Lending Competition and Relationship Banking: Evidence from Japan[*]

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ABSTRACT

The question of whether more competition among banks increases relationship banking, which is predicted to improve credit availability for informationally opaque firms in theory, is a controversial issue in the banking literature. This paper provides evidence for the negative correlation between lending competition and the provision of relationship banking by using firm-level survey data in Japan. This paper raises the question whether fierce interbank competition is always beneficial for small firms.

JEL Classification: D82, G21, L11, L14

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I.   INTRODUCTION

Does increased lending competition improve credit availability for firms dependent on bank lending? A number of empirical studies have been conducted to answer this question, but their answers are mixed. Several studies show the evidence that the increased competition improves credit availability for firms (Black and Strahan, 2002; Cetorelli, 2004; Huang, 2008), while other studies show the evidence supportive of the opposite (Petersen and Rajan, 1995; Bonacorrsi di Patti and Cetorelli, 2004; Beck et al, 2004; Zarutsukie, 2006; Ogura, 2007). The prototypical oligopoly models, such as the Cournot model and the circle-city model, predict that the total credit supply increases as the number of competing banks increases. However, this is not the only story in credit markets because of asymmetric information among lenders as well as that between a borrower and a lender.

Lenders are willing to engage in acquisition of customer-specific information and/or customer-specific services; namely *relationship banking* (Boot, 2000), aiming at positive rents from informational advantage or product differentiation. Lenders are more willing to offer loans to firms when they can expect larger rents and are inclined to provide relationship banking. One of important determinants of these expected rents is the degree of lending competition a bank faces. Therefore, lending competition can influence the credit availability through the second route, i.e., the likelihood of relationship banking to be served. The mixed finding in the existing empirical studies mentioned above is likely to have come from the difference by datasets in the relative impact of these different two effects, i.e., the oligopoly effect and the relationship banking effect. The purpose of the present study is to provide another evidence on the latter effect; i.e., the impact of lending competition to relationship banking with the data and method different from the existing studies.

The existing theories provide us with mixed conclusions about the impact of lending competition to relationship banking. In a number of theoretical studies that model relationship banking as the acquisition of borrower-specific information by banks, it is shown that the increase in the number of competing banks in a local lending market leads to a reduction in information acquisition by these banks. This is because the additional market share that can be captured by the information advantage over rival banks decreases, and, therefore, it is more difficult to recoup the investment cost for information acquisition when the number of rivals increases (Petersen and Rajan, 1995; Hauswald and Marquez, 2006). On the other hand, several studies that model relationship banking as a provision of borrower-specific consulting or monitoring services to improve the probability of the success of their borrowers' projects show the possibility that a bank is more likely to provide such consulting or monitoring services as the number of competing banks increases in order to fend off the competitive pressure from outside banks (Boot and Thakor, 2000; Dinç, 2000; Yafeh and Yosha, 2001; Marquez and Dell'Ariccia, 2004).

Some researchers resort to empirical studies in order to answer the question of whether or not lending competition promotes relationship banking. For example, Elsas (2005) and Degryse and Ongena (2007) find that the probability for a firm to maintain a long-term and broad-based relationship with a bank is U-shaped against the concentration measure in local lending markets in Germany and in Belgium, respectively. However, Petersen and Rajan (1995) and Montoriol-Garriga (2005) find evidence for the

negative correlation between lending competition and relationship banking in the U.S.

To the best of our knowledge, most of the empirical studies so far have focused on the informational aspect of relationship banking by measuring its existence by the length of the relationship (e.g., Petersen and Rajan, 1994; Berger and Udell, 1995; Degryse and van Cayseele, 2000) and/or by the breadth of the relationship including whether a firm purchases a particular type of bank product that generates an information advantage for the providing banks, such as checking account services (e.g., Degryse and Ongena, 2007). However, the information advantage is not the only aspect of relationship banking. It can also be characterized by product differentiation by providing a customer-specific profit-improving consulting/monitoring service, as is modeled in Boot et al. (2000) and others.

The present empirical study focuses on this latter aspect, which has not been fully analyzed in the empirical literature, and examines the signs of the correlation between lending competition and customer-specific consulting activities by banks. We constructed an index of the extent of relationship banking to capture this product-differentiation aspect by using a dataset constructed from more than 8,000 sample firms responding to a firm-level survey, which was conducted by the Small and Medium-Sized Enterprise Agency in Japan in 2002. Our regression analysis shows that such consulting services are *more* likely to be provided in *less* competitive lending markets. The result implies the negative correlation between lending competition and relationship banking.

The rest of this article is organized as follows; we present the detail of our dataset and variables used in the regression analysis in Section II. The specification of the regression analysis is presented in Section III. The results of the regression and the interpretation of them are reported in Section IV. Section V is the concluding remark.

II.   DATA

Our dataset is constructed from the firm-level microdata collected from *the Survey of the Financial Environment of Enterprises* in October 2002 by the Japanese Small and Medium Enterprise Agency. The survey targeted 15,000 non-agricultural private companies in Japan. The targets were randomly sampled by industry, size class 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 of the question that we used for our relationship measure was 59.4% (8,229 companies). Most of the sample companies were small or medium-sized enterprises that are not publicly traded. The survey sought information from firms concerning the details of financing activities and financial environments, including the duration and scope of the relationship with a main bank. The response from each firm was matched with its financial statement when available. It is also possible to match each observation with the economic conditions in the municipal area where the responding firm is located.

We treat a group of municipal areas with the identical telephone area code as a unit of a local lending market.[1] This assumption is justified by the following reasoning. Firstly, an identical area code is supposed to be assigned within the area where phone calls are highly frequent, reflecting dense economic transactions. Secondly, more than 89.2% of firms responding to the survey replied that a regular branch of their main bank locates within a 10 kilometer radius of their location. We aggregated the data of local

municipal economic conditions and lending market structures up to the telephone area code level in the regression analysis.

We used this area-level dataset rather than the firm-level dataset for the regression analysis so as to properly treat the market-structure measures as the *average within each area* rather than firm-specific information as we will show in the next section. Areas where the number of responding firms is less than 5 are dropped from our analysis since the measure of relationship banking, discussed later, could be extremely noisy if the number of observations in an area is too small. After this data trimming, we conducted the regression analysis with the sample that consists of 224 areas.

A.   Measure of Relationship Banking

The survey contained a multiple-choice question about what services other than commercial loans firms received from their main banks. Such additional services included *miscellaneous advices including financial consulting*.[2] We interpret this advising service as a proxy for the customer-specific consulting service that is modeled in Boot *et al*. (2000) and others. After sorting observations by telephone area code, we calculate the ratio of firms that receive such consulting services from their main banks in each area. This serves as a measure of the likelihood of the existence of relationship banking in each local lending market. We call this variable the *Ratio of Advised Firms*.

B.   Measure of the Intensity of Lending Competition

We used two measures of the intensity of lending competition in each area defined by the identical telephone area code: (1) the Herfindahl index of the number of regular branches in each area,[3] *Herfindahl Index of Branches*; and (2) the number of lending institutions that have at least one regular branch in each area, *Number of Competing Banks*. We collect the number of branches of each financial institution: city banks, trust banks, long-term credit banks, regional banks, and cooperative banks (*Shinkin* and *Shinkumi*) in each area as of October 2002 from the *Nihon Kin'yu Meikan* (the directory of Japanese financial institutions) CD-ROM, published by Nihon Kin'yu Tsushin Sha.

C.   Other Control Variables

To control for average firm characteristics in each area that are predicted to have some impact on relationship banking in the literature, we included the *Average Number of Employees*, the *Average Age of Firms* in each area, and the squares of them into the explanatory variables in the regression analysis. The number of employees is a proxy for the firm size. As the cost of information production or consultation, such as personnel costs, is presumably fixed, banks are more willing to incur such costs for the firms that are large enough to be likely to borrow a large amount of loans and to pay interests enough to cover the costs of providing such services. The average age of firms is the proxy for the availability of the public information or public reputation about the creditworthiness of firms. The fact that a firm survives longer, which is usually publicly observable, works as a good public signal for the credit quality of the firm (Diamond, 1991). Banks can expect a future increase in payoff from the increased transactions with the firms if the firm is expected to survive longer and grow larger. Therefore, banks are

more willing to provide consulting services for such promising firms. On the other hand, these services would be meaningless for firms that have already survived so long and has become so large that nobody in the market cast doubt on the creditworthiness of them. We included the square of these variables into the explanatory variables to address the latter possibility.

As for the characteristics of banks operating in each area, we included the *Share of Money-Center Banks* in each local market into the explanatory variables in the regression. This variable is the share of regular branches of money-center banks including city banks, trust banks, and long-term credit banks. These banks operate nationwide and the size of them is much larger than regional banks and cooperative banks.[4] The existing literature shows that such large banks are comparatively inefficient in processing customer-specific *soft* information,[5] and so they are less intended to provide relationship banking (Stein, 2002; Berger et al, 2005; Uchida et al, 2008; Liberti and Mian, 2009). We introduced the share of money-center banks in order to control for this factor.

In addition, banks may be more willing to invest in loan officers' consulting abilities in a large market or a growing market if consulting technology is reusable for various customers repeatedly. To control for these factors, we included the *Population* and the *Growth Rate of Taxable Income* as the proxy for the market size and growth in each area. These regional economic data was calculated from the municipal database in the Nikkei NEEDS database.

The precise definition and the descriptive statistics of these variables are listed in Table 1. The Ratio of advised firms in each area ranges from 0% to 60%. The mean of the ratio is 13.5%. The number seems to be too low for the dataset consists mainly of small and medium-sized firms with the median number of employees equal to 61 persons. This suggests that consulting by banks is more information intensive service than the other usual services that are common to be served during the course of a long-term bank-firm relationship. The Herfindahl index of bank branches ranges from 0.042 to 0.500. Its mean is 0.238 and its median is 0.241. These statistics are higher than those in Belgium reported by Degryse and Ongena (2007), 0.14 and 0.18, respectively.

Table 2 shows the correlation matrix among variables. The negative correlation between the ratio of advised firms and the squared Herfindahl index suggests that the impact of lending competition to relationship banking is hump-shaped. The Herfindahl index is negatively correlated with the average firm size, the share of money-center banks, population, and the growth rate of the taxable income. These correlations implies the tendency that the number of competing banks, average firm size, the share of money-center banks, population, and the growth rate of the taxable income are all larger in the metropolitan area than in the rural area. The correlations among explanatory variables are not so close to 1 or -1 that the problem of multicollinearity is not suspected.

Table 1
Data description

(A) Definition

Variables	Definition
Ratio of advised firms	Ratio of firms receiving a consulting service from a main bank in a region with the identical telephone area code (October 2002).
Herfindahl index of branches	Herfindahl index of each region with the identical telephone area code; calculated from the number of regular branches of city banks, trust banks, long-term credit banks, regional banks, and cooperative banks; *Shinkin* and *Shinkumi* (October 2002).
Number of banks	Number of banks including city banks, trust banks, long-term credit banks, regional banks, and cooperative banks; *Shinkin* and *Shinkumi*, that has at least a regular branch in the region (October 2002).
Average number of employees	Average number of employees of firms in the region calculated from the observations in the survey in October 2002 (persons).
Average age of firms	Average firm age in the region calculated from the observations in the survey in October 2002 (years).
Share of money-center banks	Share of regular branches of money-center banks; city banks, trust banks, and long-term credit banks, in each region (October 2002).
Population	Population in each region as of October 2000 (persons).
Growth rate of taxable income	Annual arithmetic average growth rate of the taxable income in each region from 1999 to 2002 (%).

(B) Descriptive Statistics

Variables	#obs.	mean	s.d.	min.	med.	max.
Ratio of advised firms	224	0.135	0.105	0.000	0.125	0.600
Number of responding firms in each region	224	34.29	104.66	5	14	1438
Herfindahl index of branches	224	0.238	0.089	0.042	0.241	0.500
Number of banks	224	12.00	14.04	2	8	149
Average number of employees	224	92.70	175.80	11.83	61.06	2401.52
Average age of firms	224	30.93	3.89	21.34	30.97	42.95
Share of money-center banks	224	0.048	0.088	0.000	0.016	0.524
Population	224	470,005.5	863,533.9	21,634	224,679.5	8,210,399
Growth rate of taxable income	224	-2.054	0.942	-4.380	-2.079	0.683

Table 2
Correlation coefficients among variables

	Variables	1	2	3	4	5	6	7	8	9	10	11
1	Ratio of advised firms	1.000										
2	Herfindahl index of branches (demeaned)	0.053	1.000									
3	(Herfindahl index of branches)^2 (demeaned)	-0.137	0.134	1.000								
4	Log of the number of competing banks (demeaned)	-0.085	-0.809	0.141	1.000							
5	(Log of the number of competing banks)^2 (demeaned)	-0.015	-0.306	0.558	0.537	1.000						
6	Log of the average number of employees (demeaned)	-0.030	-0.499	0.052	0.617	0.279	1.000					
7	(Log of the average number of employees)^2 (demeaned)	-0.139	-0.040	0.108	0.110	0.212	0.386	1.000				
8	Average age of firms (demeaned)	0.127	0.054	0.139	0.035	0.067	0.243	0.050	1.000			
9	(Average age of firms)^2 (demeaned)	0.030	0.084	-0.017	-0.060	0.005	-0.009	0.006	0.197	1.000		
10	Share of money-center banks	-0.053	-0.569	0.324	0.651	0.502	0.484	0.190	0.063	-0.012	1.000	
11	Log of regional population	0.021	-0.695	0.127	0.880	0.525	0.607	0.038	0.003	-0.024	0.609	1.000
12	Growth rate of taxable income (%)	-0.079	-0.293	0.108	0.387	0.188	0.365	0.202	-0.038	0.002	0.403	0.440

III.   SPECIFICATION FOR THE REGRESSION ANALYSIS

We assume that a main bank determines whether to provide consulting service to firm f in area i (=1,2,...,224) by the following linear probability model;

$$D_f = \beta_0 + \beta_1 \cdot \text{ lending market concentration}_f + \beta_2 \cdot \text{ firm characteristics}_f$$
$$+ \beta_3 \cdot \text{ regional economic condition}_f + \upsilon_f, \tag{1}$$

where D_f is the dummy variable, which is equal to one if the main bank provide consulting service to firm f or equal to zero otherwise; and υ_f is the error term. The market concentration and the regional economic condition in the right hand side of Equation (1) are supposed to be those that firm f faces, but what we can actually obtain is the average of them in each area. Therefore, we transform both of the sides of Equation (1) into the within-area averages,

$$\text{Ratio of advised firms}_i = \beta_0 + \beta_1 \cdot \text{ lending market concentration}_i$$
$$+ \beta_2 \cdot \text{ average firm characteristics}_i + \beta_3 \cdot \text{ regional economic condition}_i + \varepsilon_i, \tag{2}$$

where i (=1,2,...,224) is the index of each area, and $\varepsilon_i = \sum_{f \in F_i} \upsilon_f / n_i$ (F_i is the set of firms located in area i, n_i is the number of firms observed in area i). We use this transformed equation for the regression analysis. We also introduce the square of lending market concentration into the right hand side in some specifications so as to accommodate the possibility that the impact of lending competition is non-linear. The sign of β_1 and the estimated coefficient of the square of the lending market concentration is what we are the most interested in.

Since the dependent variable is a ratio, which is equal to $\sum_{f \in F_i} D_f / n_i$, we applied weighted least squares estimation (WLS) with the weight equal to $\left(\hat{p}_i(1-\hat{p}_i)/n_i\right)^{-0.5}$ ($\hat{p}_i$ is the estimated ratio of firms receiving advice from the main bank in region i), so as to adjust the heteroskedasticity inherent in a linear probability model.[6] In order to prevent the near multicollinearity from distorting the identification of estimators, we transformed explanatory variables into the difference from their means when we introduce the squares of variables into the right hand side of the regression.

IV.   RESULT OF THE REGRESSION ANALYSIS

A.   Baseline Regression

Table 3 is the list of estimated coefficients when the *Ratio of Advised Firms* in each area is regressed on various sets of explanatory variables. The estimated coefficients by WLS are reported in Columns (1)-(5). In addition, the estimated coefficients by ordinary least squares (OLS) with the White robust standard errors are reported in Column (6).

Table 3
Baseline regression

(A) Herfindahl Index of Branches

Specification	(1) WLS	(2) WLS	(3) WLS	(4) WLS	(5) WLS	(6) OLS with robust s.e.
Independent variables.						
Herfindahl index of branches	0.0696	0.0392	0.1875 ***	0.2642***	0.2724***	0.2596**
	(0.0424)	(0.0539)	(0.0693)	(0.0910)	(0.0872)	(0.1115)
(Herfindahl index of branches)^2		-0.0838			-1.6461***	-2.0142***
		(0.3454)			(0.5080)	(0.5774)
Log of the average no. of employees			0.0205*		0.0056	-0.0077
			(0.0113)		(0.0129)	(0.0144)
(Log of the average no. of employees)^2			-0.0034		-0.0030	-0.0093**
			(0.0050)		(0.0060)	(0.0045)
Log of the average age of firms			0.0016		0.0027*	0.0043*
			(0.0014)		(0.0016)	(0.0022)
(Log of the average age of firms)^2			-0.0004		-0.0005*	-0.0001
			(0.0003)		(0.0003)	(0.0005)
Share of money-center banks				0.0206	0.1065	0.0820
				(0.0537)	(0.0707)	(0.1025)
Log of regional population				0.0135*	0.0175**	0.0230**
				(0.0074)	(0.0083)	(0.0102)
Growth rate of taxable income				-0.0004	-0.0007	-0.0081
				(0.0046)	(0.0048)	(0.0077)
Constant	0.1417 ***	0.1407***	0.1468***	-0.0335	-0.0696	-0.1495
	(0.0056)	(0.0065)	(0.0067)	(0.0964)	(0.1067)	(0.1312)
Adjusted R^2	0.0075	-0.0018	0.0294	0.0206	0.0671	0.0451
# observations	224	224	223	224	223	224

Note. Dependent Variable: Ratio of Advised Firms. The estimated coefficients of the weighted least square (WLS) estimation, (1)-(5), and OLS with the White robust standard error, (6), are reported. *, **, *** indicate statistical significance at 10%, 5%, and 1%, respectively (two-tailed test). The content of each parenthesis is the standard error of each estimated coefficient. The Herfindahl index, log of the number of competing banks, log of the average number of employees, and the average age of firms are the difference from sample mean.

Table 3 (Continued)

(B) Number of Competing Banks

Specification	(1) WLS	(2) WLS	(3) WLS	(4) WLS	(5) WLS	(6) OLS with robust s.e.
Independent variables						
Log of the number of competing banks	-0.0037	-0.0273***	-0.0230***	-0.0564***	-0.0938***	-0.0694***
	(0.0035)	(0.0086)	(0.0079)	(0.0144)	(0.0164)	(0.0220)
(Log of the no. of competing banks)^2		0.0100***			0.0160***	0.0029
		(0.0034)			(0.0054)	(0.0100)
Log of the average no. of employees			0.0271**		0.0268**	0.0020
			(0.0124)		(0.0130)	(0.0148)
(Log of the average no. of employees)^2			0.0005		-0.0094	-0.0099**
			(0.0048)		(0.0076)	(0.0048)
Log of the average age of firms			0.0015		0.0019	0.0038*
			(0.0014)		(0.0015)	(0.0022)
(Log of the average age of firms)^2			-0.0004*		-0.0006**	-0.0001
			(0.0003)		(0.0003)	(0.0005)
Share of money-center banks				0.0790	-0.0377	0.0023
				(0.0537)	(0.0633)	(0.0943)
Log of regional population				0.0355***	0.0406***	0.0445***
				(0.0104)	(0.0112)	(0.0135)
Growth rate of taxable income				0.0019	-0.0016	-0.0087
				(0.0042)	(0.0047)	(0.0078)
Constant	0.1399***	0.1398***	0.1473***	-0.3057**	-0.3624**	-0.4307**
	(0.0058)	(0.0057)	(0.0067)	(0.1320)	(0.1431)	(0.1735)
Adjusted R^2	0.0007	0.0353	0.0386	0.0510	0.1281	0.0516
# observations	224	224	223	224	223	224

The coefficients of the *Herfindahl Index of Branches* in Panel (A) in Table 3 are positive in all specifications. The coefficients are statistically significant when we control for average firm characteristics (Column 3), local market characteristics (Column 4), and both of them (Columns 5, 6). The coefficient of the square of the *Herfindahl Index of Branches* is negative and significant in both of WLS and OLS with robust standard error (Columns 5, 6). These estimated coefficients imply that the probability to receive management advices from the main bank depicts a hump-shaped curve against the lending market concentration as is shown in Figure 1. The probability is at the peak when the Herfindahl index is larger than the mean 0.238 by 0.083, but the number of observations with the Herfindahl index greater than $0.238 + 0.083 = 0.321$ is as few as 35 out of 224. Therefore, more than 80% of the areas are in the region where the bank concentration increases the probability to receive relationship banking. The estimated slope suggests that one basis point increase in the Herfindahl index increases the probability of firms to receive advice from the main bank by 1.07% in the area with the median Herfindahl index, 0.241. This impact is larger in the area where the Herfindahl index is lower than the median, and vice versa.

Figure 1.   Predicted ratio of advised firms
Note. The explanatory variables except for the Herfindahl index are set equal to the sample mean.
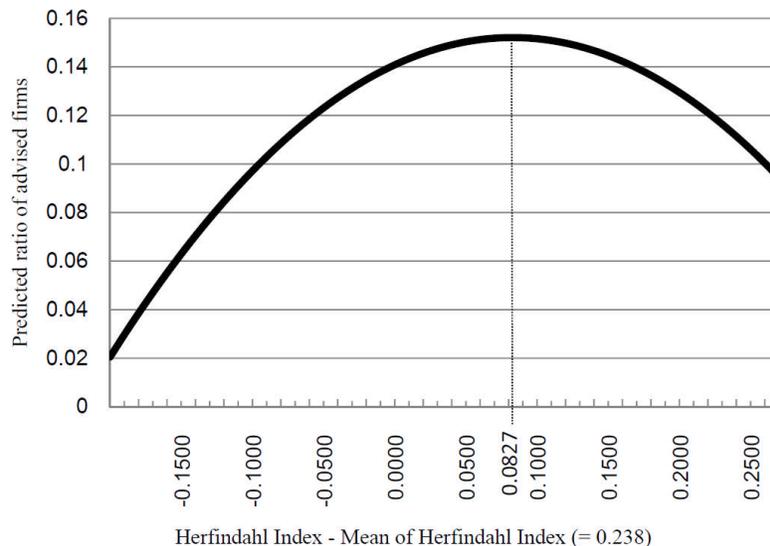
The coefficients of the *Log of the Number of Competing Banks* in Panel (B) in Table 3 are negative in all specifications. The coefficients are statistically significant when we control for firm characteristics (Column 3), local market characteristics (Column 4), and both of them (Columns 5, 6). The square of the log of the number of competing banks has positive coefficients, but it is statistically significant only in WLS (Columns 2,5, and 6). According to the estimates in Column 5, the probability of receiving advice is at maximum when the log of the number of banks is larger than its

sample mean (2.189) by 2.93, which corresponds to 167 banks. As is shown in Table 1 (B), there is not such an area where so many banks are competing. Thus, the observed areas in our dataset are in the region where the increase in the number of competing banks decreases the probability to receive relationship banking. Thus, both the estimates with the Herfindahl index and those with the logarithm of the number of competing banks show evidence for the negative correlation between lending competition and relationship banking.

Among the control variables, the population in each area has positive and statistically significant coefficients in most of specifications. This suggests that at least a part of consulting technology is reusable and so those banks in a market where potential customers are more abundant are more willing to invest in such technology. The estimated coefficients of the average number of employees and the average firm age imply that the probability to receive consulting from the main bank is increasing or hump-shaped in firm size and age as is predicted in Section II.C. In contrast, the share of money-center banks and the growth rate of the taxable income do not have statistically significant coefficients.

B.   Regression with the Sample Consists Only of Small Firms.

So far, we used all observations, including larger firms with even over 10,000 employees, in constructing the variable, *Ratio of Advised Firms*. However, these larger firms are more likely to be listed on a stock market that are required to comply with the strict information disclosure requirement and the internal governance requirement imposed by the regulator. Furthermore, many of these firms operate nationwide rather than locally. Therefore, these firms are not expected to receive advice from their main banks, and, if any, the probability for these firms to receive advice from banks is expected to be independent of local lending competition. Thus, the negative correlation between local lending competition and the likelihood of relationship banking is expected to be observed more clearly among smaller firms, such as those with fewer than 300 employees.[7]

To address this point, we reconstructed the dataset that contains only firms with fewer than 300 employees (7,521 firms), and then recalculated the *Ratio of Advised Firms* in each area. The estimated coefficients with this refined dataset are listed in Table 4. The regressions with this dataset are fit better as is shown in the improvement of adjusted R-squares and the statistical significance of the estimated coefficients of the Herfindahl index and the logarithm of the number of banks (Column 1); while the signs of the estimated coefficients do not differ from those in Table 3. Thus, the result in Table 3 is reinforced by refining the dataset.

V.   CONCLUSION

From the results in the statistical analyses presented in the previous section, we found that local lending competition has a negative impact on banks' incentive to provide relationship banking, which entails customer-specific consulting services. This result is reinforced by controlling for average firm characteristics and local economic environment and by refining the sample so that it contains only small firms that are supposed to be dependent on local lending markets.

Table 4
Regression with the data constructed from small firm data (with fewer than 300 employees)

(A) Herfindahl Index of Branches

Specification	(1) WLS	(2) WLS	(3) WLS	(4) WLS	(5) WLS	(6) OLS with robust s.e.
Independent variables.						
Herfindahl index of branches	0.1070**	0.0507	0.2304***	0.2585***	0.2716***	0.2460**
	(0.0439)	(0.0532)	(0.0614)	(0.0920)	(0.0870)	(0.1071)
(Herfindahl index of branches)^2		-0.3103			-1.5958***	-1.9237***
		(0.3460)			(0.5226)	(0.5793)
Log of the average no. of employees			0.0629***		0.0513**	0.0472
			(0.0211)		(0.0253)	(0.0361)
(Log of the average no. of employees)^2			-0.0174		0.0033	0.0214
			(0.0304)		(0.0349)	(0.0442)
Log of the average age of firms			0.0004		0.0019	0.0035
			(0.0016)		(0.0017)	(0.0022)
(Log of the average age of firms)^2			-0.0004		-0.0005	0.0001
			(0.0003)		(0.0003)	(0.0005)
Share of money-center banks				-0.0016	0.0263	0.0189
				(0.0554)	(0.0715)	(0.1093)
Log of regional population				0.0121	0.0160**	0.0177*
				(0.0076)	(0.0076)	(0.0092)
Growth rate of taxable income				0.0011	0.0003	-0.0098
				(0.0048)	(0.0049)	(0.0077)
Constant	0.1390***	0.1398***	0.1458***	-0.0138	-0.0487	-0.0979
	(0.0056)	(0.0066)	(0.0072)	(0.0986)	(0.0989)	(0.1178)
Adjusted R^2	0.0216	0.0137	0.0643	0.0242	0.0885	0.0505
# observations	224	224	224	224	224	224

Note. Dependent Variable: Ratio of Advised Firms. The estimated coefficients of the weighted least square (WLS) estimation, (1)-(5), and OLS with the White robust standard error, (6), are reported. *, **, *** indicate statistical significance at 10%, 5%, and 1%, respectively (two-tailed test). The content of each parenthesis is the standard error of each estimated coefficient. The Herfindahl index, log of the number of competing banks, log of the average number of employees, and the average age of firms are the difference from sample mean.

Table 4 (Continued)

(B) Number of Competing Banks

Specification	(1) WLS	(2) WLS	(3) WLS	(4) WLS	(5) WLS	(6) OLS with robust s.e.
Independent variables						
Log of the number of competing banks	-0.0071**	-0.0304***	-0.0231***	-0.0560***	-0.0847***	-0.0733***
	(0.0036)	(0.0087)	(0.0059)	(0.0146)	(0.0158)	(0.0214)
(Log of the no. of competing banks)^2		0.0100***			0.0120***	0.0025
		(0.0035)			(0.0046)	(0.0099)
Log of the average no. of employees			0.0793***		0.0666***	0.0571
			(0.0232)		(0.0244)	(0.0350)
(Log of the average no. of employees)^2			0.0100		0.0023	0.0211
			(0.0311)		(0.0379)	(0.0467)
Log of the average age of firms			0.0003		0.0011	0.0031
			(0.0015)		(0.0016)	(0.0021)
(Log of the average age of firms)^2			-0.0005*		-0.0006**	0.0001
			(0.0003)		(0.0003)	(0.0005)
Share of money-center banks				0.0587	-0.1085	-0.0425
				(0.0552)	(0.0660)	(0.1001)
Log of regional population				0.0338***	0.0413***	0.0440***
				(0.0106)	(0.0107)	(0.0132)
Growth rate of taxable income				0.0034	-0.0002	-0.0101
				(0.0043)	(0.0048)	(0.0077)
Constant	0.1378***	0.1374***	0.1461***	-0.2835**	-0.3712***	-0.4373***
	(0.0058)	(0.0057)	(0.0071)	(0.1339)	(0.1362)	(0.1692)
Adjusted R^2	0.0129	0.0457	0.0725	0.0495	0.1375	0.0669
# observations	224	224	224	224	224	224

The existing theories predict that relationship banking improves credit availability for (1) firms that newly enters into a market (Sharpe, 1990; Petersen and Rajan, 1995); (2) firms that have survived and kept long-term relationship with a bank (Bolton and Sharfstein, 1990; Boot and Thakor, 1994; Dell'Ariccia and Marquez, 2004); and/or (3) firms that are temporarily distressed (Dinç, 2000).

On the second point, Petersen and Rajan (1994), Berger and Udell (1995), and Elsas and Krahnen (1998) have already found supportive empirical evidence. In light of these theories, our statistical finding suggests that more lending competition can deteriorate the credit availability for these firms by decreasing the provision of relationship banking. This result raises the question whether fierce lending competition is always beneficial for borrowing firms and the social welfare.

Our result that relationship banking is increasing in lending-market concentration measures is consistent with the findings in the U.S. (Petersen and Rajan, 1994; Montoriol-Garriga, 2005). However, our finding is partially inconsistent with the findings that the probability of relationship banking to be served is U-shaped against lending-market concentration in Belgium (Degryse and Ongena 2007) and in Germany (Elsas, 2005). The investigation of the factors that brings this difference by countries remains a future research subject.

ENDNOTES

1. To put more precisely, we updated area codes of responding firms and bank branches to the ones as of February 20, 2008 so as to match with municipal economic data collected from Nikkei NEEDS database.
2. The English translation of the question asking this point in the 2002 Survey of Financial Environment is as follows:
   Question 19. Please circle the services that your company receives from the main bank among the following services except loans:
   1. checking account, 2. time deposit, 3. bill collecting service, 4. bill settlement, 5. underwriting of bank equities, 6. bond underwriting, 7. stock underwriting , 8. foreign exchange, 9. acceptance of a manager from the main bank, 10. miscellaneous transactions with companies affiliated with the main bank, 11. business exchange held by the main bank, 12. miscellaneous advices including financial consulting, 13. referrals to potential customer.
   We used a dummy variable that is equal to one if a responding firm replies that it receives 12, and equal to zero otherwise, in the calculation of the ratio of advised firms.
3. The Herfindahl index is defined by the sum of the squared shares. If the market is dominated by one bank, then the index is equal to unity. The index is closer to zero as the number of banks with a similar size increases.
4. The average total asset of money-center banks is 31,189.2 billion JPY. While that of regional banks and cooperative banks is 576.9 billion JPY as of March 2002. The average size of the former is 54 times as large as that of the latter.
5. Stein (2002) defines soft information as "information that cannot be directly verified by anyone other than the agent who produces it" and illustrates it by the example of the personality of the president of a borrowing company.
6. See, for example, 15.2 in Wooldridge (2002) for more detail. The estimated

probability can be greater than 1 or smaller than 0. Such observations are dropped from the sample in WLS.

7. The Small and Medium-sized Enterprise Act in Japan defines small and medium-sized manufacturers as those with fewer than 300 employees or with capital of less than 300 million JPY.

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