The Effects of Branch Expansion on Bank Efficiency: Evidence from Japanese Regional Banks

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Abstract

Although the Japanese financial regulators have been promoting region-based relationship banking in recent years, many regional banks expand their branch network. This paper investigates the effects of branch expansion on cost and profit efficiency for the Japanese regional banks over the period of fiscal year 1999-2009. The principal findings are as follows: First, focusing on the local activities without expanding branch network is associated with improved cost efficiency. Also, regional banks expanding branch network in certain level exhibit higher cost efficiency, whereas excessive branch expansion causes lower cost efficiency. Next, in contrast to the results for cost efficiency, regional banks focusing on the local activities exhibit lower profit efficiency. However, our results indicate that excessive branch expansion also relates to lower profit efficiency. Finally, robustness results are obtained from the samples excluding regional banks located in urban regions. The findings in this paper suggest that an adequate levels of branch expansion have positive impacts on both cost and profit efficiencies for regional banks through diversifying banks' portfolio, etc.

Keywords: Japanese regional banks, bank branches, relationship banking, efficiency

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1 Introduction

Recently economic differences among regions have become serious in Japan. According to the business conditions index for SMEs, there has been a wide disparity among prefectures in recoveries of business conditions of SMEs after Lehman shock[1]. In addition, there are some regional governments whose financial conditions are stagnateddue to the decline in tax revenues and so on[2].

On the other hand, while economic disparities and exhaustions among regions have been more serious, the role of supplying funds to SMEs, which are the main support of Japanese regional economies, smoothly is expected to regional financial institutions[3]. It can be considered that regional financial institutions whose headquarters are located in a particular prefecture, which have deep roots with local communities, can lend with the corresponding needs and characteristics of regional SMEs because they know the situations of their business areas much more than large banks such as city banks that do businesses in all over the nation and the world[4]. Since Japan's financial regulators consider these situations, they have required regional financial institutions to practice region-based relationship banking since 2003 and have strongly expected to play a role to activate regional economies by making good use of soft information accumulated by long business relations with regional SMEs and lending them. Indeed, previous banking research have shown that U.S. community banks gain competitive advantage over larger institutions by establishing long-term personalized relationships with their customers, and utilize soft information in a credit decision (see, for instance, DeYoung et al., 2004; Berger and Black, 2011).

However, in spite of the current financial administration, many regional banks have expanded their branch networks outside the prefectures where their headquarters are located and laid emphasis on not only lending activities in their home prefectures but those outside their home prefectures in Japan. Harimaya and Kondo (2011) showed that the ratio of loans supplied in the home prefectures to total loans of regional banks which have expanded their branch networks outside their home prefectures are lower and those strategies by regional banks are considered to be incompatible with the idea of relationship banking policy.

Even so, why are there many regional banks that have expanded their branch networks to other markets actively? There is a possibility that they have tried to receive

[1]The Diffusion Index of business conditions judged by SMEs is investigated by Organization for Small and Medium Enterprises and Regional Innovation. In 123rd Survey of SME Business Conditions (January-March 2011), these indexes indicated that business conditions of SMEs in many regions have been slightly later than Kanto region that includes Tokyo, which is the capital in Japan.

[2]For example, fiscal affairs of Yubari city in Hokkaido failed in March 2007.

[3]According to the statements of the Small and Medium Enterprises Agency, the ratio of the number of SMEs to total is 99.7% in 2006 and the ratio of the number of employees at SMEs is about 70% at that time.

[4]All 47 prefectures in Japan have the headquarters of regional banks and most branches of them are in the prefecture where its headquarter is located or neighboring prefectures.

positive effects on their management by laying emphasis on businesses in other prefectures where more profit opportunities are expected than their home prefectures. If they can receive these profits, it is rational for regional banks to expand their branch networks and regulators should reconsider present way of region-based relationship banking policy. But to establish branches in other prefectures and do businesses there, they have to compete with regional financial institutions whose headquarters are located there, which have more information and networks there. In addition, because it costs more to do businesses in other prefectures, it can not be denied that regional banks that have actively expanded branches in other prefectures can not have enjoyed positive effects they have expected. If so, they should concentrate on the businesses in their hometown according to the ideas of relationship banking.

The purpose of the present study is to investigate whether expanding branch networks to other prefectures by regional banks has brought their management positive effects as they have expected. Specifically, we empirically analyze whether regional banks can realize cost and profit efficiencies by entering other markets and evaluate whether these behaviors that is considered to be contrary to the idea of region-based relationship banking policy are rational for regional banks. In addition, we consider what the branching strategies by regional banks should be like with referring the empirical results in the present paper.

The remainder of the present paper is as follows. In Section 2, previous studies are reviewed. In Section 3 and 4, methodologies and the data employed in the present paper are discussed, respectively. Section 5 presents and interprets the empirical results. Summary and conclusions are provided in the final section.

2 Literature review

With regard to the impact of bank branch deregulation, there are many previous studies discussing the case for US banks. In particular, since the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 removed most of the barriers to interstate bank acquisitions and interstate banking, many empirical studies have been conducted on the effects of the geographic deregulation at the state-level. Most of these studies suggest that interstate banking deregulation has been beneficial to the banking industry.

In earlier research, Jayaratne and Strahan (1998) find that non-interest costs, wages, and loan losses have fallen after branch deregulation. Similarly, other results also support the fact that bank performance improvements have occurred after the removal of geographic restrictions (Hughes et al., 1999; Kroszner and Strahan, 1999; Stiroh and Strahan, 2002). In recent literature, Hirtle and Stiroh (2007) also find that a focus on retail activities is not associated with improved performance for the largest banks, and may actually lower performance for small and medium-sized institutions. In these literatures, most of bank performance measures are defined as financial indices such as ROA and market value of equity.

Moreover, there are many studies that linked the issue of branch expansions through bank consolidation. By using the efficiency measures obtained from the stochastic frontier model, Evanoff and Ors (2008) find that the cost efficiency of local banks tends to improve after one of their local peers is acquired by a large out-of-market bank, presumably because of increased competitive pressure. One possible explanation comes from the findings of Berger and Dick (2007) that banks with strong brand images are better able to expand the local market shares of the banks they acquire. Berger et al. (2007) also suggest that technological progress helped large, multimarket banks compete more effectively against small, single-market banks. For the impact of technological progress, Berger and De Young (2006) find that the operational efficiency of bank holding company (BHC) affiliates declined as they were located further away from their headquarter banks, however, advances in information technologies have helped mitigate these long-distance management problems[5].

On the other hand, fewer studies have looked at the impact of overall branch network size on efficiency or profitability[6]. Hirtle (2007) finds no systematic relationship between branch network size and overall institutional profitability. While these findings are inconsistent with the previous results, he suggests the effect of methodological differences of distinguishing between asset size and branch network size in the empirical specification. Thus, whereas asset size reflects the full range of banking activities, it can be captured more retail-oriented banking activities by focusing on the branch network size. Also, although it is a European cross country analysis, Hensel (2003) finds that larger European banks are less likely to realize additional cost efficiencies from expanding their branch networks than smaller institutions.

Except for U.S. banks, Barros et al. (2007), based on a mixed logit approach, found that country level characteristics such as location and legal tradition, and firm-level features including bank ownership structure are important determinates of European bank performance. Bergendahl and Lindblom (2008) also highlight the importance to consider the territory and neighborhood's developments where bank branches operate in for Swedish savings banks. Carbó Valverde et al. (2007) find that the differences in cost efficiency across Spanish banks were associated with the productivity indicators relevant to the number of bank branches. Besides these studies, there are some previous studies examining the relationship between consolidation and changes in branch network size. Avery et al. (1999) find that consolidation is negatively associated with changes in the number of banking offices per capita for U.S. commercial banks and saving associations.

In contrast, with regard to the Japanese banks, few studies have investigated the issues

[5]On the other hand, with regard to organizational characteristics, Berger et al. (2005) argued that BHCs operating in narrow geographic markets have certain advantages over more geographically dispersed BHCs. This result is consistent with Deng and Elyasiani (2008), who found that increased distance between a BHC and its branches is associated with a reduction in firm value and the increase of risk.

[6]Several studies have examined the performance of bank branches (see, for instance, Athanassopoulos, 1998; Berger et al., 1997; Zardhoohi and Kolari, 1994). However, it is almost difficult to obtain the detailed branch-based data such as loan volume and number of employees for each bank in Japan.

of branch networks, to our knowledge. Tsutsui and Kano (2003) is probably the only one previous study that has attempted to investigate the hypothesis that loan markets are segmented at the prefectural level. Using data for FY 1996, they found that the loan markets of credit associations (shinkin banks) are segmented for each prefecture, but those of regional banks are not. In other words, it can be said that regional banks positively do lending activities outside the prefectures where their headquarters are located and the investigation of this paper is based on their finding.

3 Methodology

The main purpose of this paper is to investigate the impact of branch expansion on bank performance. With regard to performance measures, we concentrate in estimating cost and profit efficiency of banks using stochastic frontier analysis (SFA). The major advantage of using SFA method is it allows the measurement error and provides a firm specific efficiency estimate[7] .

Following the previous literature, we choose the multi-output translog functional form:

$$\ln C = \alpha_0 + \sum_k \alpha_k \ln y_k + \sum_l \beta_l \ln w_l + \frac{1}{2}\sum_k \sum_j \alpha_{kj} \ln y_k \ln y_j + \frac{1}{2}\sum_l \sum_h \beta_{lh} \ln w_l \ln w_h + \sum_k \sum_l \delta_{lk} \ln y_k \ln w_l + \tau_t T + \tau_{tt} T^2 + \sum_k \tau_{Tk} T \ln y_k + \sum_l \tau_{Tl} \ln w_l + v + u \quad (1)$$

where ln C is the natural logarithm of total costs, consisting of funding, labor and capital costs; $\ln y_k$ is the natural logarithm of output k; $\ln w_l$ is the natural logarithm of price of input l; T denotes time trend; v is the statistical noise, assumed to be distributed as two-sided normal with zero mean and variance σ^2; u is the inefficiency term, assumed to be distributed as a one-sided positive disturbance; α, β, δ, and τ are coefficients to be estimated. Following previous studies, we specify the distribution of the inefficiency, u, to be half-normal[8]. Furthermore, to ensure that the estimated cost frontier is well behaved, standard homogeneity and symmetry restrictions are imposed.

The general procedure for estimating cost inefficiency from Equation (1) is to estimate equation coefficients and the error term $\epsilon = v + u$ first, and then calculate efficiency for each observation in the sample. For firm-specific efficiency estimates, Jondrow et al. (1982) proposed the distribution of the inefficiency term u conditional on the estimates of the composed error term ϵ. In this study, we employed the Battese and Coelli (1988)

[7]While SFA distinguishes random from inefficiencies, it requires an a priori assumption on the error term. In contrast, non-parametric methods such as data envelopment analysis (DEA) avoid this restriction but neglect random noise.

[8]For example, see Kaparakis et al. (1994), Mester (1996), Allen and Rai (1996) and Altunbas et al. (2000).

point estimator, which takes a value between 0 and 1 where the latter indicates a fully efficient bank.

Also, we use an alternative profit function specification, which relates profit to input prices indicating that output is held constant while output prices vary and may affect profits[9]. Thus, it employs the same independent variables as the cost function. To avoid a log of negative number, the dependent variable is given by $\ln(\pi+z+1)$, where z indicates the absolute value of the minimum value of profit (π) over all banks in the sample, and is added to every firm's dependent variable in the profit function. In addition, the composite error term is now defined as $v-u$. As described earlier, parameter restrictions are imposed, and firm-specific estimates of profit efficiency are computed as the point estimator of Battese and Coelli (1988), which is identical to cost efficiency.

Using efficiency estimates as the dependent variable, we examine the effect of expanding the networks of branches on bank performance as the second stage analysis. Thus, if branch expansion is positively correlated with the bank performance, the coefficient associated with the branch diversification is expected to have a significant positive value. In order to check the robustness of the results, we also use the efficiency rank based on an ordering of the banks' cost and profit efficiency levels in each year. The ranks are then converted to a uniform scale over [0, 1] using the formula $(order_{it}-1)/(n_t-1)$, where $order_{it}$ is the place in ascending order of the i th bank in the t th year in terms of its efficiency level and nt is the number of banks in $year_t$[10]. Thus, the bank i's efficiency rank in year t gives the proportion of the other sample banks in that year with lower efficiency level. The bank with the lowest cost efficiency level has the worst rank of 0, and the bank with the highest cost efficiency level has the best rank of 1.

4 Data

The banks considered in this study are two types of Japanese regional financial institutions: "traditional" regional banks and those formerly known as "sogo" banks (hereafter, second-tier regional banks)[11]. All these banks essentially carry out banking services within a specific district, mainly within a prefecture where each head office is located; further, their activities are related to both SMEs and local governments. However, while currently, the activities of both regional banks and second-tier regional banks are very similar, in general, the latter are smaller than the former.

Specifying inputs and outputs is often a controversial issue in banking. In this study,

[9] Translog profit and alternative profit functions have been modeled in Berger and Mester (1997).

[10] These calculation procedures are followed by the way of Berger et al. (2009), which applies to the Chinese banking sector.

[11] In contrast to the regional banks, the second-tier regional banks were allowed to convert to ordinary banks (commercial banks) in 1989. Further, unlike the regional banks, the second-tier regional banks were always restricted from financing firms other than small firms but were allowed to perform installment financing operations. Besides these two types of financial institutions, cooperative financial associations (credit associations and credit cooperatives) are occasionally classified as regional financial institutions.

following most previous literature, we consider three inputs, namely, labor (the number of employees), capital (the value of movable and immovable capital) and purchased funds (the amount of deposits). Unfortunately, as the input prices are not readily available, we use some proxies for these prices. By using available financial information on the costs they generate, we can calculate prices for each input category. The labor price is defined as the ratio of personal expenses to the average number of employees (w_1); the price of capital in each bank is defined as the ratio of non-personal expenses to the average value of movable and immovable capital (w_2); and the price of funds is given by the ratio of interest expenses on deposits to the average amount of deposits (w_3).

With regard to output specification, we employ an intermediation approach which assesses banks as financial intermediaries that utilize labor and capital to transform deposits into loans and other earning assets. However, until recently, the Japanese banking sector has suffered from nonperforming loans; therefore, there remains some doubt that the book values of loans are overestimated by the nonperforming loans. In addition, due to the introduction of market value accounting in recent years, the accounting standards for the book values of securities are not unified over the sample period in this study. Hence, outputs are identified on the basis of the flow value rather than stock value. Three outputs are considered: interest on loans and discounts (y_1); other interest income, including interest and dividends on securities, interest on call loans, etc. (y_2); and fees and commissions (y_3).

In the cost function, total costs (C) are defined as a sum of labor expenses, capital expenses, and interest expenses. On the other hand, in the profit function, total profits (π) are defined as ordinary profit, which is simply calculated as operating income minus operating expenses.

In the second stage of our analysis, investigating the impact of branch expansion on bank performance, we define a key variable for branch expansion (OUTBR) as the ratio of the branches outside the prefecture where headquarters are located to total branches for each bank. Also, to confirm the robustness of the economic results, we define an alternative measure that accounts for the differences in degree of branch expansion with dummy variables. Thus, the OUTBR data are divided into seven groups at 10% intervals in values and dummy groups are created for each group.

Furthermore, we account for several control variables with the exception of bank branches. First, in order to account for the regional economic condition, the ratio of active job openings to applicants (AJR) and the logarithm of prefectural income per capita (LPIC) are employed. Next, taking into account the regional differences in loan market, the loan market share of the largest regional banks (LMSLB) is used. While it is popular to use the Herfindahl-Hirschman index as the measure of market concentration, it is actually very difficult to calculate for each prefecture due to data availability[12]. These three regional variables are based on the prefectural level. Finally, to control for

[12]Adequate data for the outstanding loan amount of every individual banks in each prefecture is very difficult to obtain. However, data for the largest bank in each prefecture is available in the data source described below.

bank- specific characteristics, the natural logarithm of bank assets (LAST) and the ratio of non-performing loans to total loans (NPLR) are employed.

The data set used in this study is pooled data on Japanese regional banks from FY 1999 to FY 2009[13]. Financial data of individual banks are drawn from the Nikkei NEEDS Financial dataset. Also, data on prefectural amount of loans and number of branches for each bank are cited from the *KinyuMap*, published by the Financial Journal Co. Moreover, regional data comes from the Minryoku 2009 CD-ROM, edited by Asahi Newspaper[14]. Sample descriptive statistics are presented in Table 1.

5 Results

Table 2 shows the summary statistics for the cost and profit efficiency levels. The mean cost level of 0.9342 suggests that the typical bank wastes about 7% of its costs relative to the best-practice bank. The mean profit efficiency level of 0.8237 also suggests that banks on average earn about 18% less than the best-practice bank in the sample. The yearly average for the efficiency ranks not shown in the table are both 0.5 due to calculation formula. As shown in the table 2, the first result to note is the existence of lower levels of profit efficiency than those of cost efficiency. These results are consistent with those of Berger and Mester (1997) and Rogers (1998) for U.S. banks. Indeed, the Mann-Whitney U tests indicate that the distribution of cost efficiency levels is statistically different from that of profit efficiency levels at the 1% level. As shown in the standard deviation values, the variance of yearly profit efficiency levels is larger than those of cost efficiency.

Table 3 presents regression of cost efficiency levels and ranks on the branch expansion variables. In the left side of Table 3 for cost efficiency levels, the estimated sign on the degree of branch expansion (OUTBR) is negative, suggesting that a wider branch networks appears to be less cost efficient, while not statistically significant. According to the results from a model with dummy variables, however, some interesting results can be found. The estimates for the dummy variables are not proportional to the rate of branch expansion. The estimate of DMBRN, which implies a dummy variable for regional banks having no branch networks outside their home prefectures, is positive and statistically significant; it implies that focusing on the local activities without expanding branch networks is associated with improved cost efficiency. In contrast to this, the negative and statistically significant estimate of DMBR50 suggests that excessive branch expansion brings lower cost efficiency. However, since the estimate of DMBR40 is positive and statistically significant, it can be concluded that branch network expansion at least fewer than 50% do not necessary relate to low cost efficiency.

Consistent results are found in the right side of Table 3 for cost efficiency ranks. The estimate of DMBRN is negative and statistically significant, whereas insignificant in the

[13]Pooled data in this study is unbalanced because of the failure or reorganization of sample banks.

[14]The most recent data about the prefectural income per capita are cited from the Annual Report on Prefectural Accounts for FY 2009, published by the Cabinet Office, Government of Japan.

results for cost efficiency levels. Furthermore, the estimates of DMBRN and DMBR50 also have statistically significant and the same sign. Interesting differences from the results for cost efficiency levels are that the estimate of DMBR20 is negative and statistically significant, although the estimate of DMBR40 turns out to be insignificant.

For the other control variables, there are no contradictions between the results for cost efficiency levels and ranks. The measure of bank health as represented by the ratio of non-performing loans to total loans (NPLR) has a negative impact on cost efficiency. Also, the logarithm of prefectural income per capita (LPIC) reflecting the regional economic condition is positively associated with cost efficiency. However, questionable results are found in the estimates of the ratio of active job openings to applicants (AJR), which implying that regional banks located in the markets where labor force is shrinking tend to be less cost effective.

Table 4 presents the corresponding findings for profit efficiency. In sharp contrast to the results for cost efficiency, the estimate of OUTBR has a positive impact on profit efficiency levels, while not statistically significant. By considering the duality theorems between the cost and profit functions, these results seem to be inconsistent. However, the values of total costs used in the estimation are not necessarily parallel to those of total profits[15]. According to the results from a model with dummy variables, the estimate of DMBRN is negative and statistically significant. That is, diametrically opposed to the results for cost efficiency, focusing on the local activities without expanding branch network is associated with lower profit efficiency levels. However, the estimate of DMBR50 takes negative sign but insignificant, which indicates that banks expanding branches outside too much can not enjoy profit efficiency. On the other hand, the estimate of DMBR30 is positive and statistically significant.

Those results are coincident with those for profit efficiency ranks. That is, regional banks having no branches outside the prefecture where the headquarters of each bank is located do not yield profit efficiency gains. On the contrary, those expanding branch network in certain level exhibit higher profit efficiency because the estimate of DMBR30 is positive and statistically significant in this estimation too. The estimate of DMBR50 is insignificant as in the results of profit efficiency level. So it can be said that banks that expand branches outside too much can not realize profit efficiencies.

With regard to the other control variables, the estimates of AJR and LPIC have opposite signs from the results in Table 3. Also, the estimates of the ratio of non-performing loans to total loans (NPLR) turn out to be insignificant. Regarding these estimates, there are no differences between the results for profit efficiency levels and ranks.

As just described, our results suggest that certain levels of branch expansion does not have negative impacts on cost efficiency and they have positive impacts on profit efficiency. On the other hand, there remains the possibility that urban and rural areas have different market structures. Thus, a few large banks have a larger share of loans in

[15] Although we have tested with the alternative definition of total profits such as total revenues minus total costs, no distinctive improvements were obtained.

urban areas in Japan. So, in order to verify robustness of the results, we re-estimate the same empirical models by eliminating the regional banks located in urban areas[16].

The results for cost efficiency levels and ranks are shown in the Table 5. Interestingly, the estimate of OUTBR turns out to be significant and the estimate of DMBR50 has a higher statistical significance level in the results for cost efficiency levels. The estimates of DMBR30 and DMBR40 have positive signs, whereas they are insignificant. In contrast to this, the estimates of all the ratio of branch expansion dummy variables other than DMBRN have negative signs in the results for cost efficiency ranks. However, the estimates of DMBR30 and DMBR40 are still insignificant. On the other hand, the estimate of DMBR20 turns out to be significant and the DMBR50 has a higher statistical significance level. These results indicate that excessive branch expansion brings lower cost efficiency more strongly for regional banks located in rural areas.

The corresponding results for profit efficiency are shown in Table 6. Similarly to the results for cost efficiency, remarkable changes can be seen in the estimates of OUTBR; the results turn out to be significant for both profit efficiency levels and ranks. Contrary, the estimates of DMBRN become insignificant. However, since the estimates of DMBR20 and DMBR30 have significant and positive signs, it can be concluded that expanding branch network in certain level can obtain higher profit efficiency for regional banks located in rural areas too.

When we consider these situations around regional banks, it is natural for regional banks to expand their branch networks outside, though which can be considered to be contrary to the idea of region-based relationship banking policy promoted by regulators. But the finding that too much branch expansion is not rational for regional banks is very interesting.

6 Conclusion

TThe main objective of this study is to identify the effect of commercial banks' branch expansion on bank performance by using the data for Japanese regional banks. Although the Japanese financial regulators have been promoting region-based relationship banking in recent years, many regional banks expand their branch network. If the performance gains are closely relevant to a wider branch network, the deeper localization is not necessarily adequate for regional banks; and it appears to contradict with the current policy direction.

The cost and profit efficiency measures obtained from the stochastic frontier model are used as the bank performance indexes, and we empirically examine the relationship between branch expansion and efficiency measures. In this study, the presence or absence

[16]We have eliminated regional banks whose head offices are located in Tokyo, Saitama, Kanagawa, Aichi, Osaka, Kyoto, and Hyogo prefectures. Regional banks have less than 40% market share of lending in these 7 prefectures at the end of FY 2009, whereas the mean value of all 47 prefectures is 60.1% at the same time.

of branch expansion is defined whether regional banks expand their branch networks outside a prefecture where each head office is located.

The results obtained can be summarized as follows. First, focusing on the local activities without expanding branch network is associated with improved cost efficiency. Also, regional banks expanding branch network in certain level exhibit higher cost efficiency, whereas excessive branch expansion causes lower cost efficiency. Next, in contrast to the results for cost efficiency, regional banks without expanding their branch network exhibit lower profit efficiency. However, our results indicate that excessive branch expansion also relates to lower profit efficiency. Finally, robustness results are obtained from the samples excluding regional banks located in urban regions.

In terms of policy implications, the findings in this paper suggest that an adequate levels of branch expansion have positive impacts on both cost and profit efficiencies for regional banks. Therefore, it can be said that regional banks can not help having motivations to expand their branch networks. So if regulators want to require regional banks to practice relationship banking further, they should consider some devices for regional banks to strengthen local lending activities even though they expand their branch networks to other prefectures to diversify their portfolios or (and) get more profits there. In other words, regulators should let regional banks do both relationship banking and activities to improve their management efficiencies.

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Table 1: Summary statistics for the pooled 1999-2009 regression data set

	Mean	Std. Dev.	Minimum	Maximum
Cost (*profit*) (in millions of yen)				
Total costs(C)	30,592	21,693	3,210	129,311
Ordinary profit(π)	3,988	20,429	-254,327	109,874
Output quantities (in millions of yen)				
Interest on loans and discounts(y_1)	35,284	27,781	3,214	179,833
Other interest and dividend income(y_2)	9,867	10,177	213	72,534
Fees and commissions(y_3)	6,835	6,771	347	47,825
Input prices				
The price of labor(w_1)	7.9318	1.1303	4.6112	11.9572
The rental price of capital(w_2)	0.0019	0.0012	0.0002	0.0072
The price of funds(w_3)	0.4266	0.2160	0.1594	2.8752

The total number of observations is 1234.

Table 2: Summary statistics for the pooled 1999-2009 regression data set

		Cost efficiency		Profit efficiency	
Year	Number	Mean	Std. Dev.	Mean	Std. Dev.
1999	119	0.9411	0.0257	0.8461	0.0704
2000	118	0.9344	0.0291	0.8200	0.0839
2001	117	0.9281	0.0256	0.8052	0.1035
2002	117	0.9394	0.0259	0.8179	0.0853
2003	113	0.9362	0.0258	0.8442	0.0947
2004	111	0.9359	0.0278	0.8421	0.0720
2005	110	0.9399	0.0236	0.8310	0.0759
2006	109	0.9367	0.0238	0.8185	0.0760
2007	108	0.9419	0.0226	0.8041	0.0724
2008	107	0.9274	0.0279	0.7911	0.1121
2009	105	0.9388	0.0309	0.8395	0.0732
Overall	1234	0.9363	0.0266	0.8237	0.0862

Table 3: Regression on the branch expansion determining cost efficiency

	Cost efficiency level						Cost efficiency rank					
Variable	Estimate	Std. Err.		Estimate	Std. Err.		Estimate	Std. Err.		Estimate	Std. Err.	
Intercept	0.7540	0.0497	***	0.7532	0.0495	***	-1.6923	0.5825	***	-1.6533	0.5794	***
OUTBR	-0.0034	0.0060					-0.1691	0.0660	**			
DMBRN				0.0084	0.0036	**				0.1037	0.0411	**
DMBR20				-0.0019	0.0020					-0.0681	0.0228	**
DMBR30				0.0026	0.0023					-0.0080	0.0271	
DMBR40				0.0084	0.0032	***				0.0085	0.0440	
DMBR50				-0.0078	0.0047	*				-0.1041	0.0488	**
AJR	-0.0115	0.0034	***	-0.0104	0.0035	***	-0.1562	0.0367	***	-0.1415	0.0370	***
LPIC	0.0272	0.0068	***	0.0255	0.0067	***	0.3222	0.0772	***	0.2988	0.0769	***
LMSLB	0.0289	0.0089	***	0.0327	0.0092	***	0.1450	0.0890		0.1597	0.0913	*
LAST	-0.0019	0.0010	*	-0.0011	0.0010		-0.0140	0.0102		-0.0063	0.0109	
NPLR	-0.0011	0.0004	***	-0.0010	0.0004	***	-0.0109	0.0038	***	-0.0105	0.0036	***
Adjusted R^2	0.0301			0.0379			0.0344			0.0413		

1.The total number of observations is 1234.

2.***, **, * are significant at 1%, 5%, and 10% significance levels, respectively.

3.White's heteroskedasticity consistent covariance estimates are used.

Table 4: Regression on the branch expansion determining profit efficiency

	Profit efficiency level						Profit efficiency rank					
Variable	Estimate	Std. Err.		Estimate	Std. Err.		Estimate	Std. Err.		Estimate	Std. Err.	
Intercept	1.2117	0.1701	***	1.2109	0.1699	***	2.5542	0.5843	***	2.5370	0.5830	***
OUTBR	0.0023	0.0206					0.0395	0.0654				
DMBRN				-0.0204	0.0098	**				-0.1045	0.0409	**
DMBR20				-0.0009	0.0078					0.0193	0.0252	
DMBR30				0.0166	0.0068	**				0.0501	0.0256	*
DMBR40				0.0006	0.0128					-0.0168	0.0438	
DMBR50				-0.0201	0.0182					-0.0307	0.0500	
AJR	0.0148	0.0092		0.0133	0.0095		0.1272	0.0344	***	0.1151	0.0352	***
LPIC	-0.0418	0.0213	**	-0.0397	0.0213	*	-0.2534	0.0738	***	-0.2372	0.0733	***
LMSLB	0.0788	0.0281	***	0.0815	0.0290	***	0.1857	0.0850	**	0.1841	0.0875	**
LAST	-0.0060	0.0035	*	-0.0069	0.0036	*	-0.0139	0.0099		-0.0203	0.0103	**
NPLR	-0.0012	0.0009		-0.0014	0.0009		-0.0003	0.0022		-0.0011	0.0022	
Adjusted R^2	0.0271			0.0317			0.0290			0.0345		

1.The total number of observations is 1234.

2.***, **, * are significant at 1%, 5%, and 10% significance levels, respectively.

3.White's heteroskedasticity consistent covariance estimates are used.

Table 5: Regression on the branch expansion determining cost efficiency (excluding urban areas)

	Cost efficiency level						Cost efficiency rank					
Variable	Estimate	Std. Err.		Estimate	Std. Err.		Estimate	Std. Err.		Estimate	Std. Err.	
Intercept	0.8931	0.0591	***	0.8919	0.0590	***	-0.5479	0.7029		-0.5056	0.6949	
OUTBR	-0.0153	0.0065	**				-0.2930	0.0735	***			
DMBRN				0.0084	0.0039	**				0.0934	0.0440	**
DMBR20				-0.0069	0.0019	***				-0.1342	0.0224	***
DMBR30				0.0028	0.0024					-0.0001	0.0287	
DMBR40				0.0015	0.0030					-0.0284	0.0506	
DMBR50				-0.0158	0.0040	***				-0.2008	0.0449	***
AJR	-0.0067	0.0038	*	-0.0052	0.0038		-0.1167	0.0422	***	-0.0956	0.0418	**
LPIC	0.0043	0.0082		0.0020	0.0082		0.1296	0.09678		0.0957	0.0954	
LMSLB	0.0529	0.0120	***	0.0618	0.0121	***	0.4369	0.1287	***	0.5244	0.1289	***
LAST	0.0002	0.0011		0.0011	0.0011		0.0029	0.0116		0.0134	0.0120	
NPLR	-0.0009	0.0004	**	-0.0008	0.0003	**	-0.0094	0.0043	**	-0.0088	0.0037	**
Adjusted R^2	0.0416			0.0591			0.0461			0.0710		

1.The total number of observations is 1011.

2.***, **, * are significant at 1%, 5%, and 10% significance levels, respectively.

3.White's heteroskedasticity consistent covariance estimates are used.

Table 6: Regression on the branch expansion determining profit efficiency (excluding urban areas)

	Profit efficiency level						Profit efficiency rank					
Variable	Estimate	Std. Err.		Estimate	Std. Err.		Estimate	Std. Err.		Estimate	Std. Err.	
Intercept	0.6164	0.2464	**	0.6903	0.2496	***	0.6524	0.7582		0.8843	0.7644	
OUTBR	0.0629	0.0269	**				0.1655	0.0765	**			
DMBRN				-0.0167	0.0123					-0.0602	0.0440	
DMBR20				0.0171	0.0092	*				0.0522	0.0277	*
DMBR30				0.0240	0.0083	***				0.0570	0.0285	**
DMBR40				-0.0271	0.0161	*				-0.1031	0.0542	*
DMBR50				0.0250	0.0222					0.0863	0.0567	
AJR	-0.0114	0.0136		-0.0151	0.0140		0.0834	0.0436	*	0.0693	0.0444	
LPIC	0.0540	0.0313	*	0.0462	0.0317		0.0400	0.0984		0.0190	0.0994	
LMSLB	-0.0495	0.0433		-0.0411	0.0444		-0.1353	0.1318		-0.1303	0.1348	
LAST	-0.0133	0.0042	***	-0.0137	0.0043	***	-0.0348	0.0113	***	-0.0376	0.0118	***
NPLR	-0.0009	0.0011		-0.0010	0.0011		-0.0010	0.0026		-0.0015	0.0027	
Adjusted R^2	0.0122			0.0146			0.0148			0.0187		

1.The total number of observations is 1011.

2.***, **, * are significant at 1%, 5%, and 10% significance levels, respectively.

3.White's heteroskedasticity consistent covariance estimates are used.