking, and Credit Availability for Entrepreneurs*

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ABSTRACT

Existing theories consistently predict that relationship banking enhances credit availability for new firms. To put more concretely, these theories predict that soft information acquisition about borrowers' creditworthiness and the resulting incumbent lender's profit-improving and relation-specific consulting ability yield a monopolistic rent for the incumbent lender, and that this expected rent encourages a bank to lend to younger firms to pre-empt an exclusive relationship ahead of rival banks. The present study tries to provide evidence for this hypothesis using a dataset collected from the 2003 Survey of the Financial Environment of Enterprises in Japan. Our statistical analysis shows that the time interval from start-up to the first loan approval for a firm is shorter if a bank intends to undertake relationship banking, even after controlling fund-demand and creditworthiness factors of each firm. This result provides evidence to support the above hypothesis. Our logit analysis shows that the probability for banks to undertake relationship banking is decreasing or hump-shaped against the number of competing banks. Thus, the increase in the number of competing banks is more likely to discourage these banks from providing relationship banking, and this in turn diminishes credit availability for new firms. Besides such an effect arising from relationship banking, the data shows evidence suggesting the statistical significance of another mechanism generating a negative correlation between the number of competing banks and credit availability for new firms, which may be explained by the theory of winner's curse. As a whole, credit availability for new firms was higher in more concentrated local credit markets in the last fifteen years in Japan.

Key words: Credit availability, lending competition, relationship banking, small business finance

JEL classifications: G21, L11, L14

I. Introduction

Prompt resource relocation from inefficient sectors to efficient ones in need of growth funds has been thought of as an important role of the financial sector. New firms that embody Schumpeterian *new combinations* of technologies, skills, business schemes, or management strategies are typical examples of the latter. Rajan and Zingales [1998] support this view by providing evidence that financial development boosted the establishment of new companies in those sectors that are technologically dependent on external finance. These new firms are usually informationally opaque simply because of the lack of credit histories. Therefore, only those entities that have special skills to assess the potential of these firms and to monitor their performance are willing to extend funds to them (Diamond [1991]). The banking sector is the most important segment of such institutions, which can accumulate assessing and monitoring skills through repeated transactions with a large number of firms while diversifying default risks. From the viewpoint that competitive pressure in a lending market is one of the important determinants of such functionality of the banking sector, there exists extensive literature with regard to the effect of increased lending competition on credit availability for new firms.

Existing empirical studies provide mixed answers to this question. On the one hand, several studies find evidence that increased lending competition enhances the establishment of new firms, based on the data from the U.S., France, or the international industry level data (Bertrand, Schoar, and Thesmar [2007], Black and Strahan [2002], Cetorelli [2004], Cetorelli and Strahan [2006]).[1] On the other hand, another set of studies find evidence that harsher lending competition

[1] Black and Strahan [2002] find that branch deregulation in the U.S., which is non-synchronous among states, increases the rate of new incorporation. They also find that credit market concentration is negatively correlated with the rate of new incorporation. Cetorelli [2004] and Cetorelli and Strahan [2006] find that the average firm size in external fund-dependent industries is positively correlated with credit market concentration, based on industry-level data from OECD countries and from each state of the U.S., respectively. These findings suggest that bank concentration generates entry barriers by decreasing credit availability for new entrants. Bertrand *et al.*

lowers credit availability for informationally opaque small firms that are presumably younger, from data in the U.S., Italy, or international firm-level survey data (Beck, Demirgüç-Kunt, and Maksimovic [2004], Bonaccorsi-di-Patti and Dell'Ariccia [2004], Cetorelli and Gambera [2001], Petersen and Rajan [1994]).[2]

On this point, theory predicts the existence of a mechanism that transmits the competitive effect to credit availability for younger firms through bankers' willingness to undertake relationship banking. First, theoretical literature consistently predicts that relationship banking enhances credit availability for new firms. This is because banks are more inclined to lend to new firms in order to pre-empt the opportunity to establish an exclusive customer relationship and obtain soft information that rival banks cannot access, which yields a sort of monopolistic rent in future lending competitions (Sharpe [1990], Petersen and Rajan [1994]). No direct empirical tests of this prediction exist to the best of the author's knowledge. Second, it also predicts that an increase in the number of competing banks may either promote (Boot and Thakor [2000], Dinç [2000], Yafeh and Yosha [2001]) or prevent relationship banking (Hauswald and Marquez [2006]).[3] Thus, theory predicts that credit availability for new firms is enhanced by an increase in the number of competing banks if the former is the case, but it is deteriorated otherwise. Besides this mechanism that operates through bankers' willingness to undertake relationship banking, the theory of winner's curse predicts that a bank is less likely to extend a loan to a firm as the number of competing banks increases (Broecker [1990], Riordan [1993], Shaffer [1998]). A bank winning a lending competition

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[2007] find that the 1985 French banking deregulation, which allows banks to behave as profit-maximizers, promotes the metabolism of more external finance-dependent industries.

[2] Petersen and Rajan [1994] find that credit availability for small firms is higher in more concentrated markets in the U.S. in the 1980s. Cetorelli and Gambera [2001] find that credit market concentration enhances the growth of industries that are more bank-dependent in their earlier stages while it deters the growth of other industries, from international industry-level data. Beck *et al.* [2004] find that firms in more competitive credit markets are more likely to encounter financing obstacles from international firm-level survey data. Bonaccorsi-di-Patti and Dell'Ariccia [2004] find that the rate of new incorporation is inverse U-shaped against credit market concentration, and that new incorporation rates in more informationally opaque industries increase with credit market concentration from Italian province-level data.

[3] Several studies provide empirical evidence of the correlation between lending competition and relationship banking. Elsas [2005] finds that the likelihood of relationship banking is U-shaped against credit market concentration from German data. Bertrand *et al.* [2007] find that French banks improved their assessment and monitoring abilities after the 1985 deregulation in France.

in a market where every competing bank has differential information regarding the creditworthiness of a potential borrower infers that it wins simply because all rivals have more negative information than the winner. This foresight makes each bank more prudent in the lending competition. It is known that this effect becomes stronger as the number of rivals increases since the increase in the number of rivals is equivalent to the increase in the number of losers, or the amount of negative information. Thus, credit availability is hindered as the number of competing banks increases.

By statistically identifying the mechanisms predicted by each of these theories, we can identify what economic force caused discrepancy in the existing empirical studies concerning the credit availability of new firms. In order to propose an example of such an analysis, the present study first empirically identifies the positive impact of relationship banking on credit availability for new firms with a unique dataset collected from the Survey of the Financial Environment of Enterprises, which was conducted by the Small and Medium Enterprise Agency in Japan in October 2003. Second, using this dataset, this study examines whether increased lending competition promotes relationship banking. Finally, it examines another effect of lending competition on credit availability for new firms other than that through bankers' willingness to undertake relationship banking.

In order to test the first hypothesis, we examine whether the time interval from start-up to the first loan approval is shorter for firms that receive ex-post management advice from their main banks, which is one of the characteristics of relationship banking (Boot and Thakor [2000]), after controlling fund demand and creditworthiness factors of each firm. The results of this statistical analysis show evidence supporting the hypothesis that relationship banking enhances credit availability for new firms. The logit analysis about the probability of banks providing such management advice shows that this probability decreases with the number of competing banks and other measures of competitive pressure. Thus, the effect of increased lending competition through relationship banking turns out to work in the direction to damage credit availability for new firms in Japan. The analysis also shows that the time interval from start-up to the first loan approval is

shorter in markets where the number of competing banks is smaller, even after controlling the existence of relationship banking. This result suggests the statistically significant existence of another mechanism that damages credit availability for new firms as the number of competing banks increases. Winner's curse is one of the candidates that may explain this result. As a whole, our statistical analysis shows that credit availability for new firms is lower for those in less concentrated credit markets in Japan by both the mechanism through the bankers' willingness to undertake relationship banking and the mechanism that is not related to relationship banking.

The remainder of this paper is organized as follows. In Section II, we present an analytical model to summarize the hypotheses predicted by the existing literature regarding the effect of increased lending competition on relationship banking and credit availability for new firms. In Section III, we introduce the dataset collected from the Survey of the Financial Environment of Enterprises in Japan. Section IV presents the specification of the statistical inference. Sections V and VI provide descriptive statistics and the estimation results including robustness checks, respectively. Section VII presents the conclusion and remaining problems.

II. Predictions from the theory of relationship banking

Several theoretical studies predict the impact of increased lending competition on relationship banking and the credit availability for younger firms. Relationship banking is often defined as a banking mode that entails the lender's investment in proprietary or soft information acquisition about a customer's creditworthiness through sequential or multiple transactions (Boot [2000]). Such exclusive accessibility to a customer's soft information yields rent for the incumbent lender. If the competitors know that the incumbent lender has more precise information about the creditworthiness of a borrower, they expect that they are more likely to win in the next lending competition when the borrower is less creditworthy. This expected stronger winner's curse renders

the competitors more reluctant to offer lower interest rates. This results in a sort of monopolistic rent for the incumbent lender (Sharpe [1990], Rajan [1992]). Such exclusive accessibility to soft information may also foster the incumbent lender's consulting ability that can decrease the default probability of the borrower. This ability also generates rent from the cost advantage over rivals by decreasing the borrower's default probability (Boot and Thakor [2000], Yafeh and Yosha [2001]). Aiming at such a rent from relationship banking, lenders are more willing to lend to younger firms to which no bank has yet lent if they opt for relationship banking (Sharpe [1990], Petersen and Rajan [1994]). Thus, the received theory shows that relationship banking has a positive impact on credit availability for younger firms. However, how an increase in the number of competing banks affects relationship banking is controversial.[4] This increase should enhance credit availability for younger firms if it promotes relationship banking, but it deters credit availability otherwise. In order to summarize these theoretical findings and clarify the hypotheses to be tested, we present a simple model in the next subsection.

A. Model

We consider a situation where n banks compete for lending to a firm twice. In the first period, the firm needs to make an indivisible investment I to start a business. At the end of the first period, the investment yields a revenue vI if it succeeds and yields no revenue otherwise. We assume that the only way for the firm to finance the initial cost is bank lending, and that loan contract is a standard debt contract that requires a borrower to repay the promised amount as long as it is possible, but repay as much as possible if it is impossible.[5] Under this limited liability assumption, the profit of the firm at the end of the first period (after the repayment) is $\max[\theta v -$

[4] Boot and Thakor [2000] and Yafeh and Yosha [2001] demonstrate the possibility that the increase in the number of competing banks promotes consulting activity by lenders, while Hauswald and Marquez [2006] show that an increase in the number of competing banks decreases information acquisition by lenders. Petersen and Rajan [1994] interpret their empirical findings from the latter viewpoint.

[5] In other words, we assume the (ex-post) costly state verification in the case of default (Townsend [1979], Williamson [1987]).

$r,0]I$, where θ is equal to 1 if the firm is successful and equal to zero otherwise, and r is an interest rate satisfying $r \leq v$. The firm is successful with a probability of π, and is unsuccessful with a probability of $1 - \pi$. This probability is independent across periods. We assume that the firm exits at the end of the first period if it fails to repay. For the initial loan I, n banks competitively bid interest rates considering the possibility of future relationship banking. The firm borrows from a bank that offers the lowest rate. If the bids tie, the firm chooses one of the banks with an equal probability.

In the second period, the firm has an elastic demand for funds to expand the operation. The profit from the investment L at the beginning of the second competition under the standard debt contract assumption is $\max[\theta F(L) - rL, 0]$, where the revenue function F satisfies $F' > 0$, $F'' < 0$, $F(L) \to \bar{F} < \infty$ as $L \to \infty$. Linearizing the first order condition to maximize the profit with respect to L gives a simple linear (inverse) demand function $r = a - bL$ ($a, b > 0$, $\pi > 1/(1+a)$). We assume that n banks play a Cournot competition for this fund demand. In the first period, the firm must start by paying the fixed entry cost I, which is typically not so large that a bank cannot finance it alone. In the second period, however, a firm can choose whether to expand its business or not, which supposedly depends on interest rates. The amount of additional investment in this stage could be large enough that a bank hesitates to finance the entire plan alone. From this observation, we assume that banks play a Bertrand competition in the initial stage and a Cournot competition in the continuation stage.

Immediately after extending the first loan, the initial lender chooses whether to invest in relationship banking, or to put it more precisely, whether to invest in building up consulting ability through exclusive soft information acquisition regarding the creditworthiness of the borrower. The investment cost is assumed to be a fixed amount c. By paying the cost c, the incumbent lender can acquire consulting ability that can improve the success probability of the borrower in the second period from π to $\pi' = \pi + \rho(1 - \pi)$, where $1 > \rho > 0$. We assume that the incumbent lender's choice of relationship banking is observable by rival banks. The timing of the game is summarized in

Figure 1.

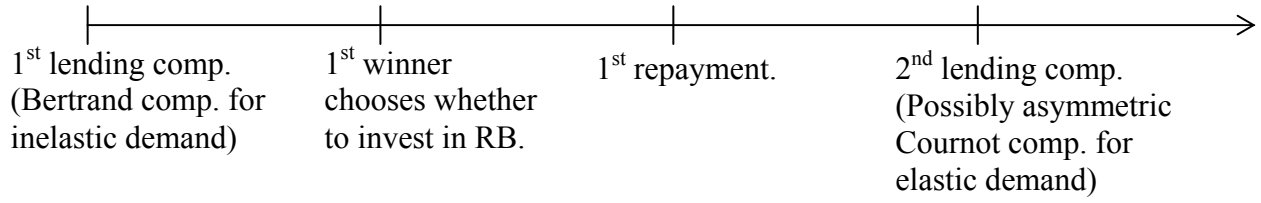

Figure 1. Timing of the sequential lending competitions

B. Second competition and the choice of banking mode

If the initial lender chooses not to invest in consulting ability, the Nash equilibrium in the second lending competition is that of a usual symmetric Cournot competition. The extended amount and the profit of each bank in the symmetric Nash equilibrium are readily derived as follows:

$$L^{t}(\pi) = \frac{(a+1)\pi - 1}{b\pi(n+1)}, \tag{1}$$

$$\Pi^{t}(\pi) = \frac{\{(a+1)\pi - 1\}^{2}}{b\pi(n+1)^{2}}. \tag{2}$$

If the initial lender chooses to invest in consulting ability, then the bank always exercises this ability. The second competition in this case is an asymmetric Cournot competition. The profits of the incumbent lender and the rival outside banks are, respectively,

$$[\pi'\{a - b(\sum_{j} L_{j}^{-r} + L^{r})\} - (1-\pi')]L^{r}, \tag{3}$$

$$[\pi\{a - b(\sum_{j} L_{j}^{-r} + L^{r})\} - (1-\pi)]L_{j}^{-r}, \tag{4}$$

where j is the index of the outside banks, L^{r} is the amount extended by the relational incumbent lender, and L^{-r} is the amount extended by the outside banks. Simple algebra gives the equilibrium

extended amount and the profit of the incumbent lender in the second competition as

$$L^r = \frac{1}{b(n+1)}\left[\frac{n\{(a+1)\pi'-1)\}}{\pi'} - \frac{(n-1)\{(a+1)\pi-1\}}{\pi}\right], \tag{5}$$

$$\Pi^r(\pi) = \frac{\pi'}{b(n+1)^2}\left[\frac{n\{(a+1)\pi'-1)\}}{\pi'} - \frac{(n-1)\{(a+1)\pi-1\}}{\pi}\right]^2. \tag{6}$$

The amount extended by each outside bank is

$$L^{-r} = \frac{1}{b(n+1)}\left[\frac{2\{(a+1)\pi-1)\}}{\pi} - \frac{\{(a+1)\pi'-1\}}{\pi'}\right]. \tag{7}$$

Clearly, this amount is smaller than that extended by the incumbent lender (5). Therefore, the profit of the incumbent lender Π^r is greater than that of an outside bank Π^{-r}.

Π^r is equal to Π^t if $\pi' = \pi$. Since Π^r is increasing π', it is always greater than Π^t if $\pi' > \pi$. This is the rent from cost efficiency resulting from the decreased default probability. Π^t decreases with the number of competing banks n while Π^r does not necessarily do so. The market share of each bank decreases as the number of competitors increases. This diminishes the profit of each bank. This force works against both Π^t and Π^r. However, the contents of the brackets in Π^r suggest another force. The incumbent lender can steal business from its rivals because of cost advantages if it exercises a consulting ability that can decrease the default probability. The impact of this business-stealing effect can increase with the number of rivals. If this is the case, an increase in the number of competing banks can increase Π^r.

Immediately after winning the first lending competition, the winning bank decides to invest in the consulting ability if and only if $(\delta\pi\Pi^r - c) - \delta\pi\Pi^t \geq 0$, where δ is a discount factor. Figure 2 shows a numerical example of the left-hand side of the inequality for a given π. In this example, the left-hand side shows a hump-shaped curve and the bank opts for relationship banking if the number of competing banks is between 3 and10. This result arises from the shape of the two profit functions mentioned in the previous paragraph. Thus, the impact of an increased number of banks can be both positive and negative, as shown in the existing literature.

C. Credit availability for a new firm

From the analysis so far, the expected profit of a bank in the first competition when each bank plans to undertake relationship banking if it wins is

$$\{\pi r - (1 - \pi)\}I + \delta\pi\Pi^{r}(\pi) - c \quad if\ it\ wins, \tag{8}$$

$$\delta\pi\Pi^{-r}(\pi) \quad if\ it\ loses. \tag{9}$$

The expected profit of a bank when each bank plans not to undertake relationship banking is

$$\{\pi r - (1 - \pi)\}I + \delta\pi\Pi^{t}(\pi) \quad if\ it\ wins, \tag{10}$$

$$\delta\pi\Pi^{t}(\pi) \quad if\ it\ loses. \tag{11}$$

The first competition is a symmetric Bertrand competition among n banks that expect these profits. Therefore, we determine the equilibrium interest rate r at the level where each bank is indifferent between winning and losing. The equilibrium interest rates in the case of relationship banking and no relationship banking are, respectively,

$$r_1^{r} = \frac{1-\pi}{\pi} - \frac{\delta\Pi^{r}(\pi) - c/\pi - \delta\Pi^{-r}(\pi)}{I}. \tag{12}$$

$$r_1^{t} = \frac{1-\pi}{\pi}. \tag{13}$$

Now, in order to elucidate the impact on credit availability for a firm in the first period, we assume that there exist potential firms of a continuum mass of 1, whose $\pi \in [\underline{\pi}, \overline{\pi}] \subset [0,1]$ are distributed according to the cumulative distribution function $G(\pi)$, and v satisfies the inequality

$$\frac{1-\overline{\pi}}{\overline{\pi}} < v < \frac{1-\underline{\pi}}{\underline{\pi}} - \frac{\delta\Pi^{r}(\underline{\pi}) - c/\underline{\pi} - \delta\Pi^{-r}(\underline{\pi})}{I}. \tag{14}$$

Under this assumption and a given n, there exist thresholds π_{*r} and π_{*t}. No bank would offer a loan to a firm with π less than each threshold in the case that each bank plans to undertake relationship banking or in the case that no bank do so, respectively. As the default probability $1 - \pi$ increases, a bank requires a higher premium for the default risk. However, the interest rate is bounded by the

highest repayable rate v. Therefore, the bank cannot but decline lending if the default probability is too high for the feasible highest rate. Each of these is implicitly defined by

$$v = \frac{1-\pi_{*r}}{\pi_{*r}} - \frac{\delta\Pi^{r}(\pi_{*r}) - c/\pi_{*r} - \delta\Pi^{-r}(\pi_{*r})}{I}. \tag{15}$$

$$v = \frac{1-\pi_{*t}}{\pi_{*t}}. \tag{16}$$

Since $\delta\pi\Pi^{r}(\pi) - c > \delta\pi\Pi^{t}(\pi) > \delta\pi\Pi^{-r}(\pi)$, the second term on the right-hand side is negative. Therefore, the threshold in the case where banks plan to undertake relationship banking π_{*r} is lower than π_{*t}. Thus, a new firm is more likely to obtain a loan from a bank that is willing to undertake relationship banking than from a bank that is not. This is the first hypothesis that we test in the present study.

<u>Prediction 1</u> *The probability for a bank to extend a loan to a new firm is higher, ceteris paribus, if the bank intends to undertake relationship banking.*

Second, if the increase in the number of competing banks has a positive (negative) impact on bankers' willingness to undertake relationship banking, then it enhances (deters) credit availability for new firms. The direction of the impact on relationship banking remains an empirical question the theory cannot decisively predict, as mentioned in the previous subsection.

<u>Prediction 2</u> *The probability for a bank to undertake relationship banking may be negatively or positively correlated with the number of competing banks.*

Finally, there may be another mechanism whereby an increase in the number of competing banks affects credit availability for new firms that were not mentioned in the above analysis. We

examine whether such another mechanism exists, and the direction of the overall impact of both the relationship banking effect and other effects.

III. Data

The important elements of the dataset were collected from the Survey of the Financial Environment of Enterprises, which was conducted by the Small and Medium Enterprise Agency in Japan in October 2003. The survey targeted 15,000 non-agricultural private companies in Japan. The targets were randomly sampled by industry, size of capital, and number of employees, from those registered with Tokyo Shoko Research Ltd., one of the largest private credit reporting companies in Japan. The response rate was 53.6%. Most of the sample companies were small or medium-sized enterprises that are not publicly traded. The survey asked firms about details of financing activities and financial environments including the terms and amounts of financial transactions with a main bank, the recent lending attitude of a main bank, the duration and scope of the relationship with a main bank, and the impact of M&A or failure of a main bank. The survey also asked how the founder financed start-up and later-stage funds. The responses from each firm were matched with financial statements if available. It is also possible to match each observation with the financial statements or other attributes of a main bank and with the economic conditions in the prefecture where the responding firm was located. These variables serve as control variables for extracting the ceteris-paribus impacts of relationship banking and the intensity of lending competition on credit availability.

A. Measure of credit availability for new firms

The most important variable is the measure of credit availability for new firms. On this point, the survey asked each firm how many years after start-up did it apply to banks for the first

loan, and whether it was approved or not. The start-up year of each firm was also obtained from the survey. If we find that the time interval from start-up to the first loan approval is shorter for firms that are provided with relationship banking in the future, after controlling fund demand and creditworthiness factors for each firm as well as the right-censoring problem, this will serve as evidence to support Prediction 1. In addition, if we find that the number of competing banks has a positive (negative) impact on the time interval, then this suggests that credit availability for new firms is deterred (enhanced) by an increase in the number of competing banks. In order to statistically examine such impacts, we apply censored regression analysis and duration analysis to the length of time from start-up to the first loan approval for each firm. In the statistical inference, we use those firms that had started up after the beginning of 1993 to assure a reasonable number of start-up firms in each year.

B. Measure of the existence of relationship banking

The survey asked a multiple-choice question about what services other than lending firms received from their main banks. Such additional services included advice about financial and other management matters, and the introduction of new customers. It is possible to interpret these services as relationship banking defined in Boot and Thakor [2000] or Yafeh and Yosha [2001]. We use a dummy variable ADVICE as the measure of the existence of relationship banking, which is equal to 1 if a firm received management advice from a main bank and zero otherwise. We also use a dummy variable ADVICE&INTRODUCTION that is equal to 1 if a firm received management advice or the introduction of customers and zero otherwise. By looking at the signs of the coefficients of these dummy variables in the regression analysis or duration analysis of the time interval from start-up to the first loan approval, we can statistically examine the effect of relationship banking on credit availability for new firms as presented by Prediction 1 in the previous section. These dummies also serve as dependent variables in a logit analysis to examine the impact

of lending competition on relationship banking as summarized in Prediction 2.

In order to test Prediction 1 properly, the lender of the first loan has to be identical to the main bank providing ADVICE or INTRODUCTION as of 2003. Unfortunately, we cannot exactly identify the lender of the first loan. However, in the subsample of our dataset for the duration analysis of that information about years of relationship with main banks is available, 92.6% of firms receiving ADVICE or INTRODUCTION as of 2003 did not switch their main banks since the first loan application. This suggests that the main bank providing ADVICE or INTRODUCTION as of 2003 is highly likely to be identical to the bank that received the first loan application since it is unlikely that a firm applies for the first loan to non-main banks. Thus, the dummy variables, ADVICE, and ADVICE&INTRODUCTION can serve as reasonable measures to examine the effect of relationship banking for the credit availability of new firms.

C. Measure of the intensity of lending competition

We assume that the geographical limit of a lending market for small or medium-sized companies is the prefecture since the operating area of many regional banks or cooperative lending institutions,[6] which are major providers of relationship banking, are limited within the confines of a prefecture although no regulations exist in this regard. A prefecture may be too large a unit for a lending market since more than 90% of companies replied that they had a branch of their main bank within a 10-kilometer radius. In spite of this potential problem, we assume that the prefecture is the unit of a lending market for the sake of data availability. We construct three measures of the intensity of lending competition in each prefecture: (1) The number of lending institutions that have

[6] There are two types of cooperative lending institution for small businesses, *Shinyo Kinko* (credit vault) and *Shinyo Kumiai* (credit union). The former lends only to member firms with 300 or fewer employees or with capital of 900 million yen or less. The restrictions are more severe for the latter. These lend only to member manufacturers with 300 or fewer employees or with capital of 300 million yen or less, to member wholesale companies with 100 or fewer employees or with capital of 100 million yen or less, to member retailers with 50 or fewer employees or with capital of 50 million yen or less, and to other member service companies with 100 or fewer employees or with capital of 50 million yen or less. In counting the number of competing banks for the logit of the relationship banking probability as of 2003, we adjust the number of banks according to these restrictions for each firm size. In the duration analysis, we simply use the number of banks excluding *Shinyo Kumiai* since firms rarely choose this type of bank as a main bank (only 1.2% in our dataset).

at least one regular branch in each prefecture; (2) the Herfindahl index of the number of regular branches in each prefecture; and (3) the Herfindahl index of loan amounts in each prefecture.

For the calculation of the branch Herfindahl index in the logit of relationship banking, we collect the number of branches of each financial institution in each prefecture as of April 2002 from *Nihon Kinyu Meikan* (the directory of Japanese financial institutions), Nihon Kinyu Tsushin Sha. For the loan Herfindahl index, we collect the outstanding loan amount for each bank in each prefecture at the end of March 2002 from the special issue of *Kinyu Journal* (financial journal) if available, and approximate the amounts from the share of branch numbers and the total amounts by institution type (nationwide banks or regional banks) in each prefecture otherwise. For the duration analysis, we calculate the branch Herfindahl index as of April 1992, 1997, and 2002, and the loan Herfindahl index at the end of March 1992, 1997, and 2002 in the same way. Then, we match the indices in 1992, 1997, and 2002 with the firms started up in 1993–1996, in 1997–2001, and in 2002–2003, respectively, after adjusting the branch shares and the loan amount shares according to bank mergers or failures between these data points.

Casual observation suggests that larger banks, typically nationwide banks, rarely provide relationship banking that entails management advice for customers. If this is the case, the lending competition measure for our statistical analysis must be calculated after excluding the branches of nationwide banks. In our sample, however, 17.7% of the firms of that main bank is a nationwide bank receive ADVICE or INTRODUCTION. This probability is not much lower than regional banks (22.3%), and Shinkin banks (17.7%). In order to test the predictions listed in the previous section, the measure of market structure must cover all competitors who are potentially able to provide relationship banking in each local market. From this consideration, we treat nationwide banks, regional banks, and Shinkin banks equally in constructing the measure of the intensity of the local lending competition.

IV. Specifications for estimation

A. Time interval from start-up to the first loan approval

First, we regress the natural log of the time interval from start-up to the first loan approval of each firm on the measures of regional lending competition, the measure of relationship banking and other control variables in order to statistically test the impact of the intensity of lending competition on credit availability for new firms through the relationship banking effect and other effects. To put more precisely, we use censored regression to address the right censoring problem arising from the possibility that firms have never applied for a loan as of the survey in 2003 simply because they are too young at the moment. The sign of the coefficients of the dummy variables, ADVICE or ADVICE&INTRODUCTION, and the measure of lending competition are what we would like to know for the examination of the predictions in the previous section. If these variables have POSITIVE and significant coefficients, then these factors have NEGATIVE impacts on credit availability for new firms.

Second, we apply duration analysis. Let us denote the duration from start-up to the first loan approval as T. We assume that this is distributed according to the cumulative distribution function $F(t|\mathbf{x}) = \text{Prob}(T \leq t|\mathbf{x})$, $t \geq 0$, where $\mathbf{x}$ is a vector of explanatory variables including a measure of lending competition, a measure of relationship banking, and other control variables. We assume that the corresponding hazard function is a proportional one, i.e.,

$$\lambda(t;\mathbf{x}) = \frac{f(t \mid \mathbf{x})}{1 - F(t \mid \mathbf{x})} = \exp(\mathbf{x}\boldsymbol{\beta})\lambda_0(t), \tag{17}$$

where $\boldsymbol{\beta}$ is a vector of the coefficients to be estimated. Conceptually, the hazard function λ corresponds to the probability for a new firm to obtain a loan $1 - G(\pi_{*t})$ or $1 - G(\pi_{*r})$ in the model presented in the previous section. If an estimated coefficient of an explanatory variable is POSITIVE and significant, then the explanatory variable has POSITIVE impact on credit availability for new

firms. We estimate the coefficient vector $\boldsymbol{\beta}$ using the Cox partial maximum likelihood estimation (Cox [1972]), which does not require specifying a parametric function for λ_0.

B. Logit analysis of relationship banking

In Section II, we have shown that an incumbent bank chooses relationship banking if and only if $(\delta\pi_i\Pi^r_i - c_i) - \delta\pi_i\Pi^t_i \geq 0$. This proposition can be restated as follows:

$$ADVICE_i = \begin{cases} 1 & \text{if } (\delta\pi_i\Pi_i^r - c_i) - \delta\pi_i\Pi_i^t + e_i > 0, \\ 0 & \text{otherwise,} \end{cases} \tag{19}$$

where $e_i \sim$ logistic C.D.F. $H(e_i) \equiv \exp(-e_i)/(1 - \exp(-e_i))$. Linearizing $(\delta\pi_i\Pi^r_i - c_i) - \delta\pi_i\Pi^t_i$ of firm i into $\mathbf{z_i\gamma}$, the log likelihood function can be maximized as

$$\sum_i \{ADVICE_i \log[H(\mathbf{z_i\gamma})] + (1 - ADVICE_i)\log[1 - H(\mathbf{z_i\gamma})]\}, \tag{20}$$

where $\boldsymbol{\gamma}$ is the coefficient to be estimated. The sign of the coefficient for the measure of lending competition represents the direction of the impact of competition on the frequency of relationship banking.

V. Descriptive statistics

A. Time interval from start-up to the first loan application

The number of observations for which we can obtain all items necessary for our statistical inference is 1,436. 1,059 firms out of them successfully obtained the first loan, and other firms are rejected, or didn't apply for a loan at all. Among these firms that obtained a loan, the number of firms that received management advice from a main bank as of October 2003 is 30 (2.8%), and the number of firms that received management advice or customer introduction from a main bank as of October 2003 is 94 (9.7%). The t-test for the mean difference shows that the number of years from start-up to the first loan application is less on average for those that received advice or customer

introduction (Table 1). The difference is statistically significant and is about one fifth to one third of a year. Figure 3 depicts the histogram and the estimated kernel density for those receiving advice or customer introduction. This figure clearly shows the tendency that the duration is shorter for those firms receiving main bank advice. Thus, relationship banking appears to enhance credit availability for new firms although we do not control any other factors or the right-censoring problem for those firms whose first application was rejected or those that didn't apply for a loan. We will check whether this result would change after controlling these other factors. Table 2 shows the summary statistics for these covariates used in the duration analysis.

B. Likelihood of relationship banking

The number of samples for which we can collect all items required for the estimation of the relationship banking probability is 2,498. The summary statistics of covariates sorted by whether receiving advice or not are listed in Table 3. The stars in the table show that the mean difference of each item between firms with advice and those without is statistically significant. Table 3(1) shows that firms with advice tended to be relatively larger and older. They also tended to maintain longer relationships with main banks, and were located in a market where lending competition was less severe. Table 3(2) shows that firms with advice or customer introduction by main banks tended to be relatively larger, older, and maintain longer relationships with main banks. Table 3(1) suggests the tendency that lending competition hinders relationship banking while Table 3(2) does not show such a clear direction. Roughly speaking, firms in manufacturing, real estate, and other services (typically restaurants and hotels) seem to be more likely to receive relationship banking (Table 4).

VI. Results

A. Duration from start-up to the first loan approval

In the duration analysis, we include industry dummies and start-up year dummies so as to control unobservable factors. Table 5A presents the results from the specification without the ADVICE or the ADVICE&INTRODUCTION dummy. The first three columns are the results from the censored regression, and the last three columns are the results from the Cox partial maximum likelihood estimation. The coefficients of the branch/loan Herfindahl indices are negative and significant at the 99 % level, and the coefficient of the number of banks in a market (natural log) is positive and significant at the 99% level in the censored regression. These results suggest that lending competition limits credit availability for new firms in Japan. In the Cox partial maximum likelihood, the coefficients of the branch/loan Herfindahl indices are positive but insignificant, and the coefficient of the number of banks in a market (natural log) is negative and significant at the 90% level. These results are weaker than those from the censored regression, but, at least, do not contradict to the results from the censored regression (Note that the meanings of the sings of coefficients in the Cox PMLE are opposite to those in the censored regression, see Section IV B).

Among other covariates, the years of an owner's business experience in the industry has a positive impact on credit availability. This variable may reflect the growth potential of a firm. Variables regarding local economic conditions also have significant impacts. Real prefecture GDP growth, the loan share-weighted average of bank ROA, and the loan share-weighted average of the reserve ratio have positive impacts on credit availability for new firms. These results suggest that a new firm is more likely to obtain a loan if the local economic and financial conditions are good. The loan-share-weighted average of the loan/deposit ratio also has a significant positive impact on credit availability. This suggests that credit availability is higher in a market where banks are keener on extending loans.

Table 5B shows the results from the specification that includes the ADVICE dummy. In the censored regression, the ADVICE dummy has negative coefficients, which are statistically significant at the 95% level (Specifications (1)–(3) in Table 5B(1)). This result does not change that

much even if we include the mean ROA of a firm from start-up to the first loan approval in order to control the fund demand factor of each firm more closely (Specifications (4)–(5) in Table 5B(1)). The results of the Cox partial maximum likelihood estimation show the same signs of the impact of ADVICE although they are not statistically significant (Table 5B(2)). The other estimated coefficients show a similar tendency to the results in Table 5A. Another interesting finding is that the number of competing banks and the other measures of lending competition have statistically significant signs that are consistent with the previous results in Table 5A even after controlling the existence of relationship banking. This finding suggests the existence of another mechanism through which the intensity of lending competition pushes down the credit availability for new firms. Table 5C shows the results from the specification that uses the ADVICE&INTRODUCTION dummy instead of the ADVICE dummy. The results show stronger evidence supporting the hypothesis that that relationship banking that entails management advice by a main bank enhances credit availability for new firms, and that this mechanism is not the only one that generates the negative correlation between lending competition and credit availability for younger firms.

B. Likelihood of relationship banking

In the logit analysis, we include industry dummies as explanatory variables to control unobservable factors. We introduce the squared measures of concentration after so as to accommodate the possibility that the probability to receive consulting services is hump-shaped against the number of competing banks. All concentration measures are redefined as the difference from means to prevent the near multicollinearity problem resulting from high correlation between squared measures and original measures. We used the full sample available from the survey in 2003 including those firms whose information on the first loan application is not available. Table 6 shows the estimated marginal effects in the logit of the probability of a firm to receive management advice from a main bank (Table 6, first three columns), and the probability of a firm receiving management

advice or introduction of customers (Table 6, last three columns). The logit for the ADVICE dummy (first three columns of Table 6) shows that the marginal effects of the branch/loan Herfindahl indices are positive and statistically significant, and that the coefficient of the number of competing banks is negative and significant while no squared measures of lending market concentration have significant coefficients. The logit for the ADVICE & INTRODUCTION dummy (last three columns of Table 6) shows the less clear results. Only the coefficient of squared log of number of competing banks (difference from mean) has a significant negative coefficient. This suggests that the probability to receive ADVICE/INTRODUCTION is hump-shaped against the intensity of lending competition, and it is maximal at the number of competing banks equal to exp(mean log number of banks: 3.735) = 42.

The estimated coefficient of the number of banks (natural log) in the ADVICE dummy logit (column 3 in Table 6) suggests that the one-sigma increase (some 53) in the number of banks in an average market where 58 banks operate decreases the probability of receiving management advice by −1.4%. This means that such an increase in the number of banks decreases the ADVICE probability by half since the ratio of firms receiving management advice in the sample is about 2.8%. The estimated coefficients of the number of banks in the last column in Table 6 suggests that such an increase in the number of banks decreases the ADVICE&INTRODUCTION probability by −1.0%, which means a 10% decrease in the ADVICE&INTRODUCTION probability (9.7% in our sample). The one-sigma decrease in the number of banks increases the ADVICE & INTRODUCTION probability by 3.7%, which means 38% increase of the probability.

Among other covariates, the age of a firm, the number of employees of the firm, or the years of relationship with a main bank has a significant positive marginal effects.. These results suggest that relatively larger firms with longer relationships with a main bank are more likely to receive advice from that main bank. The log of loan amounts from a main bank has a positive and significant coefficient. This result suggests that main banks are more likely to try to influence the

borrower's management if they are more exposed to borrower's default risk. It is expected that this incentive for banks to influence borrowers' business becomes weaker as the portion guaranteed by credit guarantee corporations, which is public institutions to provide credit guarantees for small businesses. Indeed, the coefficient of the public guarantee ratio of loans from a main bank has negative and significant coefficient. The bad loan ratio of a main bank has negative coefficients. This may reflect the fact that banks that are less willing to provide consulting service are more likely to accumulate bad loans although we need more careful investigation on its causality. The number of branches of a main bank has a negative and significant coefficient. This result supports the view that larger banks encounter a difficulty in undertaking relationship banking, as is shown in the theory by Stein (2002), and the empirical findings of Berger, Miller, Petersen, Rajan, and Stein (2005) based on U.S. data, and of Uchida, Udell, and Watanabe (2005) based on Japanese data.

C. Robustness check: simultaneous estimation

In the previous sections, we estimated the effect of consulting services on the duration from start-up to the first loan approval and the probability to provide consulting services for borrowers separately. However, the estimated coefficients may be contaminated with the simultaneous equation bias if an unobservable factor affecting the consulting probability is correlated with an unobservable factor affecting the duration. In order to address this problem directly, we estimate these equations as simultaneous equations by applying the two-stage regression procedure for an endogenous dummy model by Heckman (1978) to our censored regression of the duration from start-up to the first loan approval. Instrumental variables for the first stage probit estimation of the probability receiving consulting services includes a concentration measure (branch Herfindahl index, loan Herfindahl index, or log of the number of competing banks, difference from the mean), the square of it, loan/asset ratio of a firm, ROA of a firm, number of employees, age of a firm, years of relationship with a main bank, bad loan ratio of a main bank,

number of branches of a main bank, bad loan ratio in each prefecture, number of firms per bank in each prefecture, and real GDP growth of each prefecture. All these variables are as of 2002. The fifth and forth rows from the bottom in Table 7 list the test statistics for the null hypothesis that all of these instruments have zero coefficients. The tests suggest that these variables work effectively as instrumental variables for the ADVICE&INTRODUCTION dummy while they perform poorly for the ADVICE dummy. The coefficients of concentration measures in the first stage probit for the probability to receive consulting services (Equation 2 in Table 7) are not significant perhaps because of the decrease in the number of observations. Nonetheless, the coefficients of the key variables in the equation of the time interval from start-up to the first loan approval (Equation 1 in Table 7) have the same signs as in the previous regressions and remain statistically significant. Thus, the simultaneous equation bias does not seriously affect the results in the analysis of the duration from start-up to the first loan approval.

D. Summary and interpretation of the main findings

First, the analysis on the duration between start-up and the first loan application supports the hypothesis that relationship banking enhances credit availability for new firms even after controlling the profitability or growth potential of a firm and the right-censoring problem as far as possible. Second, the logit analysis shows that the probability to provide consulting services is decreasing or hump-shaped against lending competition. Third, the duration analysis suggests the existence of another mechanism whereby increased number of competing banks diminishes credit availability for new firms other than through bankers' willingness to choose relationship banking. All in all, the data shows that increase in the number of competing banks is more likely to hinder credit availability for new firms in the last 15 years in Japan.

VII. Conclusion and remaining problems

The present study has empirically verified the prediction that relationship banking entailing management consulting service enhances credit availability for new firms. In addition, the analysis has found evidence that larger number of competing banks hinders credit availability for new firms in Japan. The predictions of existing theory vary with the sign of the correlation between lending competition and relationship banking, as seen in Figure 3, while it consistently predicts a positive impact of relationship banking on credit availability for new firms. From this viewpoint, we can infer that the discrepancy of the existing literature on the impact of lending competition on credit availability for new firms arises mainly from the sign of the correlation between relationship banking and lending competition, although we need to conduct more empirical investigations on this matter. The analysis also suggests the existence of another mechanism that decreases credit availability as the number of competing banks increases. The theory of winner's curse mentioned in the introduction provides a possible explanation for this result, but the empirical identification of such another mechanism remains a subject for future research.

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Figure 2. Numerical example of the choice between relationship banking and transaction banking

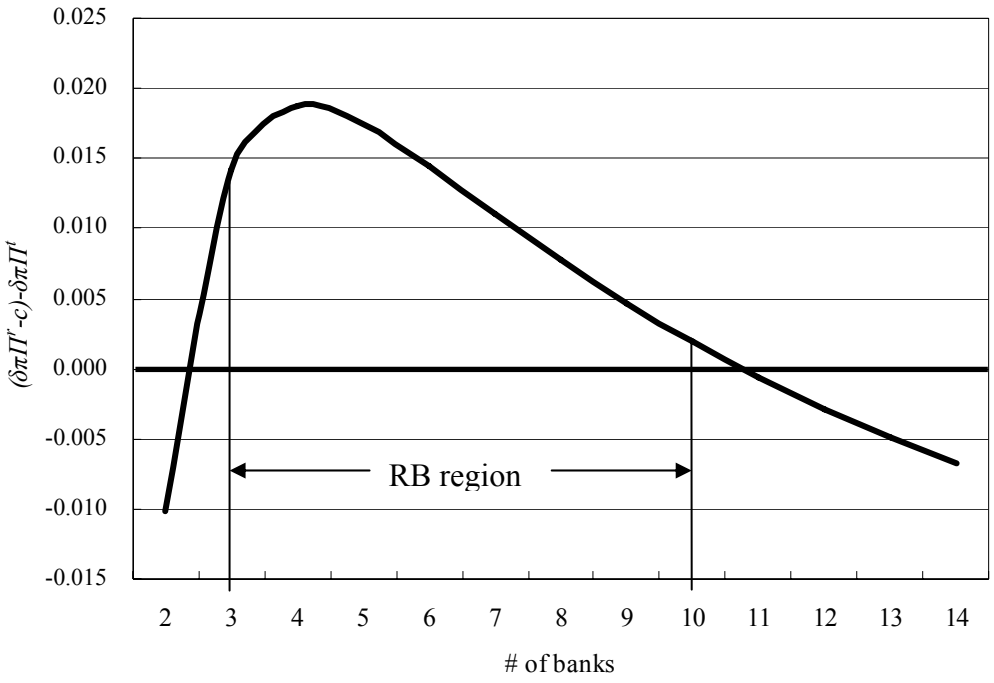


Table 1. Years from start-up to the first loan approval

Yrs. from start-up to the first loan approval	no. obs.	mean	s.d.	min.	max.
Firms without advice	1029	2.02	1.24	1.00	8.00
Firms with advice	30	1.63 **	0.96	1.00	5.00
Firms without advice & introduction	965	2.03	1.24	1.00	8.00
Firms with advice/introduction	94	1.81 *	1.11	1.00	7.00

(Note) *, ** indicate that the mean difference between firms with advice and those without advice is significant at 90%, and 95% level, respectively. The numbers are calculated from the non-censored samples.

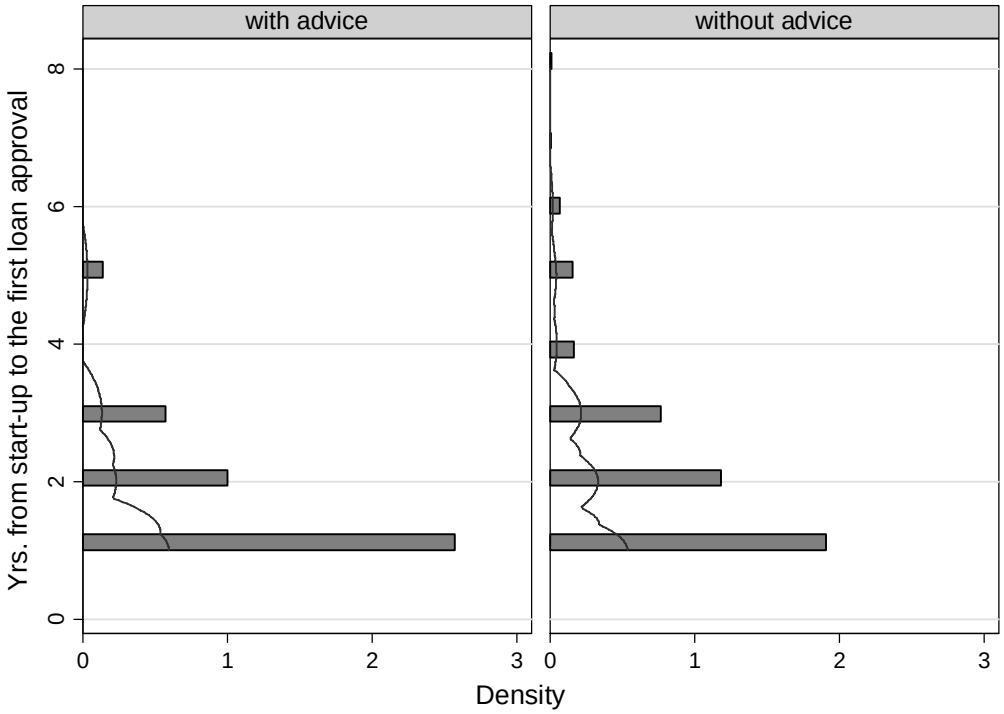
Table 2. Summary statistics for the variables in the duration analysis

Variables	no. of obs.	mean	s.d.	min.	max.
Bank branch Herfindahl index (each pref.)	1436	0.096	0.065	0.022	0.277
Bank loan Herfindahl index (each pref.)	1436	0.147	0.084	0.046	0.433
Number of banks (each pref.)	1436	63.90	52.01	5	182
Change in land price (for commercial purpose, %)	1436	-12.64	9.24	-32.95	40.60
Owner's experience in the industry (yrs.)	1436	17.02	11.60	0	55
Owner's age at start-up (yrs. old)	1436	52.18	9.05	26.83	81.83
Number of employees at start-up (persons)	1436	8.64	21.29	0	300
Mean ROA from start-up to the first loan application (%)	846	-0.77	21.01	-155.05	98.27
Real Pref. GDP growth (%)	1436	0.84	1.44	-6.59	6.10
Bank ROA (weighted avg. in each pref., %)	1436	-0.14	0.41	-2.23	0.47
Bank loan/deposit (weighted avg. in each pref., %)	1436	80.97	6.49	63.27	94.00
Bank reserve ratio (weighted avg. in each pref., %)	1436	12.89	3.53	6.67	24.74
Ordinary profit/sales in each industry (%)	1436	0.096	0.065	0.022	0.277

(Note) Herfindahl indices, the number of banks in each prefecture, changes in land price, prefecture real GDP growth, bank ROA, bank loan/deposit ratio, bank reserve ratio, industry profit/sale ratio are all average between the start-up year to the first loan application year of each firm (or the survey year 2003 if no applications are made since the start-up). Bank ROA, bank loan/deposit ratio, bank reserve ratio of each prefecture in each fiscal year is calculated as a loan-share-weighted average of operating banks in each prefecture. The items of each bank are calculated according to the following formula: Bank ROA = (ordinary profit*365/days in FY) / total assets, Loan/deposit rate = loans / (deposits + negotiable CDs + debts). Reserve ratio = (cash & deposits + call loans +bills receivable) / (deposits + negotiable CDs). Industry ordinary profit and sales are collected from the Financial Statement Statistics of Corporations by industry (all sizes of firms), Ministry of Finance in Japan.

Figure 3. Histogram of the duration from start-up to the first loan approval

A. Sort by ADVICE dummy



B. Sort by ADVICE & INTRODUCTION dummy

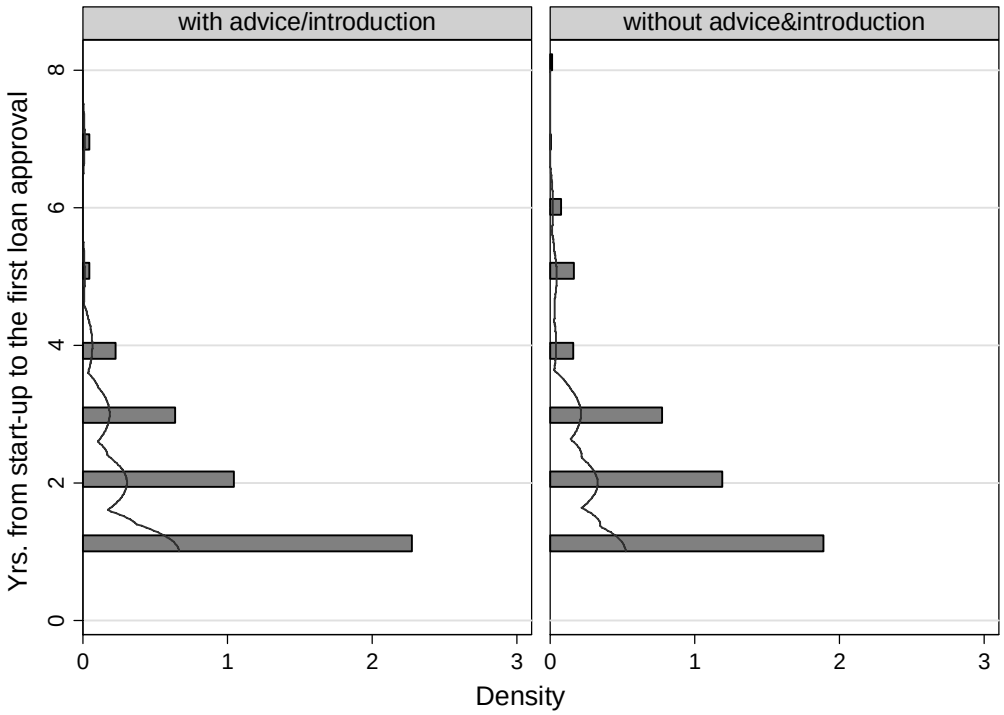


Table 3. Summary statistics for the variables in the RB logit

(1) Sort by ADVICE dummy

Firms with advice by MB	no. obs.	mean	s.d.	min.	max.
Number of employees (persons)	270	62.57	66.78	2	299
ROA (%)	270	0.33	6.41	-49.03	35.95
Loan/asset ratio (%)	270	49.89	27.35	0.00	139.83
Firm age (yrs. old)	270	39.78	15.64	2.00	89.58
Yrs. of relationship with MB	270	34.46	16.81	2	90
Public guarantee ratio of loans from MB (%)	270	23.65	29.10	0	100
Loan amounts from MB (m yen)	270	1206.26	4983.02	0	60526
Bad loan ratio of MB	270	8.57	3.44	2.60	28.10
No. of branches of MB	270	166.29	157.06	6	611
Bank branch Herfindahl index	270	0.114	0.059	0.031	0.276
Bank loan Herfindahl index	270	0.188	0.078	0.083	0.365
No. of banks operating in each pref.	270	48.5	44.5	5	187
Bad loan ration in each pref.	270	5.03	4.03	0.67	20.57
No. of firms per bank (1000 firms)	270	4.10	1.52	2.13	14.64
Real GDP growth from 2001 to 2002	270	0.20	1.43	-4.27	3.86
Firms without advice by MB	no. obs.	mean	s.d.	min.	max.
Number of employees (persons)	2228	39.00 **	49.00	1	300
ROA (%)	2228	0.47	11.60	-199.95	94.30
Loan/asset ratio (%)	2228	41.31 ***	36.92	0.00	506.94
Firm age (yrs. old)	2228	28.97 ***	17.51	0.92	91.42
Yrs. of relationship with MB	2228	25.48 ***	17.60	0	96
Public guarantee ratio of loans from MB (%)	2228	37.22	39.77	0	100
Loan amounts from MB (m yen)	2228	738.13	11762.87	0	500000
Bad loan ratio of MB	2228	9.18 **	3.72	0.00	49.00
No. of branches of MB	2228	194.69 ***	183.98	4	611
Bank branch Herfindahl index	2228	0.103 ***	0.060	0.031	0.276
Bank loan Herfindahl index	2228	0.173 ***	0.077	0.083	0.365
No. of banks operating in each pref.	2228	59.2 ***	53.3	5	187
Bad loan ration in each pref.	2228	4.99	4.26	0.67	20.57
No. of firms per bank (1000 firms)	2228	4.26	1.55	2.13	14.64
Real GDP growth from 2001 to 2002	2228	0.16	1.43	-6.59	3.86

(Note) *, **, *** indicate that the mean difference between firms with advice and those without advice is significant at 90%, 95%, and 99% significance level, respectively. Firm data (number of employees, ROA, loan (=short-term loan+long-term loan)/asset ratio, public guarantee ratio of loans from a main bank, loan amounts from a main bank) are as of October 2003 or the latest end of a fiscal year. Herfindahl indices、the number of banks and the number of branches are as of April 2002. Changes in land price, prefecture real GDP growth are from March 2001 to March 2002. Number of firms in each prefecture is as of October 2001. Bad loan ratio of each bank as of March 2002 is defined by the following formula: {(loans to borrowers in legal bankruptcy) + (past due loans in arrears by 6 months or more) + (loans in arrears by 3 months or more and less than 6 months) + (restructured loans)} / (total loans outstanding). Bad loan ratio in each prefecture is lending-share weighted average of banks operating in the prefecture.

(2) Sort by ADVICE&INTRODUCTION dummy

Firms with advice / introduction by main bank (MB)	no. obs.	mean	s.d.	min.	max.
Number of employees (persons)	509	59.31	63.20	1	299
ROA (%)	509	0.88	7.43	-49.03	91.46
Loan/asset ratio (%)	509	44.88	27.95	0.00	214.65
Firm age (yrs. old)	509	36.25	16.81	0.92	89.58
Yrs. of relationship with MB	509	31.94	17.36	1	90
Public guarantee ratio of loans from MB (%)	509	26.75	32.86	0	100
Loan amounts from MB (m JPY)	509	950.76	3821.69	0	60526
Bad loan ratio of MB	509	8.8	3.3	3	28
Number of branches of MB	509	184.63	172.67	6	611
Bank branch Herfindahl index	509	0.11	0.06	0.03	0.28
Bank loan Herfindahl index	509	0.18	0.08	0.08	0.36
Number of banks operating in each pref.	509	55.1	49.5	5	187
Bad loan ration in each pref.	509	4.93	4.03	0.67	20.57
Number of firms per bank (1000 firms)	509	4.20	1.56	2.13	14.64
Real GDP growth from 2001 to 2002	509	0.12	1.39	-4.27	3.86
Firms without advice by MB including referrals	**no. obs.**	**mean**	**s.d.**	**min.**	**max.**
Number of employees (persons)	1989	37.01***	47.32	1	300
ROA (%)	1989	0.35	11.93	-199.95	94.30
Loan/asset ratio (%)	1989	41.57*	37.89	0.00	506.94
Firm age (yrs. old)	1989	28.58***	17.51	0.92	91.42
Yrs. of relationship with MB	1989	25.04***	17.56	0	96
Public guarantee ratio of loans from MB (%)	1989	38.05	40.09	0	100
Loan amounts from MB (m JPY)	1989	747.26	12435.65	0	500000
Bad loan ratio of MB	1989	9.2	3.8	0	49
Number of branches of MB	1989	193.40	183.63	4	611
Bank branch Herfindahl index	1989	0.10	0.06	0.03	0.28
Bank loan Herfindahl index	1989	0.17	0.08	0.08	0.36
Number of banks operating in each pref.	1989	58.8	53.2	5	187
Bad loan ration in each pref.	1989	5.01	4.29	0.67	20.57
Number of firms per bank (1000 firms)	1989	4.25	1.54	2.13	14.64
Real GDP growth from 2001 to 2002	1989	0.18	1.44	-6.59	3.86

(Note) *, **, *** indicate that the mean difference between firms with advice and those without advice is significant at 90%, 95%, and 99% significance level, respectively. Firm data (number of employees, ROA, loan (=short-term loan+long-term loan)/asset ratio, public guarantee ratio of loans from a main bank, loan amounts from a main bank) are as of October 2003 or the latest end of a fiscal year. Herfindahl indices、the number of banks and the number of branches are as of April 2002. Changes in land price, prefecture real GDP growth are from March 2001 to March 2002. Number of firms in each prefecture is as of October 2001. Bad loan ratio of each bank as of March 2002 is defined by the following formula: {(loans to borrowers in legal bankruptcy) + (past due loans in arrears by 6 months or more) + (loans in arrears by 3 months or more and less than 6 months) + (restructured loans)} / (total loans outstanding). Bad loan ratio in each prefecture is lending-share weighted average of banks operating in the prefecture.

Table 4. Ratio of firms with relationship banking

A. ADVICE by a main bank

Industry	Without advice	With advice	Total	Percentage of firms with advice
Manufacturing	588	101	689	14.7
Construction	781	64	845	7.6
Retail	134	18	152	1.8
Whole sale	430	60	490	11.8
Real estate	54	1	55	12.2
Information/communication	57	4	61	6.6
Other service	184	22	206	10.7
Total	2,228	270	2,498	10.8

B. ADVICE&INTRODUCTION by a main bank

Industry	Without advice & introduction	With advice/ introduction	Total	Percentage of firms with advice
Manufacturing	529	160	689	23.2
Construction	697	148	845	17.5
Retail	120	32	152	21.1
Whole sale	398	92	490	18.8
Real estate	43	12	55	21.8
Information/communication	48	13	61	21.3
Other service	154	52	206	25.2
Total	1,989	509	2,498	20.4

Table 5. Results of the duration analysis

A. Without ADVICE dummy

Variables	Censored Regression (1)	(2)	(3)	Cox PMLE (1)	(2)	(3)
Bank branch HI in each prefecture (mean between start-up and the 1st loan appl.)	-1.962 *** (0.488)			0.222 (0.743)		
Bank loan HI in each prefecture (mean between start-up and the 1st loan appl.)		-1.029 *** (0.388)			-0.030 (0.591)	
Number of banks in each prefecture (log) (mean between start-up and the 1st loan appl.)			0.337 *** (0.052)			-0.134 * (0.075)
Founder's real estate dummy (0,1)	0.188 *** (0.066)	0.188 *** (0.067)	0.164 ** (0.066)	-0.191 * (0.101)	-0.190 * (0.101)	-0.183 * (0.102)
Founder's real estate dummy *land price change (%)	0.027 *** (0.003)	0.027 *** (0.003)	0.025 *** (0.003)	-0.029 *** (0.005)	-0.029 *** (0.005)	-0.028 *** (0.005)
Owner's age at start-up (log)	0.420 *** (0.112)	0.429 *** (0.112)	0.392 *** (0.111)	-0.513 *** (0.156)	-0.513 *** (0.156)	-0.503 *** (0.156)
Yrs. of owner's experience in the industry (log)	-0.045 ** (0.021)	-0.047 ** (0.021)	-0.043 ** (0.02)	0.049 (0.030)	0.049 (0.030)	0.046 (0.030)
No. of employees at start-up (log)	0.009 (0.022)	0.007 (0.022)	0.010 (0.021)	-0.011 (0.032)	-0.010 (0.032)	-0.012 (0.032)
Pref. real GDP growth (%)	-0.047 *** (0.017)	-0.044 ** (0.017)	-0.048 *** (0.017)	0.033 (0.030)	0.033 (0.030)	0.031 (0.030)
Pref. mean bank ROA (%)	-0.796 *** (0.075)	-0.838 *** (0.075)	-0.735 *** (0.075)	1.589 *** (0.172)	1.616 *** (0.163)	1.488 *** (0.168)
Pref. mean loan/deposit ratio (%)	-0.051 *** (0.005)	-0.050 *** (0.005)	-0.060 *** (0.005)	0.076 *** (0.007)	0.076 *** (0.007)	0.078 *** (0.007)
Pref. reserve ratio (%)	-0.054 *** (0.009)	-0.049 *** (0.009)	-0.082 *** (0.01)	0.031 ** (0.013)	0.028 ** (0.013)	0.049 *** (0.016)
Start-up year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-1542.21	-1525.18	-1535.48	-7098.77	-7098.81	-7097.27
Pseudo R^2	0.107	0.104	0.114			
Number of observations	1,436	1,436	1,436	1,436	1,436	1,436
Number of censored obs.	377	377	377	377	377	377

(Note) *, **, *** indicate that the estimated coefficient is different from zero at 90%, 95%, and 99% significance level (two-sided), respectively.

B. With ADVICE dummy

(1) Censored regression

Variables	(1)	(2)	(3)	(4)	(5)	(6)
ADVICE(0,1) as of 2003	-0.273 **	-0.269 **	-0.259 **	-0.413 **	-0.401 **	-0.418 **
	(0.13)	(0.131)	(0.129)	(0.204)	(0.204)	(0.202)
Bank branch HI in each prefecture (mean between start-up and the 1st loan appl.)	-1.938 ***			-2.014 ***		
	(0.487)			(0.711)		
Bank loan HI in each prefecture (mean between start-up and the 1st loan appl.)		-0.991 ***			-1.479 **	
		(0.387)			(0.577)	
Number of banks in each prefecture (log) (mean between start-up and the 1st loan appl.)			0.333 ***			0.320 ***
			(0.052)			(0.076)
Founder's real estate dummy (0,1)	0.199 ***	0.198 ***	0.174 ***	0.301 ***	0.304 ***	0.280 ***
	(0.066)	(0.067)	(0.066)	(0.093)	(0.093)	(0.093)
Founder's real estate dummy *land price change (%)	0.028 ***	0.028 ***	0.025 ***	0.041 ***	0.041 ***	0.038 ***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)
Owner's age at start-up (log)	0.423 ***	0.431 ***	0.395 ***	0.301 *	0.307 *	0.246
	(0.112)	(0.112)	(0.111)	(0.168)	(0.168)	(0.168)
Yrs. of owner's experience in the industry (log)	-0.047 **	-0.049 **	-0.044 **	-0.009	-0.009	-0.010
	(0.021)	(0.021)	(0.02)	(0.03)	(0.03)	(0.03)
No. of employees at start-up (log)	0.011	0.009	0.012	0.020	0.021	0.021
	(0.022)	(0.022)	(0.021)	(0.031)	(0.031)	(0.031)
Mean ROA from start-up to the first loan application (%)				0.003 **	0.003 **	0.003 **
				(0.002)	(0.002)	(0.001)
Pref. real GDP growth (%)	-0.045 ***	-0.042 **	-0.046 ***	-0.024	-0.018	-0.024
	(0.017)	(0.017)	(0.017)	(0.028)	(0.028)	(0.028)
Pref. mean bank ROA (%)	-0.793 ***	-0.835 ***	-0.732 ***	-0.829 ***	-0.860 ***	-0.785 ***
	(0.075)	(0.074)	(0.075)	(0.102)	(0.1)	(0.101)
Pref. mean loan/deposit ratio (%)	-0.051 ***	-0.050 ***	-0.060 ***	-0.086 ***	-0.087 ***	-0.094 ***
	(0.005)	(0.005)	(0.005)	(0.007)	(0.008)	(0.008)
Pref. reserve ratio (%)	-0.054 ***	-0.048 ***	-0.082 ***	-0.035 **	-0.033 **	-0.062 ***
	(0.009)	(0.009)	(0.01)	(0.015)	(0.015)	(0.017)
Start-up year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.108	0.106	0.116	0.157	0.156	0.162
Number of observations	1436	1436	1436	846	846	846
Number of censored obs.	377	377	377	367	367	367

(Note) *, **, *** indicate that the estimated coefficient is different from zero at 90%, 95%, and 99% significance level (two-sided), respectively.

(2) Cox partial maximum likelihood estimation

Variables	(1)	(2)	(3)	(4)	(5)	(6)
ADVICE(0,1) as of 2003	0.294 (0.188)	0.294 (0.189)	0.287 (0.189)	0.479 (0.300)	0.477 (0.300)	0.480 (0.300)
Bank branch HI in each prefecture (mean between start-up and the 1st loan appl.)	0.219 (0.743)			-0.152 (1.092)		
Bank loan HI in each prefecture (mean between start-up and the 1st loan appl.)		-0.060 (0.591)			0.125 (0.887)	
Number of banks in each prefecture (log) (mean between start-up and the 1st loan appl.)			-0.132 * (0.075)			-0.073 (0.111)
Founder's real estate dummy (0,1)	-0.201 ** (0.102)	-0.200 ** (0.102)	-0.193 * (0.102)	-0.337 ** (0.144)	-0.337 ** (0.144)	-0.334 ** (0.144)
Founder's real estate dummy *land price change (%)	-0.029 *** (0.005)	-0.029 *** (0.005)	-0.028 *** (0.005)	-0.051 *** (0.008)	-0.051 *** (0.008)	-0.050 *** (0.008)
Owner's age at start-up (log)	-0.519 *** (0.156)	-0.519 *** (0.156)	-0.509 *** (0.156)	-0.436 * (0.239)	-0.433 * (0.239)	-0.421 * (0.24)
Yrs. of owner's experience in the industry (log)	0.051 * (0.030)	0.052 * (0.030)	0.048 (0.030)	-0.006 (0.045)	-0.007 (0.045)	-0.007 (0.045)
No. of employees at start-up (log)	-0.012 (0.032)	-0.012 (0.032)	-0.013 (0.032)	-0.015 (0.047)	-0.016 (0.047)	-0.016 (0.047)
Mean ROA from start-up to the first loan application (%)				-0.004 ** (0.002)	-0.004 ** (0.002)	-0.004 ** (0.002)
Pref. real GDP growth (%)	0.030 (0.030)	0.030 (0.030)	0.029 (0.030)	-0.051 (0.049)	-0.051 (0.049)	-0.051 (0.049)
Pref. mean bank ROA (%)	1.588 *** (0.172)	1.617 *** (0.163)	1.489 *** (0.167)	1.722 *** (0.228)	1.699 *** (0.213)	1.650 *** (0.221)
Pref. mean loan/deposit ratio (%)	0.076 *** (0.007)	0.076 *** (0.007)	0.079 *** (0.007)	0.126 *** (0.012)	0.127 *** (0.012)	0.128 *** (0.012)
Pref. reserve ratio (%)	0.031 ** (0.013)	0.028 ** (0.013)	0.049 *** (0.016)	0.003 (0.023)	0.007 (0.022)	0.018 (0.027)
Start-up year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	-7097.66	-7097.70	-7096.20	-2936.77	-2936.77	-2936.56
Number of observations	1436	1436	1436	846	846	846
Number of censored obs.	377	377	377	367	367	367

(Note) *, **, *** indicate that the estimated coefficient is different from zero at 90%, 95%, and 99% significance level (two-sided), respectively.

C. With ADVICE & INTRODUCTION dummy

(1) Censored regression

Variables	(1)	(2)	(3)	(4)	(5)	(6)
ADVICE&INTRODUCTION (0,1) as of 2003	-0.214*** (0.078)	-0.214*** (0.078)	-0.205*** (0.077)	-0.468*** (0.115)	-0.464*** (0.116)	-0.466*** (0.115)
Bank branch HI in each prefecture (mean between start-up and the 1st loan appl.)	-1.914*** (0.487)			-1.939*** (0.705)		
Bank loan HI in each prefecture (mean between start-up and the 1st loan appl.)		-0.971** (0.387)			-1.406** (0.572)	
Number of banks in each prefecture (log) (mean between start-up and the 1st loan appl.)			0.331*** (0.052)			0.313*** (0.076)
Founder's real estate dummy (0,1)	0.197*** (0.066)	0.197*** (0.066)	0.173*** (0.066)	0.310*** (0.092)	0.314*** (0.092)	0.289*** (0.092)
Founder's real estate dummy *land price change (%)	0.027*** (0.003)	0.027*** (0.003)	0.025*** (0.003)	0.040*** (0.005)	0.041*** (0.005)	0.038*** (0.005)
Owner's age at start-up (log)	0.420*** (0.111)	0.429*** (0.112)	0.392*** (0.11)	0.313* (0.166)	0.319* (0.167)	0.259 (0.166)
Yrs. of owner's experience in the industry (log)	-0.047** (0.020)	-0.049** (0.021)	-0.044** (0.020)	-0.009 (0.03)	-0.009 (0.03)	-0.010 (0.03)
No. of employees at start-up (log)	0.014 (0.022)	0.012 (0.022)	0.015 (0.022)	0.030 (0.031)	0.031 (0.031)	0.031 (0.031)
Mean ROA from start-up to the first loan application (%)				0.003** (0.001)	0.003** (0.001)	0.003** (0.001)
Pref. real GDP growth (%)	-0.044** (0.017)	-0.041** (0.017)	-0.045*** (0.017)	-0.023 (0.028)	-0.017 (0.028)	-0.023 (0.027)
Pref. mean bank ROA (%)	-0.787*** (0.075)	-0.829*** (0.074)	-0.726*** (0.075)	-0.804*** (0.101)	-0.834*** (0.099)	-0.760*** (0.1)
Pref. mean loan/deposit ratio (%)	-0.051*** (0.005)	-0.049*** (0.005)	-0.059*** (0.005)	-0.085*** (0.007)	-0.086*** (0.008)	-0.093*** (0.008)
Pref. reserve ratio (%)	-0.054*** (0.009)	-0.048*** (0.009)	-0.081*** (0.01)	-0.033** (0.015)	-0.031** (0.015)	-0.059*** (0.017)
Start-up year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.109	0.107	0.116	0.163	0.163	0.168
Number of observations	1436	1436	1436	846	846	846
Number of censored obs.	377	377	377	367	367	367

(Note) *, **, *** indicate that the estimated coefficient is different from zero at 90%, 95%, and 99% significance level (two-sided), respectively.

(2) Cox partial maximum likelihood estimation

Variables	(1)	(2)	(3)	(4)	(5)	(6)
ADVICE&INTRODUCTION (0,1) as of 2003	0.247 **	0.248 **	0.243 **	0.540 ***	0.540 ***	0.543 ***
	(0.111)	(0.111)	(0.111)	(0.162)	(0.162)	(0.162)
Bank branch HI in each prefecture (mean between start-up and the 1st loan appl.)	0.197			-0.122		
	(0.742)			(1.094)		
Bank loan HI in each prefecture (mean between start-up and the 1st loan appl.)		-0.069			0.159	
		(0.591)			(0.889)	
Number of banks in each prefecture (log) (mean between start-up and the 1st loan appl.)			-0.130 *			-0.081
			(0.075)			(0.111)
Founder's real estate dummy (0,1)	-0.201 **	-0.200 **	-0.193 *	-0.350 **	-0.351 **	-0.347 **
	(0.102)	(0.102)	(0.102)	(0.144)	(0.144)	(0.144)
Founder's real estate dummy *land price change (%)	-0.029 ***	-0.029 ***	-0.028 ***	-0.050 ***	-0.050 ***	-0.050 ***
	(0.005)	(0.005)	(0.005)	(0.008)	(0.008)	(0.008)
Owner's age at start-up (log)	-0.517 ***	-0.517 ***	-0.508 ***	-0.464 *	-0.461 *	-0.448 *
	(0.157)	(0.157)	(0.157)	(0.24)	(0.241)	(0.241)
Yrs. of owner's experience in the industry (log)	0.052 *	0.053 *	0.049	-0.001	-0.002	-0.002
	(0.03)	(0.031)	(0.031)	(0.046)	(0.046)	(0.046)
No. of employees at start-up (log)	-0.016	-0.016	-0.017	-0.024	-0.024	-0.024
	(0.032)	(0.032)	(0.032)	(0.047)	(0.047)	(0.047)
Mean ROA from start-up to the first loan application (%)				-0.004 **	-0.004 **	-0.004 **
				(0.002)	(0.002)	(0.002)
Pref. real GDP growth (%)	0.030	0.030	0.029	-0.053	-0.053	-0.053
	(0.03)	(0.03)	(0.03)	(0.049)	(0.049)	(0.049)
Pref. mean bank ROA (%)	1.575 ***	1.602 ***	1.476 ***	1.682 ***	1.659 ***	1.606 ***
	(0.172)	(0.163)	(0.167)	(0.228)	(0.212)	(0.221)
Pref. mean loan/deposit ratio (%)	0.076 ***	0.075 ***	0.078 ***	0.125 ***	0.125 ***	0.127 ***
	(0.007)	(0.007)	(0.007)	(0.011)	(0.012)	(0.012)
Pref. reserve ratio (%)	0.030 **	0.028 **	0.049 ***	0.005	0.009	0.020
	(0.013)	(0.013)	(0.016)	(0.023)	(0.022)	(0.027)
Start-up year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	-7096.42	-7096.45	-7095.00	-2932.97	-2932.96	-2932.71
Number of observations	1436	1436	1436	846	846	846
Number of censored obs.	377	377	377	367	367	367

(Note) *, **, *** indicate that the estimated coefficient is different from zero at 90%, 95%, and 99% significance level (two-sided), respectively.

Table 6. Marginal effects on ADVICE, ADVICE&INTRODUCTION
(logit, all samples including those without information on the first loan application)

	Dep. Var.: ADVICE			Dep. Var.: ADVICE&INTRODUCTION		
Variables	(1)	(2)	(3)	(1)	(2)	(3)
Bank branch HI as of 2002 (difference from mean)	0.3127 ***			0.1921		
	(0.1108)			(0.1836)		
Bank branch HI^2 as of 2002 (difference from mean)	-2.1252			-2.0383		
	(1.3398)			(2.2639)		
Bank loan HI as of 2002 (difference from mean)		0.2593 ***			0.1899	
		(0.0878)			(0.1453)	
Bank loan HI^2 as of 2002 (difference from mean)		-1.3116 *			-1.9217	
		(0.7897)			(1.3501)	
Number of banks (log) as of 2002 (difference from mean)			-0.0213 ***			-0.0088
			(0.0073)			(0.0123)
Number of banks (log) ^{2} as of 2002 (difference from mean)			-0.0086			-0.0232 **
			(0.007)			(0.0114)
Loans/assets (%)	0.0002	0.0002	0.0002	0.0000	0.0000	0.0000
	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0003)
Firm ROA (%)	0.0002	0.0002	0.0002	0.0012	0.0011	0.0011
	(0.0006)	(0.0007)	(0.0006)	(0.001)	(0.001)	(0.001)
No. of employees (log of +1)	0.0054	0.0055	0.0057	0.0360 **:	0.0363 ***	0.0367 ***
	(0.0057)	(0.0057)	(0.0057)	(0.0094)	(0.0094)	(0.0094)
Firm age (log of +1)	0.0436 ***	0.0437 ***	0.0439 ***	0.0217	0.0217	0.0210
	(0.0114)	(0.0114)	(0.0113)	(0.0182)	(0.0182)	(0.0182)
Yrs. of relationship with MB (log of +1)	0.0015	0.0014	0.0008	0.0273 *	0.0273 *	0.0271 *
	(0.009)	(0.009)	(0.0089)	(0.0155)	(0.0155)	(0.0155)
Loan amounts from MB (log of +1,m JPY)	0.0169 ***	0.0168 ***	0.0169 ***	0.0306 ***	0.0305 ***	0.0306 ***
	(0.0025)	(0.0025)	(0.0025)	(0.004)	(0.004)	(0.004)
Public guarantee ratio of loans from MB (%)	-0.0005 ***	-0.0005 ***	-0.0005 ***	-0.0006 **	-0.0006 **	-0.0006 **
	(0.0002)	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0002)
Bad loan ratio of MB (%)	-0.0023 *	-0.0024 *	-0.0020	-0.0034	-0.0035	-0.0033
	(0.0013)	(0.0013)	(0.0013)	(0.0022)	(0.0022)	(0.0022)
Number of MB branches (log)	-0.0101 *	-0.0095 *	-0.0084	-0.0101	-0.0089	-0.0079
	(0.0056)	(0.0057)	(0.0057)	(0.0093)	(0.0094)	(0.0094)
Pref. Bad loan ratio (%)	-0.0014	-0.0014	-0.0019	-0.0018	-0.0017	-0.0029
	(0.0012)	(0.0012)	(0.0013)	(0.002)	(0.002)	(0.0021)
Number of firms per bank in each pref. (1,000 firms)	0.0017	0.0010	-0.0007	0.0034	0.0031	0.0038
	(0.0033)	(0.0031)	(0.0032)	(0.0054)	(0.0051)	(0.0054)
Pref. real GDP growth (%)	0.0007	0.0011	-0.0007	-0.0051	-0.0053	-0.0084
	(0.0032)	(0.0032)	(0.0032)	(0.0054)	(0.0054)	(0.0055)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	-740.8	-740.4	-739.5	-1144.8	-1144.3	-1142.9
Pseudo R^2	0.134	0.135	0.136	0.094	0.094	0.095
Number of observations	2,498	2,498	2,498	2,498	2,498	2,498

(Note) *, **, *** indicate that the estimated coefficient is different from zero at 90%, 95%, and 99% significance level (two-sided), respectively.

Table 7. Simultaneous estimation (main variables only)

Equation 1	Dependent variable: Log of the time interval from start-up to the first loan approval (censored regression, Advice/ Advice&introduction is instrumented)					
variables	Estimated coefficients (standard error)					
Bank branch HI (mean between start-up and the 1st loan appl.)	-1.915 ** (0.76)			-1.709 ** (0.759)		
Bank loan HI (mean between start-up and the 1st loan appl.)		-0.821 (0.693)			-0.602 (0.676)	
N. of banks (log, mean between start-up and the 1st loan appl.)			0.304 *** (0.083)			0.269 *** (0.082)
Advice(0,1) as of 2003	-4.088 *** (1.101)	-2.108 *** (0.803)	-2.532 ** (1.037)			
Advice&introduction (0,1) as of 2003				-2.182 *** (0.499)	-1.859 *** (0.487)	-1.904 *** (0.514)
Equation 2	Dep. var.: ADVICE(0,1) as of 2003 (probit)			Dep. var.: ADVICE&INTRODUCTION(0,1) As of 2003 (probit)		
variables	Estimated coefficients (standard error)			Estimated coefficients (standard error)		
Bank branch HI as of 2002 (difference from mean)	1.930 (2.937)			1.340 (2.008)		
Bank branch HI^2 as of 2002 (difference from mean)	13.087 (31.467)			-2.699 (22.036)		
Bank loan HI as of 2002 (difference from mean)		2.061 (2.291)			0.903 (1.575)	
Bank loan HI^2 as of 2002 (difference from mean)		31.044 (20.172)			15.937 (14.74)	
Number of banks (log) as of 2002 (difference from mean)			-0.227 (0.177)			-0.135 (0.125)
Number of banks$(log)^2$ as of 2002 (difference from mean)			0.244 (0.175)			0.017 (0.11)
Test of H_0: All instruments for ADVICE, ADVICE&INTRODUCTION have zero coefficients.						
Chi-squared (12)	11.31	18.47	13.18	24.52 **	27.98 ***	25.02 **
P-value	0.503	0.102	0.356	0.017	0.006	0.015
Pseudo R^2 of Equation 1	0.134	0.127	0.136	0.137	0.132	0.141
Number of observations	575	575	575	575	575	575
Number of censored obs.	128	128	128	128	128	128

(Note) *, **, *** indicate that the estimated coefficient is different from zero at 90%, 95%, and 99% significance level (two-sided), respectively.

Table A1. Number of observations for the duration analysis and the Branch Herfindahl Index in each prefecture

		Branch number Herfindahl index	
	No. of obs.	April 1992	April 2002
Hokkaido	41	0.0496	0.0694
Aomori	10	0.1893	0.2051
Akita	8	0.1743	0.2492
Yamagata	26	0.1653	0.1673
Iwate	6	0.1669	0.1782
Miyagi	30	0.1404	0.1774
Fukushima	29	0.1235	0.1298
Gunma	21	0.1020	0.1154
Tochigi	24	0.1313	0.1510
Ibaraki	7	0.1462	0.1681
Saitama	40	0.0778	0.0956
Chiba	51	0.0844	0.1127
Tokyo	233	0.0231	0.0370
Kanagawa	99	0.0540	0.0653
Niigata	48	0.1338	0.1468
Yamanashi	2	0.2788	0.2911
Nagano	27	0.1823	0.1848
Shizuoka	42	0.0757	0.0767
Gifu	22	0.1240	0.1376
Aichi	68	0.0450	0.0473
Mie	15	0.1451	0.1427
Toyama	27	0.1380	0.1176
Ishikawa	13	0.1251	0.1791
Fukui	11	0.1751	0.2126
Shiga	0	0.2754	0.2712
Kyoto	24	0.0875	0.1480
Osaka	110	0.0269	0.0481
Nara	6	0.1897	0.2155
Wakayama	3	0.1417	0.2232
Hyogo	33	0.0506	0.0680
Tottori	16	0.2528	0.2181
Shimane	13	0.2560	0.1904
Okayama	32	0.1093	0.1341
Hiroshima	58	0.1141	0.1283
Yamaguchi	9	0.1708	0.1560
Tokushima	3	0.2253	0.2374
Kagawa	14	0.1497	0.1637
Ehime	34	0.2122	0.2080
Kochi	10	0.2413	0.2511
Fukuoka	88	0.0781	0.0828
Saga	5	0.1856	0.1915
Nagasaki	9	0.2100	0.1865
Kumamoto	6	0.2027	0.2102
Oita	19	0.1516	0.2029
Miyazaki	8	0.1938	0.2488
Kagoshima	17	0.1999	0.2027
Okinawa	19	0.2744	0.2760
Total	1,436	0.1500	0.1643