

Competition among Financial Institutions and Startup Company Exit

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ABSTRACT

In this paper, we use aggregate panel data on prefectures in Japan and analyze the influence of competition among financial institutions on the probability of small company exit. We conduct the following two analyses. First, we use data on startup companies and analyze the effect of competition among financial institutions on the probability of startup company exit. The result shows that the competition among financial institutions is positively correlated with the probability of startup company exit. In other words, excessive competition increases the startup companies' exit. Second, we use data on all small and medium-sized enterprises in Japan and analyze the effect of competition among financial institutions on the probability of firm bankruptcy. The result shows that the competition is negatively correlated with the bankruptcy, indicating that the influence of competition among financial institutions on the probability of small companies' exit changes with firm age.

JEL Classifications: G33, M13

*Keywords: competition; exit; startup companies; relationship banking; bankruptcy;
small and medium-sized enterprises*

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I. INTRODUCTION

The study of factors that grow the economy has been a central theme in economics for more than a century, such as that presented by Schumpeter (1911). In particular, entrepreneurial activity is most attended in recent years¹. However, for new firms, to continue their businesses for a long time is difficult. In actuality, *the 2006 White Paper on Small and medium-sized enterprises in Japan* shows a first five-year survival rate of startup companies in Japan of 41.8% and a first ten-year survival rate of 26.1%. As Carter and Van Auken (2006) and Franco and Haase (2010) indicate, one of the major causes of the bankruptcy of new companies is financial; however, the fact that young and small companies fail to raise money is no accident.

In general, small and medium-sized enterprises (SMEs) tend to have a significant need for outside funds. However, it is difficult for SMEs to obtain external financing because they must deal with asymmetric information that exists between firms and financial institutions (Berger and Udell, 1998). Above all, new firms face extreme difficulty obtaining external financing. They cannot obtain business loans until they develop a reputation and their transparency is recognized by people who are not stakeholders².

Therefore, startup companies must address and resolve the asymmetric information problem that they face with financial institutions. Recently, a business model called relationship banking has attracted attention as a tool to solve this problem and is a concept from Petersen and Rajan (1994) and Berger and Udell (1995).

Relationship banking builds on a theory introduced by Leland and Pyle (1977) and Campbell and Kracaw (1980) that states that a financial institution plays an important role in information production. The theory further developed by Diamond (1984), Fama (1985), and Diamond (1991), states that even a company whose current corporate performance is bad can obtain a loan if it is judged as promising by financial institutions. This phenomenon occurs because of the long-term information production function and the information storage function of financial institutions. These points indicate that relationship banking is a business model that is clearly distinguished from the conventional business model. However, relationship banking has the following problems. For example, a hold-up problem that occurs as a result of the information monopoly of a specific financial institution is a case in point (Sharpe, 1990; Rajan, 1992). Companies facing the hold-up problem reduce their borrowing from financial institutions and likely reduce their investments. As a solution to this problem, Ongena and Smith (2000) suggest relationships with multiple banks. However, they also note that multiple bank relationships worsen the availability of the firms' credit.

As previously shown, the merits and costs of relationship banking are gradually becoming clear. However, a conclusion has yet to be reached regarding whether it is a merit or a cost for relationship banking. The typical example is competition among financial institutions³.

Since Petersen and Rajan (1995), who developed the origin of this topic, a number of studies were conducted. For instance, Boot and Thakor (2000), Yafeh and Yosha (2001), and Black and Strahan (2002) insist that competition among financial institutions promotes relationship lending. These studies draw on the theory that each financial institution develops a relationship as a way to differentiate itself from other financial institutions.

In contrast, Beck, Demirgug-Kunt, and Maksimovic (2004) and Houswald and Marquez (2006) conclude that competition among financial institutions hinders relationship lending. These studies are grounded in the theory that competition makes it difficult for financial institutions to lock their companies into long-term transactions, indicating that they are reluctant to develop relationships with those companies.

As previously noted, studies are conducted on the effects of competition among financial institutions on relationship banking and many inconsistent results have been reported till date. Of course, this type of research is also conducted in Japan. For example, Ogura (2007) and Ogura and Yamori (2010) are representative studies, particularly in the field of empirical research. Ogura (2007) analyzes the influence of a financial institution's competitive nature on the credit availability for new firms, and Ogura and Yamori (2010) analyze the influence of competition among financial institutions on such institutions' consulting services. These studies show that competition among financial institutions affects the attitude toward risk of each such institution. Thus, competition among financial institutions has a negative effect on relationship banking.

Moreover, recent studies analyze the existing long-term business relations between firms and financial institutions, as well as the future relationships between new companies and financial institutions. For example, Ogura (2012) analyzes the effect of lending competition on the credit availability of new firms. This type of study reveals how competition among financial institutions affects their expected rent, including loan terms such as changes in interest rates.

However, a primary concern for firms is not about lending terms but about business performance. Thus, in this paper, we analyze the effect of competition among financial institutions on the probability of startup company exit⁴. This study does not aim to clarify how competition affects lending terms, as previous studies did, but intends to elucidate the influence of competition on the business performance of startup companies. In addition, in this paper, we adopt the probability of exit as an index of business performance.

Furthermore, we clarify whether or not the same influence is observed when using SMEs as a sample. Petersen and Rajan (1995) state that the relationship between competition among financial institutions and loan terms changes with firm age⁵. Therefore, we also analyze all SMEs to determine the influence of the change in firm age.

The remainder of this paper is organized as follows. Section II introduces the data used in this study. Section III presents the results of the regression analyses. More specifically, Section III.A presents the regression analyses on the probability of the exit of startup companies that are or are younger than five years of age, and Section III.B presents the regression analyses on the probability of the exit of startup companies that are or are younger than ten years of age. Section III.C presents the regression analyses on the probability of all SMEs bankruptcies. Section IV provides a conclusion and discussion on remaining issues.

II. DATA

This section introduces the data used in this study, which include aggregate data on prefectures. We analyze the probability of startup company exit using fixed effects

estimation. In addition, in this paper, we target only small companies that are either not older than five or ten years. In addition, the data used in this paper are from either 2007 to 2010 or 2002 to 2010⁶.

A. Probability of Startup Company Exit and Probability of All SMEs Bankruptcies⁷

As previously noted, in this paper, we target only small companies that are within five or ten years of their incorporation date because the business performance of such companies is subject to support from financial institutions. The method to extract the companies that meet this condition is as follows. First, we use ORBIS, which is provided by Bureau van Dijk. We limit the sample to small Japanese companies that were incorporated from 2002 to 2010⁸. We then divide these companies into two categories. The first category is “active companies,” classified as active at the beginning of March 2012 in ORBIS. The second category is “inactive companies,” classified as inactive at the beginning of March 2012 in ORBIS⁹.

Details of the data used in this paper are as follows. Table 1 shows the number of small startup companies that began operations between 2002 and 2011 in Japan and their exit rate until March 2012. As Table 1 shows, although the number of startup and active companies fluctuates in this period, the total transition is relatively stable. In contrast, the number of inactive companies has clearly decreased since 2008, resulting in the continued decrease of the exit rate of startup companies since 2008. The cause of the decline depends on the definition of inactive. As previously noted, whether a company in ORBIS is active is judged by whether the company was active in March 2012. Thus, the exit rate of relatively new companies is low¹⁰. In particular, the rate of the companies founded in 2011 is extremely low. Therefore, we exclude 2011 data and target only companies founded from 2002 to 2010 to eliminate the bias associated with the extraction of data¹¹.

Table 1
Number of startup companies and exit rate

Startup year	Number of startup companies	Number of active companies	Number of inactive companies until March 2012	Exit rate (%)
2002	67,588	56,543	11,045	16.3
2003	73,953	59,956	13,997	18.9
2004	81,912	66,837	15,075	18.4
2005	88,207	73,091	15,116	17.1
2006	99,483	81,911	17,572	17.7
2007	93,441	78,955	14,486	15.5
2008	98,759	83,311	15,448	15.6
2009	94,476	83,641	10,835	11.5
2010	98,719	92,213	6,506	6.6
2011	83,180	83,143	37	0.0
Total	879,718	759,601	120,117	13.7

Source: ORBIS (Bureau van Dijk)

Next, we introduce data on the bankruptcy rate for all SMEs in Japan. Table 2 shows the number of SMEs in Japan between 2002 and 2011 and companies' bankruptcy rate. We use the Number of Prefectural Sorted Ordinary Corporation published by the National Tax Agency and the Annual Report of Bankrupt Enterprises published by the Organization for Small & Medium Enterprises and Regional Innovation, Japan to calculate the bankruptcy rate. Incidentally, the data in Table 2 are different from the data in Table 1 with respect to the definition of the exit and bankruptcy rates. The exit rate is classified on the basis of whether a company is inactive in March 2012. The bankruptcy rate is judged by whether a company is bankrupt every year. Hence, Table 2 shows that the numbers of all SMEs and of bankrupt companies are relatively stable. Moreover, the definition of SMEs in Table 2 differs from that of startup companies in Table 1. Thus, the probability of startup company exit exceeds the probability of all SMEs bankruptcies.

Table 2
Number of all SEMs and bankruptcy rate

Year	Number of all SEMs	Number of bankrupt companies	Bankruptcy rate (%)
2002	2,709,517	14,889	0.550
2003	2,695,241	12,408	0.460
2004	2,713,908	10,922	0.402
2005	2,733,820	10,375	0.380
2006	2,754,743	10,708	0.389
2007	2,549,012	11,603	0.455
2008	2,525,674	13,107	0.519
2009	2,524,491	11,921	0.472
2010	2,505,096	10,524	0.420
2011	2,526,722	10,227	0.405
Total	26,238,224	116,684	0.445

Source: (1) Number of Prefectural Sorted Ordinary Corporation (National Tax Agency). (2) Annual Report of Bankrupt Enterprises (Organization for Small & Medium Enterprises and Regional Innovation. JAPAN)

Note that two definitions exist for SMEs in Japan. One definition is classified by the number of employees and the other by the amount of capital, depending on the industry. Accordingly, in this paper, we adopt the definition that uses the amount of capital. In particular, we use the definition of companies with capital of 50 million yen or less, which is a sufficient condition of the definition of SMEs in Japan. In brief, a firm with capital of 50 million yen or less is always classified as an SME irrespective of the business type.

B. Competitive Degree of Financial Institutions

We adopt the Herfindahl index of the number of financial institutions as a proxy for the intensity of competition among financial institutions. This index, the most representative one that shows the competition degree of financial institutions, is used in many studies (see Degryse and Ongena, 2005; Ogura, 2007; Ogura and Yamori, 2010; Presbitero and Zazzaro, 2011; Chong, Lu, and Ongena, 2013)¹².

We compute the Herfindahl index of the number of financial institutions from *Nihon Kinyu Meikan* (the directory of Japanese financial institutions), which is published by Nihon Kinyu Tsushin Sha. In addition, our target is only financial institutions that accept deposits and channel the money into lending activities. More concretely, we adopt city banks, regional banks, trust banks, second-tier regional banks, shinkin banks, credit cooperatives, and other banks: Shinsei Bank, Aozora Bank, The Shoko Chukin Bank, ShinGinko Tokyo, Citibank Japan, Incubator Bank of Japan, and Aeon Bank.

C. Other Explanatory Variables

We use the following variables as other explanatory variables: the number of financial institutions, population, real gross prefectural product, the number of ordinary corporations, economic growth rate, and startup rate. These variables are primarily based on the econometric model used in Headd (2003), Carter and Van Auken (2006), and Franco and Haase (2010).

Next, we explain each explanatory variable in detail. The number of financial institutions is the variable used to clarify the effect that a change in the number of financial institutions for a certain Herfindahl index of the number of financial institutions has on the probability of the exit. For instance, we assume the following case: one is the region for which the Herfindahl index is 0.20 and comprises five groups each of a financial institution, and the other case is the region for which the Herfindahl index is 0.20 and comprises five groups of one hundred financial institutions each. Of course, the Herfindahl index is the same but the concentration degree of financial institutions markedly differs. Thus, containing the number of financial institutions makes it possible to investigate the effect that cannot be grasped by the Herfindahl index of the number of financial institutions only—the effect of the concentration of financial institutions on the probability of the exit. The data used are from *Nihon Kinyu Meikan*.

The population variable clarifies the effect of the magnitude of the potential demand in each prefecture on the probability of the exit. A populous prefecture has larger potential demand, and an increase in the number of people is expected to lead to a decrease in the probability of startup company exit. Moreover, a prefecture with a large population tends to attract a number of financial institutions, which increases the degree of competition of financial institutions. Thus, we expect that population is highly correlated with the intensity of the competition among financial institutions. The data are taken from the Population Estimates published by the Bureau of Statistics of the Ministry of Internal Affairs and Communications.

The real gross prefectural product variable represents the economic scale of each prefecture. If this variable is contained, we reveal the effect that the scale of the economy has on the probability of the exit. The data are from the Report on Prefectural Accounts produced by the Cabinet Office.

The number of ordinary corporations indicates the number of their competitors that exist in each prefecture. In other words, this variable elucidates the influence of a change in the number of rivals for each company on the probability of the exit. The larger the number of rivals, the more intense the competition for survival seems to become, thus increasing the exit rate in the prefecture. The data are obtained from the

Number of Prefectural Sorted Ordinary Corporation published by the National Tax Agency.

The economic growth rate variable takes into account the effect of the business cycle on the probability of the exit. Economic booms appear to lower the probability of the exit. We calculate the growth rate using the Report on Prefectural Accounts published by the Cabinet Office.

The startup rate is deemed to be highly correlated to the probability of the exit. For instance, according to the Granger causality test, which is based on the vector auto regression (VAR) model in *the 2002 White Paper on Small and Medium Enterprises in Japan*, startup rates in the previous period and earlier affect the (current) exit rate, a result that is significant at the 5% level. Furthermore, the startup rate variable is suspected to be correlated with the intensity of competition among financial institutions. For example, Bonaccorsi di Patti and Dell'Ariccia (2006) refer to the fact that competition among banks lowers the startup rate. Therefore, adopting the startup rate as an explanatory variable is important for reducing endogeneity. For this reason, we adopt the startup rate as an explanatory variable in this study, and the definition of the startup rate is the percentage of the number of small and unlisted enterprises that are newly established during the period to the number of ordinary companies that existed at the beginning of the period. We use ORBIS and the Number of Prefectural Sorted Ordinary Corporation to compute the startup rate.

III. EMPIRICAL RESULTS

In this section, we consider the effect of competition among financial institutions on the probability of startup company exit. Specifically, we analyze the probability of startup company exit within the first five years from incorporation, the probability of startup company exit within the first ten years from incorporation, and the probability of all SMEs bankruptcies.

A. First Five-year Probability of Startup Company Exit

First, we analyze the effect of competition among financial institutions on the first five-year probability of startup company exit. Table 3 shows the definition of the explanatory variables and the descriptive statistics using data from 2007 to 2010. The N in this table indicates the number of corporate enterprises established from 2007 to 2010 in Japan, which is in line with the total number of startup companies from 2007 to 2010 in Table 1. As previously stated, the explanatory variables in this study are largely based on Headd (2003), Carter and Van Auken (2006), and Franco and Haase (2010). We use the following regression model and estimate this model using a fixed-effect estimation.

$$y_{it} = \beta_1 x_{it} + a_i + u_{it} \quad (1)$$

where y_{it} is the logit transformation of the exit rate. To be specific, y_{it} is $\ln \frac{p}{1-p}$, where p is exit rate in each prefecture¹³. In addition, x_{it} represents the time-varying

explanatory variables. To be concrete, x_{it} represents the Herfindahl index of the number of financial institutions, the number of financial institutions, population, real gross prefectural product, the number of ordinary corporations, the economic growth rate, and the startup rate. Moreover, a_i represents the time-invariant explanatory variables of, specifically, startup capital, business type, regional attribute, information on managers (e.g., qualification, age, business career), and others.

Table 3
Definition and descriptive statistics of variables for startup companies
from 2007 to 2010

(A) Definition	
Variable Name	Definition
Exit rate	Exit rate of startup companies in each prefecture
Herfindahl index of financial institutions	Herfindahl index of the number of financial institution is each prefecture
Financial institutions	The number of financial institutions in each prefecture (unit: thousand)
Population	Population in each prefecture (unit: million)
GPP	Real gross prefectural product in each prefecture (unit: trillion yen)
Ordinary corporations	The number of ordinary corporations in each prefecture (unit: thousand)
Economic growth rate	Growth rate of the real gross prefectural product in each prefecture
Startup rate	Startup rate of small and unlisted enterprises in each prefecture

(B) Descriptive Statistics						
Variable Name	N	Mean	Median	S.D.	Min.	Max.
Exit rate	188	13.532	10.529	11.715	0.287	64.839
Herfindahl index of financial institutions	188	0.165	0.172	0.068	0.039	0.325
Financial institutions	188	0.487	0.336	0.395	0.150	2.314
Population	188	2.725	1.717	2.638	0.589	13.159
GPP	188	11.326	6.006	15.587	1.979	102.042
Ordinary corporation	188	55.815	28.217	83.480	9.354	534.752
Economic growth rate	188	0.284	0.067	3.947	-9.367	9.087
Startup rate	188	2.946	2.802	0.784	1.063	5.860

Table 4 shows the result of the regression analyses. Columns 1 and 2 indicate the regression result when the robust standard errors are adopted as the standard errors. Incidentally, because we conduct logistic regression for Table 4, the figures in the upper rows represent changes in the odds ratio of the probability of the exit. In Column 1, the odds ratio of the Herfindahl index of the number of financial institutions is -32.146, which is significant at the 1% level. Therefore, according to Column 1, an increase in the Herfindahl index of the number of financial institutions by 0.1 makes the probability of startup company exit 4.0% of the original value. In other words, the

probability of the startup company exit increases with the competition among financial institutions. Column 2 represents the result when the Herfindahl index of the number of financial institutions is added to Column 1, and its purpose is to clarify whether a U-shaped correlation exists between the Herfindahl index and the probability of the exit¹⁴. However, in Column 2, both the Herfindahl index and the square of the index are not significant.

Columns 3 and 4 represent the result for the case wherein cluster-robust standard errors are used as the standard errors and the sample is clustered by year. In Column 3, the odds ratio of the Herfindahl index of the number of financial institutions is -5.565, which is significant at the 5% level. Thus, according to Column 3, an increase in the Herfindahl index of the number of financial institutions by 0.1 results in a probability of startup company exit that is 57.3% of the original value. Moreover, we also obtain similar results in Column 4, which shows the square of the Herfindahl index added to Column 3.

Table 4
Results of regression analysis on the probability of startup company exit
from 2007 to 2010

	(1)	(2)	(3)	(4)	(5)	(6)
	Logit with RSE	Logit with RSE	Logit with s.e. clustered by year	Logit with s.e. clustered by year	Logit with RSE clustered by year	Logit with RSE clustered by year
Financial competition Characteristics						
Herfindahl index of financial institutions	-32.146*** (11.427)	33.106 (47.119)	-5.565** (2.526)	-20.043** (9.962)	-5.565** (1.486)	-20.043 (8.533)
(Herfindahl index of financial institution) ²		-157.381 (134.481)		34.546 (22.997)		34.546 (19.108)
Other variables						
Financial institutions	-2.431 (13.343)	-0.576 (13.328)	0.817 (1.059)	0.088 (1.161)	0.817 (0.503)	0.088 (0.167)
Population	6.255** (2.743)	6.498** (2.719)	-0.311*** (0.113)	-0.382*** (0.122)	-0.311** (0.060)	-0.382** (0.098)
GPP	0.216* (0.124)	0.211* (0.124)	0.063 (0.057)	0.071 (0.057)	0.063* (0.020)	0.071* (0.027)
Ordinary corporations	0.444** (0.123)	0.471*** (0.119)	-0.010 (0.010)	-0.009 (0.010)	-0.010 (0.004)	-0.009 (0.004)
Economic growth rate	-0.100*** (0.015)	-0.098*** (0.014)	-0.30 (0.037)	-0.023 (0.037)	-0.030 (0.030)	-0.023 (0.031)
Startup rate	-0.221 (0.238)	-0.247 (0.233)	0.236* (0.142)	0.242* (0.142)	0.236** (0.067)	0.242** (0.075)
Constant	-39.448** (14.587)	-48.135*** (14.587)	-1.792*** (0.674)	-0.132 (1.293)	-1.792*** (0.295)	-0.132 (0.777)
Adjusted R ²	0.414	0.423	0.076	0.087	0.076	0.087
Number of observation	188	188	188	188	188	188

Note: The lower rows are standard errors.

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Columns 5 and 6 show the result using cluster-robust standard errors by year and robust standard errors as the standard errors. In Column 5, the Herfindahl index of the number of financial institutions is significant at the 5% level as well as Column 3. In contrast, the Herfindahl index in Column 6, whose square is added to Column 5, is not significant. Furthermore, in Column 6, the square of the Herfindahl index is also not significant.

To summarize these results, the intensity of competition among financial institutions is positively correlated, but is not U-shaped correlated, with the first five-year probability of startup company exit.

B. First Ten-year Probability of Startup Company Exit

Next, we analyze the influence of competition among financial institutions on the first ten-year probability of startup company exit. The purpose of the analysis is twofold. First, we aim to clarify whether we observe the effect of competition among financial institutions on the exit rate when we change the definition of startup companies from the first five years from incorporation to the first ten years from incorporation. In the previous analysis, we define companies whose age is five years or less as new companies. In the subsequent analysis, we define companies whose age is ten years or less as new companies and conduct the same analysis.

Second, we aim to clarify whether we observe the effect of competition among financial institutions on the probability of startup company exit in periods exclusive of a certain period. The previous analysis showed that competition among financial institutions affects the probability of startup company exit. However, in the analysis, we use only companies that were incorporated from 2007 to 2010. Therefore, we cannot deny the possibility that this effect exists only during the 2007-2010 period. In this subsection, we use data from 2002 to 2010 and analyze the effect of competition among financial institutions on the first ten-year probability of startup company exit.

Table 5
Descriptive statistics of variables for startup companies from 2002 to 2010

Variable Name	N	Mean	Median	S.D.	Min.	Max.
Exit rate	423	16.788	15.044	10.582	0.287	64.839
Herfindahl index of financial institutions	423	0.160	0.168	0.066	0.035	0.325
Financial institutions	423	0.500	0.354	0.405	0.150	2.667
Population	423	2.721	1.744	2.592	0.589	13.159
GPP	423	11.146	5.913	15.294	1.979	102.042
Ordinary corporation	423	58.118	28.669	87.174	9.354	587.825
Economic growth rate	423	0.887	0.963	3.054	-9.367	9.087
Startup rate	423	2.732	2.635	0.785	0.963	7.018

Table 5 shows descriptive statistics using data from 2002 to 2010. We use the previously described regression model (1) and conduct the logistic regression using the fixed effects model and an analysis of the first ten-year probability of the exit. Table 6 shows the result of the regression analyses. Incidentally, Columns 1-6 in Table 6 respectively correspond to Columns 1-6 in Table 4. Therefore, Columns 1 and 2 represent the case wherein robust standard errors are adopted as the standard errors, columns 3 and 4 represent the case wherein cluster-robust standard errors are adopted as the standard errors, and Columns 5 and 6 represent the case wherein cluster-robust standard errors by year and robust standard errors are adopted as the standard errors.

The results in Table 6 are similar to those in Table 4. Therefore, competition among financial institutions influences the probability of startup company exit not only for five-year-old or younger companies but also for ten-year-old or younger companies. In addition, we observe this influence when using data that are not from 2007 to 2010.

Table 6
Results of regression analysis on the probability of startup company exit
from 2002 to 2010

	(1) Logit with RSE	(2) Logit with RSE	(3) Logit with s.e. clustered by year	(4) Logit with s.e. clustered by year	(5) Logit with RSE clustered by year	(6) Logit with RSE clustered by year
Financial competition Characteristics						
Herfindahl index of financial institutions	-.12.423** (5.267)	-8.836 (21.294)	-4.704*** (1.289)	-12.530** (5.299)	-4.704*** (0.880)	-12.530** (4.158)
(Herfindahl index of financial institution) ²		-8.287 (41.290)		19.556 (12.845)		19.556* (9.863)
Other variables						
Financial institutions	3.296 (1.989)	3.426 (2.077)	0.609 (0.513)	0.245 (0.565)	0.609** (0.249)	0.245 (0.209)
Population	4.459** (1.586)	4.497*** (1.602)	-0.268*** (0.054)	-0.305*** (0.059)	-0.268*** (0.024)	-0.305*** (0.039)
GPP	0.027 (0.094)	0.027 (0.094)	0.014 (0.025)	0.018 (0.026)	0.014 (0.019)	0.018 (0.021)
Ordinary corporations	0.068*** (0.023)	0.069*** (0.024)	-0.001 (0.004)	-0.001 (0.004)	-0.001 (0.003)	-0.001 (0.003)
Economic growth rate	-0.069*** (0.012)	-0.069*** (0.012)	-0.021 (0.020)	-0.019 (0.020)	-0.021 (0.012)	-0.019 (0.012)
Startup rate	-0.211** (0.099)	0.212** (0.099)	0.221*** (0.068)	0.224*** (0.068)	0.221*** (0.043)	0.224*** (0.043)
Constant	-17.306*** (5.326)	17.816*** (6.203)	-1.372*** (0.348)	-0.513 (0.663)	-1.372*** (0.145)	-0.0513 (0.410)
Adjusted R ²	0.245	0.245	0.083	0.088	0.083	0.088
Number of observation	423	423	423	423	423	423

Note: The lower rows are standard errors.

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

C. Probability of all SMEs Bankruptcies

Finally, we analyze the effect of competition among financial institutions on the probability of all SMEs bankruptcies. As previously noted, Petersen and Rajan (1995) state that the relationship between competition among financial institutions and lending terms changes with firm age, and competition begins to benefit companies as they age. Therefore, there is a possibility that the bankruptcy rate of SMEs changes with firm age, and this is the reason why we conduct this analysis.

Table 7 shows the descriptive statistics for the data from 2002 to 2010. We conduct the analysis using the same method as previously described, and Table 8 provides the results. In addition, Columns 1-6 in Table 8 respectively correspond to Columns 1-6 in Tables 4 and 6.

Table 7
Descriptive statistics of variables for all SMEs from 2002 to 2010

Variable Name	N	Mean	Median	S.D.	Min.	Max.
Bankruptcy rate	423	0.443	0.435	0.108	0.192	0.920
Herfindahl index of financial institutions	423	0.160	0.168	0.066	0.035	0.325
Financial institutions	423	0.500	0.354	0.405	0.150	2.667
Population	423	2.721	1.744	2.592	0.589	13.159
GPP	423	11.146	5.913	15.294	1.979	102.042
Ordinary corporations	423	58.118	28.669	87.174	9.354	587.825
Economic growth rate	423	0.887	0.963	3.054	-9.367	9.087
Startup rate	423	2.732	2.635	0.785	0.963	7.018

As indicated in Table 8, the result from using all SMEs as a sample is significantly different from the result from using startup companies as a sample. The most notable difference is the odds ratio of the Herfindahl index of the number of financial institutions. In the analyses in Tables 4 and 6, which used new firms as a sample, the odds ratio of the Herfindahl index is negative. In other words, competition among financial institutions is positively correlated with the probability of startup company exit. However, the analysis in Table 8 shows a positive odds ratio for the Herfindahl index, indicating that competition among financial institutions is negatively correlated with the probability of all SMEs bankruptcies. Thus, we obtain the result that the influence of competition on the probability of the exit changes with firm age on using the probability of bankruptcy. Furthermore, the influence is negative on the probability of the exit for young companies but positive on the probability of the exit for mature companies, as noted by Petersen and Rajan (1995).

IV. CONCLUSION AND DISCUSSION

In this paper, we clarify the following two points. First, competition among financial institutions is positively correlated with the probability of startup company exit, indicating that excessive competition increases the probability of the exit. Furthermore, this result is true regardless of whether a startup company is defined as one whose age is five years or younger or ten years or younger.

Table 8
Results of regression analysis on the probability of all SMEs bankruptcies
from 2002 to 2010

	(1) Logit with RSE	(2) Logit with RSE	(3) Logit with s.e. clustered by year	(4) Logit with s.e. clustered by year	(5) Logit with RSE clustered by year	(6) Logit with RSE clustered by year
Financial competition Characteristics						
Herfindahl index of financial institutions	0.424 (0.751)	1.235 (2.274)	1.258*** (0.308)	1.223 (1.270)	1.258*** (0.202)	1.223 (0.707)
(Herfindahl index of financial institution) ²		-1.874 (4.877)		0.089 (3.079)		0.089 (2.049)
Other variables						
Financial institutions	2.337*** (0.544)	2.367*** (0.565)	0.399*** (0.123)	0.398*** (0.135)	0.399** (0.122)	0.398*** (0.097)
Population	0.116 (0.240)	-0.108 (0.240)	0.006 (0.013)	0.006 (0.014)	0.006 (0.013)	0.006 (0.015)
GPP	0.048*** (0.018)	0.048*** (0.018)	-0.004 (0.006)	-0.004 (0.006)	-0.004 (0.005)	-0.004 (0.005)
Ordinary corporations	0.010** (0.004)	-0.010** (0.004)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Economic growth rate	0.025*** (0.002)	-0.025*** (0.002)	-0.005 (0.005)	-0.005 (0.005)	-0.005 (0.004)	-0.005 (0.004)
Startup rate	0.043 (0.034)	-0.043 (0.034)	0.001 (0.016)	0.001 (0.016)	0.001 (0.013)	0.001 (0.014)
Constant	6.194*** (0.743)	-6.309*** (0.825)	-5.794*** (0.083)	-5.790*** (0.159)	-5.794*** (0.063)	-5.790*** (0.048)
Adjusted R ²	0.219	0.219	0.061	0.061	0.061	0.061
Number of observation	423	423	423	423	423	423

Note: The lower rows are standard errors.

*Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

Second, competition among financial institutions is negatively correlated with the probability of all SMEs bankruptcies. This result suggests that financial institutions' support changes as firms mature and is in accordance with the result of Petersen and Rajan (1995); in other words, competition among financial institutions does not benefit startup companies but benefits mature companies.

Furthermore, this result suggests the possibility that SMEs are able to minimize the probability of bankruptcy throughout their life cycles if they start a business in a region with less intense financial competition and transfer to a region with intense financial competition after the growth of their business.

We also clarify a part of the ideal financial systems needed to efficiently support and promote young SMEs in local regions. However, the analyses in this paper address only the probability of the exit, making further research necessary to clarify the comprehensive effect of competition among financial institutions on small, young companies.

In addition, in this paper, we are unable to reveal the path to bankruptcy. More specifically, we are unable to clarify which path among the following is realized. First, competition among financial institutions reduces business loans from main banks, then this reduction worsens corporate results, and then poor business performance increases the probability of the exit. Second, only the probability of relief of a firm facing management problems declines. Third, these two phenomena occur simultaneously, which causes the probability of the exit to increase. Unfortunately, we cannot address this issue because of data limitations, and such remaining issues await further investigation.

ENDNOTES

1. The studies that state that entrepreneurship is important for economic growth are Stel, Carree, and Thurik (2005) and Wong, Ho, and Autio (2005).
2. Berger and Udell (1998) call such correspondence between the growth cycle of a firm and the source of financing a financial growth cycle paradigm.
3. Boot (2000) states that the effect of competition on relationship banking is complex and suggests that research on this topic needs to advance. Incidentally, as subsequently introduced, numerous studies on this theme have been conducted since Boot (2000) and the discussion is still in progress.
4. Mayer (1988) shows that banks play important roles in firms' avoiding bankruptcy. Moreover, Hoshi, Kashyap, and Scharfstein (1990), Grunert and Weber (2009), and Shimizu (2012) indicate the possibility that a close relationship between firm and bank improves business performance or avoids firms' entering bankruptcy.
5. They conclude that competition works against startup companies; however, the trend is reversed as a firm's age increases and competition works in favor of mature companies.
6. We use data from 2007 to 2010 in the analysis on the probability of the exit of startup companies that are in their first five years of incorporation or data from 2002 to 2010 for companies in their first ten years of incorporation.
7. The names of the exit and the bankruptcy are not unified because of the differences in the data used.
8. The definition of a small company in ORBIS is one that is not listed and that satisfies any of the following conditions: (a) operating revenue less than US\$1.3 million; (b) total assets less than US\$2.6 million; or (c) less than 15 employees.
9. The meaning of "inactive" in ORBIS includes bankruptcy, dissolved, in liquidation, and so on. Therefore, this is different from the exact meaning of bankruptcy; hence in this paper, we do not call companies classified as inactive in ORBIS as bankrupt but as inactive.
10. Incidentally, ORBIS does not include detailed information on the year in which a company went out of business or the length that it was active.
11. The method of excluding the year, which may bias the results of the analysis, is frequently used in research related to bankruptcy or a business closure, such as Begley, Ming, and Watts (1996) and Headd (2003).
12. Incidentally, in American empirical research, the amount of deposits is commonly used to measure the competition degree of financial institutions (e.g., Petersen and Rajan, 1995; Dick and Lehnert, 2010).

13. In this paper, we cannot use a yearly exit rate due to the data characteristics. However, according to *the 2006 White Paper on Small and medium-sized enterprises in Japan*, 81.3% of new companies in Japan, which exit within five years from their incorporation, exit within three years from the incorporation. Therefore, in the fixed effects estimation in this paper, we regard p as a within-three-year exit rate.
14. Elsas (2005), who conducts an empirical study with German data, states that an inverted U-shaped correlation exists between bank concentration and the likelihood of observing relationship lending. Simply, bank competition that is too intense or not intense enough hinders relationship lending.

REFERENCES

- Beck, T., A. Demirgüç-Kunt, and V. Maksimovic, 2004, "Bank Competition and Access to Finance: International Evidence," *Journal of Money, Credit, and Banking*, 36, 627-648.
- Begley, J., J. Ming, and S. Watts, 1996, "Bankruptcy Classification Errors in the 1980s: An Empirical Analysis of Altman's and Ohlson's Models," *Review of Accounting Studies*, 1, 267-284.
- Berger, A., and G. Udell, 1995, "Relationship Lending and Lines of Credit in Small Firm Finance," *Journal of Business*, 68, 351-381.
- Berger, A., and G. Udell, 1998, "The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle," *Journal of Banking & Finance*, 22, 613-673.
- Black, S., and P. Strahan, 2002, "Entrepreneurship and Bank Credit Availability," *Journal of Finance*, 57, 2807-2833.
- Bonaccorsi Di Patti, E., and G. Dell'Ariccia, 2006, "Bank Competition and Firm Creation," *Journal of Money, Credit and Banking*, 36, 225-251.
- Boot, A., 2000, "Relationship Banking: What Do We Know?" *Journal of Financial Intermediation*, 9, 7-25.
- Boot, A., and A. Thakor, 2000, "Can Relationship Banking Survive Competition?" *Journal of Finance*, 55, 679-713.
- Campbell, T., and W. Kracaw, 1980, "Information Production, Market Signaling, and the Theory of Financial Intermediation," *Journal of Finance*, 35, 863-882.
- Carter, R., and H. Van Auken, 2006, "Small Firm Bankruptcy," *Journal of Small Business Management*, 44, 493-512.
- Chong, T., L. Lu, and S. Ongena, 2013, "Does Banking Competition Alleviate or Worsen Credit Constraints Faced by Small- and Medium-sized Enterprises? Evidence from China," *Journal of Banking and Finance*, 37, 3412-3424.
- Degryse, H., and S. Ongena, 2005, "Distance, Lending Relationships, and Competition," *Journal of Finance*, 60, 231-266.
- Dick, A., and A. Lehnert, 2010, "Personal Bankruptcy and Credit Market Competition," *Journal of Finance*, 65, 655-686.
- Diamond, D., 1984, "Financial Intermediation and Delegated Monitoring," *Review of Economic Studies*, 51, 393-414.
- Diamond, D., 1991, "Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt," *Journal of Political Economy*, 99, 689-721.

- Elsas, R., 2005, "Empirical Determinants of Relationship Lending," *Journal of Financial Intermediation*, 14, 32-57.
- Fama, E., 1985, "What's Different about Banks?" *Journal of Monetary Economics*, 15, 29-39.
- Franco, M., and H. Haase, 2010, "Failure Factors in Small and Medium-sized Enterprises: Qualitative Study from an Attributional Perspective," *International Entrepreneurship and Management Journal*, 6, 503-521.
- Grunert, J., and M. Weber, 2009, "Recovery Rates of Commercial Lending: Empirical Evidence for German Companies," *Journal of Banking & Finance*, 33, 505-513.
- Hauswald, R., and R. Marquez, 2006, "Competition and Strategic Information Acquisition in Credit Markets," *Review of Financial Studies*, 19, 967-1000.
- Headd, B., 2003, "Redefining Business Success: Distinguishing between Closure and Failure," *Small Business Economics*, 21, 51-61.
- 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, 67-88.
- Leland, H., and D. Pyle, 1977, "Informational Asymmetries, Financial Structure, and Financial Intermediation," *Journal of Finance*, 32, 371-387.
- Mayer, C., 1988, "New Issues in Corporate Finance," *European Economic Review*, 32, 1167-1189.
- Ogura, Y., 2007, "Lending Competition, Relationship Banking, and Credit Availability for Entrepreneurs," *RIETI Discussion Paper Series*, 07-E-036.
- Ogura, Y., 2012, "Lending Competition and Credit Availability for New Firms: Empirical Study with the Price Cost Margin in Regional Loan Markets," *Journal of Banking and Finance*, 36, 1822-1838.
- Ogura, Y., and N. Yamori, 2010, "Lending Competition and Relationship Banking: Evidence from Japan," *International Journal of Business*, 15, 377-393.
- Ongena, S., and D. Smith, 2000, "What Determines the Number of Bank Relationships? Cross-country Evidence," *Journal of Financial Intermediation*, 9, 26-56.
- Petersen, M., and R. Rajan, 1994, "The Benefits of Lending Relationships: Evidence from Small Business Data," *Journal of Finance*, 49, 3-37.
- Petersen, M., and R. Rajan, 1995, "The Effect of Credit Market Competition on Lending Relationships," *Quarterly Journal of Economics*, 110, 407-443.
- Presbitero, A., and A. Zazzaro, 2011, "Competition and Relationship Lending: Friends or Foes?" *Journal of Financial Intermediation*, 20, 387-413.
- Rajan, R., 1992, "Insiders and Outsiders: The Choice between Informed and Arm's-Length Debt," *Journal of Finance*, 47, 1367-1400.
- Schumpeter, J., 1911, *A Theory of Economic Development*, Harvard University Press.
- Sharpe, S., 1990, "Asymmetric Information, Bank Lending and Implicit Contracts: A Stylized Model of Customer Relationships," *Journal of Finance*, 45, 1069-1087.
- Shimizu, K., 2012, "Bankruptcies of Small Firms and Lending Relationship," *Journal of Banking & Finance*, 36, 857-870.
- Stel, A., M. Carree, and R. Thurik, 2005, "The Effect of Entrepreneurial Activity on National Economic Growth," *Small Business Economics*, 24, 311-321.
- Wong, P., Y. Ho, and E. Autio, 2005, "Entrepreneurship, Innovation, and Economic Growth: Evidence from GEM Data," *Small Business Economics*, 24, 335-350.
- Yafeh, Y., and O. Yosha, 2001, "Industrial Organization of Financial Systems and Strategic Use of Relationship Banking," *European Finance Review*, 5, 63-78.