

## Are Banks Affiliated with Bank Holding Companies More Efficient Than Independent Banks? The Recent Experience Regarding Japanese Regional BHCs

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**Abstract.** Few studies have investigated whether Japanese banks affiliated with bank holding companies are more efficient and profitable than independent banks. The present paper tests this hypothesis by using both a stochastic frontier approach and a market valuation approach. First, our results suggest that banks affiliated with bank holding companies are *not* more cost-efficient than are independent banks. Because of the brief history of Japanese BHCs, it is fair to conclude that the formation of regional bank holding companies has not achieved efficiency gains *so far*. Second, we find that banks affiliated with bank holding companies are more profit-efficient than are independent banks. This is particularly apparent when the establishment of the bank holding companies increases market power in regional markets. This supports the Financial Services Agency's policy to increase the profitability of regional banks through bank consolidation. Finally, based on standard event study methodology, we find that the market did not regard news about the establishment of bank holding companies as significant events.

**Key words:** bank holding company, Japanese regional banks, stochastic frontier approach, cost efficiency, profit efficiency, event study

**JEL Classification:** G21

### 1. Introduction

The financial “Big Bang,” initiated by the Hashimoto Cabinet in 1996, has substantially changed Japanese banking markets. A clear example is the consolidation among large city banks that has occurred since 1999. Each city bank, having a close relationship with large industrial firms, formed the core of the Japanese “keiretsu” groups that dominated Japanese financial and industrial businesses. There were 13 city banks as of March 1990, while there are five city bank groups currently. These five city bank groups employ the bank holding company format, which has been allowed by the deregulation of the 1990's.

As Hughes et al. (1999) pointed out, bank consolidation can provide the benefits of better diversification of assets and liabilities, the spreading of overhead costs,

and a wider scope of products and services. However, since consolidation increases the complexity of organization, it may increase costs of production and lead to greater inefficiency due to hard-to-control agency problems within the organization. Therefore, in principal, the owners of the firm decide to consolidate with other firms only when the positive effects of the consolidation are larger than its negative effects.<sup>1</sup>

The U.S. banking industry has experienced many consolidations since 1990. Currently, the bank holding company is the dominant form of bank ownership in the United States. Stiroh (2000) reported that as of year-end 1997, only 17% of all FDIC-insured assets were held by independent bank and thrift institutions, while 83% were held by bank holding companies (BHCs). The BHC structure is attractive in the United States due to expanded non-bank powers and geographic advantages. Although the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 deregulated interstate branching regulation, the BHC structure remains advantageous (Berger et al., 1995). First, BHCs can expand into activities that are still restricted for individual banks. Second, the BHC structure provides better access to funds, tax advantages, improved flexibility regarding bank-level constraints, and possible efficiency gains.

In contrast to the United States, Japan lifted its ban on bank holding companies very recently. However, it is apparent that the introduction of the bank holding company structure has accelerated banking sector consolidation. In Japan, the formation of a holding company is preferable to mergers because subsidiaries of a holding company can preserve their autonomy and independence. Also, due to the limited labor market for bank managers, Japanese managers are very sensitive that they will lose their positions when their company merges with other firms. The holding company structure can save overhead costs but still give larger independence to its subsidiaries.

In sharp contrast to city banks, all of which have been reorganized as subsidiaries of bank holding companies, there are very few *regional* banks that use the bank holding company structure. The reasons why many regional banks are reluctant to use the bank holding company structure are controversial. Some, including the Financial Services Agency (FSA), argue that the bank managers hesitate to perform consolidation because it will cost them their positions. The FSA believes that a decrease in the number of banks is necessary to raise banks' profitability, and encourages banks to merge with other banks or to participate in bank holding company groups. However, others argue that the BHC structure is not employed by many regional banks simply because it is neither more efficient nor profitable than independent bank organization.

Therefore, a test of the hypothesis that the bank holding company is more efficient and profitable than independent bank organization has important implications for the current banking policy conducted by the FSA. If the hypothesis is confirmed, the FSA's policy to encourage bank consolidation is supported. Unfortunately, there has been no study testing this hypothesis in Japan, while many papers have studied

this hypothesis regarding U.S. banks. This lack of research in Japan is due to the fact that the bank holding company structure has been allowed in Japan only since 1998. However, there are eleven bank holding companies in Japan now. Although the length of the Japanese experience still may not be completely adequate, it is a good time to test whether bank holding company organization is more efficient and profitable than independent bank organization.

This paper uses two methods to analyze the efficiency of Japanese bank holding companies: a stochastic frontier approach and a market valuation approach. First, we estimate the cost and profit functions of regional banks and compare the estimated inefficiencies between independent regional banks and banks affiliated with BHCs. This stochastic frontier approach is common in the literature, but the effects of the consolidation may not have been fully realized as of March 2003 due to the short history of the sample BHCs. So, we use the market value approach to supplement the stochastic frontier approach. That is, a standard event study is employed to investigate how stock market participants evaluate the news of the formation of bank holding companies. If positive abnormal returns are found on and around the event date, we can then assume that the market participants expect that the consolidation will enhance future profits.

This paper is organized as follows. In Section 2, the regulation on bank holding company structure and its historical development in Japan are briefly explained. In Section 3, we estimate the stochastic frontier cost and profit functions for all regional banks. We find that independent banks are more cost-efficient than are subsidiary banks, but that subsidiary banks tend to be more profit-efficient than are independent banks. Namely, the formation of the bank holding companies did not enhance cost efficiency but increased profit efficiency. In Section 4, we analyze the market price reaction to the news of holding company formations. Based on a standard event study methodology, we find that the market does not regard most formation news as significant. Finally, Section 5 provides a conclusion.

## 2. Historical Development of the Bank Holding Companies in Japan

Japanese financial institutions have been subject to more restrictive financial and anti-monopoly regulations than have industrial companies (Japanese Bankers Association, 2001; Hsu, 1999a,b). For example, new entries to the financial business have seldom been allowed. Financial regulations limited competition among financial institutions (e.g., commercial banks, trust banks, securities companies, and insurance companies) and created a stable financial system, but inefficiencies and inflexibility due to such restrictive regulation were widely recognized in the late 1980's. Also, the United States and European countries demanded the Japanese government advance financial deregulation in order to allow foreign companies to enter Japanese markets.<sup>2</sup> These financial regulations have been relaxed since the 1980s and were particularly accelerated by the financial "Big-Bang" starting in 1996. The important deregulation related to this paper is that banks have

been allowed to enter other financial businesses through purchasing or establishing subsidiary securities companies and subsidiary trust banks since 1993 and subsidiary insurance companies since 1998, although the “full-subsiary” restriction is imposed in terms of subsidiary securities companies, trust banks, and insurance companies. Namely, banks can have only full subsidiaries which are defined as companies in which the parent bank has more than 50% of the total issued shares.

Banks are under more severe antimonopoly regulation than are industrial firms. The Antimonopoly Law does not prohibit industrial companies from having subsidiaries, while banks are not allowed to hold more than 5% of the outstanding shares of a domestic company. This asymmetric treatment is supported by the common view that financial institutions might control the economy without this restriction. In addition to share-holding regulation, the Antimonopoly Law prohibited the establishment of “pure holding companies.” A pure holding company is defined as a company whose business is only to manage subsidiaries and was the management system used by the “Zaibatsu,” family-owned conglomerates that dominated the Japanese economy in the pre-World War II period. However, as the Antimonopoly Law allowed industrial companies to have subsidiaries, Japanese big businesses, such as Toyota and Hitachi, effectively became “industrial holding companies.” Therefore, these industrial firms could expand their businesses by purchasing or establishing subsidiaries, while the ban on pure holding companies did not seem to be a serious restriction on their operations. However, as banks were allowed only to own limited kinds of subsidiaries, the ban on pure holding companies made bank consolidation difficult.

As the economic functions of “pure holding companies” and “industrial holding companies” are the same, many argued that the ban on “pure holding companies” should be lifted. Finally, the Antimonopoly Law was amended in July 1997 and a new Antimonopoly Law was made effective in December 1997. The amended Article 9 of the Antimonopoly Law allows the establishment of pure holding companies except when the holding companies would have excessive monopoly power. An additional amendment of the Banking Law authorized banks to establish bank holding companies in 1998.

Since then, almost all major banks have established bank holding companies. In August 1999, Daiichi-Kangyo Bank, Fuji Bank, and Industrial Bank of Japan jointly announced that they would be merged into a bank holding company, Mizuho Holdings. Mizuho Holdings was established in September 2000. The Mitsubishi-Tokyo Financial Group (MTFG) was established in April 2001. Tokyo-Mitsubishi Bank, Mitsubishi Trust Bank, and Nihon Trust Bank became subsidiary banks of the MTFG. UFJ Holdings was established in April 2001. UFJ Holdings had Sanwa Bank, Tokai Bank, and Toyo Trust Bank as subsidiaries. Finally, the Mitsui-Sumitomo Bank established the Mitsui-Sumitomo Financial Group in December 2002. In addition to these four mega-bank groups, other large banks also established bank holding companies: Resona Holdings and Mitsui Trust Holdings. Therefore,

Table I. Bank holding companies in Japan

Bank Holding Company	Foundation Date	Subsidiary Banks	Assets (trillion yen)
<Major Banks>			
Mizuho Financial Group	September 2000	Mizuho Bank, Mizuho Corporate Bank	134.0
Mitsubishi-Tokyo Financial Group	April 2001	Tokyo-Mitsubishi Bank, Mitsubishi Trust Bank	99.2
UFJ Holdings	April 2001	UFJ Bank, UFJ Trust Bank	80.2
Resona Holdings	December 2001	<u>Kinki-Osaka Bank, Nara Bank</u> , Resona Bank, Saitama Resona Bank, Resona Trust Bank	42.9
Mitsui Trust Holdings	February 2002	Chuo-Mitsui Trust Bank	12.5
Mitsui-Sumitomo Financial Group	December 2002	Mitsui-Sumitomo Bank	104.6
<Regional Banks>			
Sapporo-Hokuyo Holdings	April 2001	<u>Hokuyo Bank, Sapporo Bank</u>	6.7
Momiji Holdings	September 2001	<u>Setouchi Bank, Hiroshima Sogo Bank</u>	2.7
Kyushu-Shinwa Holdings	April 2002	<u>Kyushu Bank, Shinwa Bank</u>	2.7
Ashigin Financial Group	March 2003	<u>Ashikaga Bank</u>	5.3
Hokugin Financial Group	September 2003	<u>Hokuriku Bank</u>	5.6

Notes. (1) Subsidiary banks and assets are as of March 2003.

(2) Lines below bank names denote that the bank is a regional bank.

all major banks except Sumitomo Trust Bank are now affiliated with bank holding companies (see Table I).

In contrast to major banks, most regional banks are still independent. Although there are about 120 regional banks, only five regional bank holding companies have been established as of 2004. Sapporo-Hokuyo Holdings was the first bank holding company that affiliated *regional* banks: Hokuyo Bank and Sapporo Bank. These two banks are operated in Hokkaido. The second regional bank holding company is Momiji Holdings, established in September 2001. Two regional banks in Hiroshima Prefecture, Setouchi Bank and Hiroshima Sogo Bank, are affiliated with Momiji Holdings. Two regional banks in Nagasaki Prefecture, Kyushu Bank and Shinwa Bank, established Kyushu-Shinwa Holdings in April 2002 as the third regional bank holding company.<sup>3</sup> In 2003, the Ashigin Financial Group and the Hokugin Financial Group were established.<sup>4</sup> These two holding companies are single-bank holding companies. Finally, two regional banks, Kinki-Osaka Bank and Nara Bank, joined

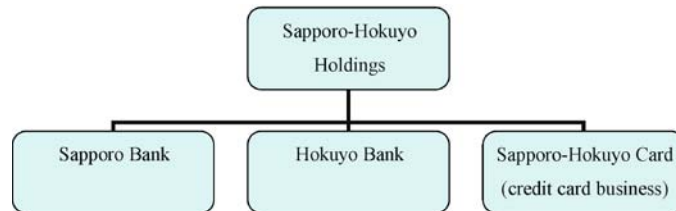


Figure 1. An example of Regional Bank Holding Company: Sapporo-Hokuyo Holdings.

Resona Holdings (formerly Daiwagin Holdings), a major bank holding company, in December 2001.

Figure 1 shows the basic structure of Sapporo-Hokuyo Holdings, the first and the largest regional bank holding company.<sup>5</sup> The structure of Sapporo-Hokuyo Holdings is very simple, and member banks still have a large degree of independence. Furthermore, the scope of the businesses of this holdings group is the same as that of participating banks before the group's formation. Its simple structure and high independence are in contrast with those of major bank holding companies. First, the banks participating in the major bank holding companies were usually reorganized, losing their independence. For example, Daiichi-Kangyo Bank, Fuji Bank, and Industrial Bank of Japan were reorganized to establish Mizuho Bank and Mizuho Corporate Bank, and Sanwa Bank and Tokai Bank were merged into UFJ Bank. Second, the major bank holding companies have various subsidiaries, such as commercial banks, trust banks, security companies, and credit card companies. For example, as of March 2003, UFJ Holdings had 115 consolidated subsidiaries, while Sapporo-Hokuyo Holdings had only 14 consolidated subsidiaries.

### 3. Efficiency Difference

#### 3.1. MOTIVATION

The growing bank consolidation in the U.S. strongly suggests that the benefits of consolidation exceed its costs. In fact, Kohers et al. (2000), reviewing previous empirical studies, concludes that recent bank consolidation in the United States enhances the efficiency of bank operations. However, this conclusion regarding U.S. consolidation may not be applicable to Japan, because of the different regulatory environments between the United States and Japan. As mentioned in Section 2, the scopes of the businesses of regional bank holding companies in Japan are almost the same as those of independent banks. Although the Financial Services Agency seems to believe that bank consolidation enhances the efficiency and profitability of regional banks, the fact that few consolidations occurred among regional banks may imply that the drawbacks of the consolidation exceed its benefits.

Though this issue is very significant to current banking policy, it has not been tested empirically. By estimating the cost and profit functions of regional banks, we investigate whether subsidiary banks under bank holding companies are more cost-efficient or profit-efficient than are independent banks.

### 3.2. METHODOLOGY

In order to obtain cost and profit inefficiency indexes of sample banks, we employ a stochastic frontier approach. Although frontier efficiency estimation has become a common approach in bank efficiency research, several estimation methods have been used in the literature. Particularly, to estimate the cost and profit functions, there are two popular specifications: the conventional translog function and Fourier-flexible function. In this paper, we employ the standard translog function, because the Fourier-flexible function approach requires a large sample to obtain accurate results and is more suitable for large banks (McAllister and McManus, 1993; Mitchell and Onvural, 1996).

First, the frontier cost function is given as

$$\begin{aligned} \ln TC = & \alpha_0 + \sum_{i=1}^3 \alpha_i \ln Y_i + \sum_{i=1}^3 \beta_i \ln P_i + \frac{1}{2} \sum_{i=1}^3 \sum_{j=1}^3 \alpha_{ij} \ln Y_i \ln Y_j \\ & + \frac{1}{2} \sum_{i=1}^3 \sum_{j=1}^3 \beta_{ij} \ln P_i \ln P_j + \sum_{i=1}^3 \sum_{i=1}^3 \delta_{ij} \ln P_i \ln Y_j + v + u, \end{aligned} \quad (1)$$

where  $\ln TC$  is the natural logarithm of total costs, consisting of funding, labor and capital costs,  $\ln Y_i$  is the natural logarithm of output  $i$  ( $= 1, 2, 3$ ),  $\ln P_i$  is the natural logarithm of price of the input  $i$ ,  $v$  is statistical noise, assumed to be distributed as a two-sided normal with zero mean and variance  $\sigma^2$ ,  $u$  is the inefficiency term, assumed to be distributed as a one-sided positive disturbance, and  $\alpha$ ,  $\beta$ , and  $\delta$  are coefficients to be estimated. Furthermore, following Mester (1996) and Allen and Rai (1996), we specify the distribution of the inefficiency,  $u$ , to be half-normal.

To ensure linear homogeneity in input prices, the following restrictions have to be imposed on the parameters in Equation (1):

$$\sum_{i=1}^3 \beta_i = 1; \quad \sum_{i=1}^3 \beta_{ij} = 0 \quad \text{for all } j; \quad \sum_{i=1}^3 \delta_{ij} = 0 \quad \text{for all } j. \quad (2)$$

Furthermore, the second order parameters in Equation (1) must satisfy the following symmetry conditions,

$$\alpha_{ij} = \alpha_{ji} \quad \text{for all } i, j; \quad \beta_{ij} = \beta_{ji} \quad \text{for all } i, j. \quad (3)$$



Estimates of this model can be carried out through the maximum likelihood procedure.<sup>6</sup> Observation-specific estimates of the inefficiency,  $u$ , can be calculated based on the estimated parameters and on the distribution of the inefficiency term conditional on the estimates of the composed error term, as proposed by Jondrow et al. (1982). When the distribution of the inefficiency is half-normal, the conditional mean of  $u$  is defined as

$$E(u | \varepsilon) = \frac{\sigma\lambda}{1 + \lambda^2} \cdot \left[ \frac{f(\varepsilon\lambda/\sigma)}{1 - F(\varepsilon\lambda/\sigma)} + \left( \frac{\varepsilon\lambda}{\sigma} \right) \right], \quad (4)$$

where  $\varepsilon$  is the sum of the two error terms in Equation (1) (i.e.,  $\varepsilon = v + u$ ),  $F(\cdot)$  and  $f(\cdot)$  are the standard normal distribution and the standard normal density function, respectively,  $\sigma$  is the sum of the standard deviations for  $v$  and  $u$  (i.e.,  $\sigma = \sigma_u + \sigma_v$ ), and  $\lambda$  is the ratio of the standard deviations of error components (i.e.,  $\lambda = \sigma_u/\sigma_v$ ), which is a measure of the relative contribution of inefficiency to noise for the sample banks.

We also estimate the frontier profit function. This estimation employs the following specification, which is essentially the same as the frontier cost Equation (1).

$$\begin{aligned} \ln \pi = & \alpha_0 + \sum_{i=1}^3 \alpha_i \ln Y_i + \sum_{i=1}^3 \beta_i \ln P_i + \frac{1}{2} \sum_{i=1}^3 \sum_{j=1}^3 \alpha_{ij} \ln Y_i \ln Y_j \\ & + \frac{1}{2} \sum_{i=1}^3 \sum_{j=1}^3 \beta_{ij} \ln P_i \ln P_j + \sum_{i=1}^3 \sum_{i=1}^3 \delta_{ij} \ln P_i \ln Y_j + v - u. \end{aligned} \quad (5)$$

Now, the dependent variable  $\ln TC$  is replaced with  $\ln \pi$ , and the inefficiency term is  $-u$ , where  $\ln \pi$  is the natural logarithm of profits.<sup>7</sup> Parameter restrictions specified by Equations (2) and (3) are also imposed, and observation-specific estimates of profit inefficiency are computed from the conditional distribution of  $u$  on  $\varepsilon$ , which is defined in a manner similar to Equation (4).

### 3.3. DATA

In this study, data are drawn from the *Analysis of Financial Statements of All Banks* for the fiscal year 2002 (from April 2002 to March 2003). Our sample consists of 117 banks: 64 first-tier regional banks and 53 second-tier regional banks. As mentioned above, only nine regional banks were affiliated with BHCs as of March 2003.<sup>8</sup>

It is controversial to define the inputs and outputs of banking firms. In the present paper, following Kasuya (1986) and McKillop et al. (1996), an intermediation approach is employed. Three outputs are considered: loans and bills discounted ( $Y_1$ ), securities plus trading account securities ( $Y_2$ ), and cash and cash due from



Table II. Descriptive statistics of the variables used in the model for fiscal 2002 (millions of yen)<sup>a</sup>

Variable	Mean	Median	St.Dev.	Min	Max
TC (total costs)	28186	24325	19691	3436	95330
$\pi$ (profit)	24470	17730	23498	932	142933
$Y_1$	1523960	1197095	1309183	129613	7902054
$Y_2$	519287	357821	497565	28165	2072948
$Y_3$	142819	111084	116786	11963	728277
$P_1$	8.7276	8.6377	1.3676	4.5643	12.8539
$P_2$	0.3989	0.3618	0.1538	0.1695	1.1948
$P_3$	0.0010	0.0008	0.0005	0.0004	0.0038

<sup>a</sup>Number of observations: 117 regional banks.

banks plus call loans ( $Y_3$ ). We include three inputs into the equation: labor (the annual average number of employees), capital (the value of movable and immovable capital), and funds (the amount of deposits). Unfortunately, as the input prices are not readily available, we use proxies for these prices. The labor price is defined as the ratio of personnel expenses to the average number of employees ( $P_1$ ), the price of capital in each bank is defined as the ratio of non-personnel expenses to the average value of movable and immovable capital ( $P_2$ ), and the price of funds is given by the ratio of interest expense on deposits to the average amount of deposits ( $P_3$ ). Total costs ( $TC$ ) are defined as a sum of labor expense, capital expense, and interest expense.

It is common to use ordinary profits as the dependent variable for the profit function. However, we use operating income minus total costs ( $TC$ ) as profits,  $\pi$ , in the profit function estimation because reported ordinary profits for Japanese banks are not considered as the best indicator for bank performance. First, ordinary profits depended on the subjective recognition of loan losses. For 2002 fiscal year, banks might post excessive loan-losses because of the FSA's relentless pressure. So, there is a possibility that reported profits do not reflect bank's true profits. Second, accounting standard for Japanese banks have been arbitrarily altered. The reported ordinary profits are very sensitive to such accounting rule changes. Third, many Japanese banks have suffered huge loan losses in recent years and not a few banks recorded negative ordinary profits for fiscal 2002. As the natural log of negative profits is not defined, estimation based on ordinary profits makes our sample too small.

Table II provides descriptive statistics for all variables used in the model.

### 3.4. EMPIRICAL RESULTS

In the interest of space, the parameters for both of the frontier cost and profit functions are not reported.<sup>9</sup> The majority of the parameters including  $\sigma$  and  $\lambda$  in (4)

Table III. Summary statistics regarding frontier inefficiency estimates for fiscal 2002

	Cost inefficiency	Profit inefficiency
<i>Pooled Results:</i>		
Mean	0.0802	0.1975
Min	0.0202	0.0395
Max	0.2847	0.7251
No. of observations		117
<i>Affiliated with BHCs:</i>		
Mean	0.1415 <sup>a</sup>	0.1560
Min	0.0488	0.0395
Max	0.2847	0.4320
No. of observations		9
<i>Independent banks:</i>		
Mean	0.0750	0.2010
Min	0.0202	0.0570
Max	0.2379	0.7251
No. of observations		108

<sup>a</sup>The mean value of banks affiliated with BHCs is significantly larger than that of independent banks based on the Mann-Whitney *U* test at a 1% critical level.

are estimated significantly in both functions. Furthermore, the regularity conditions evaluated for the mean values are also satisfied.

The summary statistics regarding frontier inefficiency estimates are reported in Table III. Here, as each observation-specific estimate of inefficiency is not statistically consistent, we employ a non-parametric test (i.e., Mann-Whitney *U* test) to compare the inefficiencies between BHC banks and independent banks. The cost inefficiency results indicate that independent banks are more cost-efficient than banks affiliated with BHCs. Furthermore, it is notable that one of the subsidiaries is the most inefficient bank.<sup>10</sup> This finding contrasts with Kohers et al. (2000), who find that recent U.S. bank mergers enhance efficiency. Of course, there is a possibility that inefficient banks had been forced to establish bank holding companies and that the positive effects of the BHC organization had not been realized by fiscal 2002.<sup>11</sup> Therefore, it may be too early to conclude that independent banks are more cost-efficient than are subsidiary banks, but to note that this result is not consistent with the FSA's current policy to encourage bank consolidation to increase banks' cost-efficiency.

It is also interesting that the cost inefficiencies of banks affiliated with the same bank holding company are not of the same level. For example, those of Hokuyo Bank and Sapporo Bank are 0.210 and 0.049, respectively. Also, those of Kyushu

Bank and Shinwa Bank are 0.099 and 0.151. This suggests that subsidiary banks are still independently operated even after participation in the bank holding company.

The results regarding profit inefficiency indicate that banks affiliated with BHCs are more profit-efficient than are independent banks, although the difference is not statistically significant. However, it is notable that the most profit-efficient bank is Hokuyo Bank, a subsidiary bank of Sapporo-Hokuyo Holdings. The establishment of Sapporo-Hokuyo Holdings increased its market power in Hokkaido, because Sapporo-Hokuyo Holdings is the largest bank group in Hokkaido with 6 trillion yen in deposits, while the second largest bank in Hokkaido is Hokkaido Bank with 3 trillion yen in deposits.<sup>12</sup> In contrast to Sapporo-Hokuyo Holdings, other regional bank holding companies do not enjoy great market powers. The total assets of Momiji Holdings were 2.7 trillion yen as of March 2003, while those of Hiroshima Bank, a leading bank in Hiroshima Prefecture, had total assets of 5.7 trillion yen. Estimated profit inefficiencies of Setouchi Bank and Hiroshima Sogo Bank are not low (i.e., 0.198 and 0.102, respectively). Kyusu-Shinwa Holdings (2.7 trillion yen in assets) exceeds Jyuhachi Bank (2.2 trillion yen in assets) to become the largest bank in Nagasaki Prefecture. Estimated profit inefficiencies of Kyushu Bank and Shinwa Bank are 0.131 and 0.103.

In summary, our results suggest that the establishment of regional bank holding companies in Japan enhances profit efficiency when bank consolidation reduces competitiveness in the regional market. As consolidation doesn't effect expense reduction, increased market power may raise profitability.

#### 4. Market Valuation

##### 4.1. MOTIVATION

The empirical results described in Section 3 fail to show that the regional BHCs are more cost-efficient than are independent banks, which stands in contradiction to the FSA's policy to encourage bank consolidation in order to enhance efficiency. Yet, the stochastic frontier approach may not have enough power to identify cost efficiency due to the fact that BHCs in Japan have had a very short history. If it takes a few years for benefits of consolidation to be realized, it is natural that an analysis that uses data for only 2002 cannot find significant differences between independent banks and banks affiliated with BHCs. So, we investigate the market valuation of the consolidation news in order to supplement our stochastic frontier approach. As stock price is the present value of expected future cash flows received by investors, the change in the stock price reflects how market participants evaluate the impact of the consolidation on the bank's future cash flows. If markets are rational, stock prices are an unbiased estimate of the present value of future cash flows. If rational markets anticipates that consolidation will increase future cash flows because of improvement in cost efficiency or profit efficiency, stock prices will rise when news of the consolidation becomes public.

Table IV. The event date for the regional bank holding companies

Regional BHCs	The event date
Sapporo-Hokuyo Holdings	February 9, 2000
Momiji Holdings	November 1, 2000
Kyushu-Shinwa Holdings	May 14, 2001
Ashigin Financial Group	December 10, 2002
Hokugin Financial Group	May 23, 2003

#### 4.2. METHODOLOGY

We use a standard event study methodology to investigate how the stock markets responded to the establishment of bank holding companies.<sup>13</sup> First, we carefully search Nihon Keizai Shinbun and Nikkei Kinyu Shinbum to find when news of the establishment of each bank holding company was first reported. For example, the case of Momiji Holdings was first reported in the morning paper on November 1, 2000, of Nikkei Kinyu Shinbum. According to the article, we also find that the news was not available at the market closing time on October 31. So, November 1, 2000, is set as an event date ( $t = 0$ ) for Momiji Holdings. The event dates for other BHCs are summarized in Table IV.

Second, we collect the closing stock prices of banks involved in the BHCs for the period from 120 trading days before the event date ( $t = -120$ ) to 10 trading days after the event date ( $t = +10$ ). For Momiji Holdings, we collect the stock prices of Hiroshima Sogo Bank and Setouchi Bank from May 12, 2000, to November 16, 2000.

Third, we estimate the standard market model, using the Tokyo Stock Price Index (TOPIX) as the market portfolio. The estimation period spans from 120 to 30 trading days before the announcement date of the establishment of the bank holding companies (i.e.,  $t = -120$  to  $t = -30$ ). In this paper, we use an equally-weighted portfolio consisting of the banks involved in each regional bank holding company and calculate the daily returns of this portfolio.

Fourth, using the estimated market model equation, we calculate abnormal returns (AR) for the portfolios from 10 trading days before the event date ( $t = -10$ ) to 10 trading days after it ( $t = 10$ ). AR is defined as the difference between the actual return and the predicted return based on the estimated market model. In addition, we calculate the cumulative abnormal return from the event date ( $t = 0$ ) to  $t_1$  days after the event ( $t = t_1$ ),  $CAR(0, t_1) = \sum_{t=0}^{t_1} AR_t$ . Then, we test whether AR (or CAR) is significantly different from zero.

#### 4.3. RESULTS

Table V shows the abnormal returns (AR) for each regional bank holding company around the event date.<sup>14</sup> The abnormal returns on event date ( $t = 0$ ) are

Table V. Reactions to news of the establishment of bank holding companies

Trading days	Sapporo-Hokuyo Holdings		Momiji Holdings		Kyushu-Shinwa Holdings	
	AR	<i>t</i> -statistics	AR	<i>t</i> -statistics	AR	<i>t</i> -statistics
-5	0.0153	0.99	-0.0019	-0.35	-0.0277	-2.07
-4	-0.0091	-0.59	-0.0012	-0.21	0.0179	1.34
-3	0.0007	0.04	-0.0033	-0.60	-0.0162	-1.20
-2	-0.0142	-0.91	0.0031	0.55	-0.0072	-0.54
-1	-0.0007	-0.04	-0.0095	-1.72	-0.0055	-0.41
0	-0.0020	-0.13	-0.0026	-0.47	0.0158	1.18
1	0.0392	2.53	0.0109	1.97	0.0009	0.07
2	0.0209	1.35	0.0074	1.33	0.0092	0.68
3	0.0167	1.08	0.0002	0.03	0.0034	0.25
4	-0.0144	-0.93	-0.0060	-1.08	0.0009	0.07
5	0.0201	1.30	-0.0002	-0.04	-0.0020	-0.15
Trading days	Ashigin Financial Group		Hokugin Financial Group			
	AR	<i>t</i> -statistics	AR	<i>t</i> -statistics		
-5	-0.0159	-0.76	0.0218	1.15		
-4	-0.0125	-0.60	-0.0125	-0.66		
-3	0.0148	0.71	-0.0112	-0.59		
-2	-0.0370	-1.78	-0.0059	-0.31		
-1	-0.0016	-0.08	-0.0083	-0.44		
0	-0.0089	-0.43	-0.0412	-2.17		
1	0.0121	0.58	0.0339	1.79		
2	-0.0293	-1.41	0.0051	0.27		
3	0.0157	0.75	0.0235	1.24		
4	-0.0307	-1.48	0.0163	0.86		
5	0.0117	0.56	-0.0365	-1.93		

insignificantly different from zero in all cases except for that of the Hokugin Financial Group. For the Hokugin Financial Group, the AR is significantly *negative* at the 5% critical level. Clearly, the market did not regard the establishment of regional bank holding companies as positive events. If it takes a few days for the news to be reflected in stock prices, we need to check cumulative abnormal returns (CAR). The CAR(0, 1) are insignificant in all cases.<sup>15</sup> However, it is notable that the abnormal return on  $t = 1$  for the Sapporo-Hokuyo Holdings is significant, although the CAR(0, 1) is not significant. This weak positive reaction is consistent with the results in Section 3 showing that Sapporo-Hokuyo Holdings increased its market powers and profit-efficiency.

We fail to find in most cases that the market regarded the news of the establishment of bank holding companies as relevant to banks' future values. However, we

have to admit the limitations of our analysis. The dates of the event (i.e., the date when the market participants first became aware of the plan to establish a bank holding company) are hard to determine. Usually, the establishment of a bank holding company is the final stage of a bank alliance. For example, the Nikkei Newspaper reported the alliance between Sapporo Bank and Hokuyo Bank on September 17, 1999. At that time, the article explained that it was not clear whether the alliance would be limited to certain businesses or lead to the establishment of a bank holding company. As the first news of the establishment of a bank holding company was revealed on February 9, 2000, we chose that day as the event date.<sup>16</sup> Of course, to the extent that market participants expected the establishment of BHCs, the abnormal return on our event date should be smaller. Therefore, the failure to find positive abnormal returns in response to the news of the BHC establishment may be due to misspecification of the event date.

#### 4.4. INEFFICIENCIES AND MARKET VALUATION

Several factors are known to affect the market valuations of bank consolidations. Kohers et al. (2000), reviewing previous studies, finds that the market reaction to bank mergers depends on bank's X-efficiencies, their relative size, and geographical diversification (i.e., interstate or intrastate mergers).<sup>17</sup> Hughes et al. (1999), among others, finds that the economic benefits of consolidation are strongest for those banks engaged in interstate expansion, because geographic expansion can diversify banks' macroeconomic risk. However, the geographic diversification effect of the BHCs seems not to be important for Japanese banks. There have not been any geographic branch restrictions on banks in Japan, although banks have to obtain approval from the Financial Services Agency (formerly the Ministry of Finance) when they open or relocate branches. Therefore, the bank holding company format has no relative advantage against independent banks for geographic expansion in Japan. Rather, Japanese bank holding companies aim to increase market shares in regional markets. For example, two regional bank holding companies affiliate banks that locate in the same city: Sapporo-Hokuyo in Sapporo city, Hokkaido, and Kyushu-Shinwa in Sasebo city, Nagasaki Prefecture. Hiroshima Sogo Bank and Setouchi Bank, under Momiji Holdings, are located not in the same city but in the same prefecture. As the Ashigin Financial Group and the Hokugin Financial Group are single-bank holding companies, it is clear that these holding companies do not diversify geographical risks.<sup>18</sup>

Finally, we investigate the relationship between market reactions and inefficiencies. For example, Kohers et al. (2000) finds that X-efficiencies help to explain the market's perception of mergers involving banks. We obtain the abnormal returns of each bank affiliated with regional bank holding companies in the same manner as that described in Section 4.2. Table VI shows the abnormal returns and inefficiency indices estimated in Section 3.<sup>19</sup> Sapporo Bank recorded the largest CAR(0, 1) of 6.5%, while Setouchi Bank recorded a negative CAR(0, 1) of -0.07%. The

Table VI. Abnormal returns and inefficiencies of regional banks affiliated with regional BHCs for 2002

	Abnormal Returns		CAR(0, 1)		Cost inefficiencies	Profit inefficiencies
	Value	<i>t</i> -statistics	Value	<i>t</i> -statistics		
Hokuyo	-0.0036	-0.172	0.0089	0.210	0.2103	0.0395
Sapporo	-0.0003	-0.013	0.0656	1.461	0.0488	0.0599
Setouchi	-0.0006	-0.067	-0.0007	-0.038	0.1238	0.1978
Hiroshima Sogo	-0.0046	-0.274	0.0172	0.507	0.0957	0.1021
Kyushu	0.0165	0.874	0.0199	0.528	0.0986	0.131
Shinwa	0.0151	0.837	0.0135	0.384	0.1508	0.103
Ashikaga	-0.0089	-0.426	0.0032	0.077	0.0758	0.2137

simple regression results between CAR(0, 1) and PI (profit inefficiencies) and between CAR(0, 1) and CI (cost inefficiencies) are as follows. The figures in the parentheses are *t*-values.

$$CAR = -0.19 \text{ PI} + 0.04, \quad \text{adj-}R^2 = 0.176.$$

(-1.51)      (2.42)

$$CAR = -0.22 \text{ CI} + 0.04, \quad \text{adj-}R^2 = 0.143.$$

(-1.41)      (2.23)

CAR are negatively related to PI (and CI), but both coefficients are insignificant.

To confirm the robustness of the above results for fiscal 2002, we also investigate the relationship between CAR and the cost inefficiencies estimated for fiscal 1999. Studies in the U.S. find that news of bank consolidation have larger wealth effects on inefficient banks. This finding is due to the fact that there is much room for improvement in inefficient banks and that consolidation will accelerate the banks' restructuring. Unfortunately, we fail to find any significant relationship between the CAR and the cost inefficiencies estimated for fiscal 1999.<sup>20</sup>

## 5. Concluding Remarks

The aim of this paper is to test the hypothesis that the regional bank holding company structure is more efficient and profitable than independent bank organization. This investigation has important implications for the current banking policy conducted by the FSA, which encourages regional banks to consolidate. Unfortunately, until the present there has been no study to test this hypothesis in Japan, while there have been many studies concerning this issue for U.S. banks. To test the hypothesis, we used the stochastic frontier approach and the market valuation approach. First, we estimated the cost and profit functions of regional banks and compared the estimated inefficiencies between independent regional banks and banks affiliated with BHCs.



We then used the market valuation approach to supplement the stochastic frontier approach.

Our first result suggests that the banks affiliated with bank holding companies are *not* more cost-efficient than independent banks, even though all banks officially explained that their intention regarding consolidation was to realize efficiency gains. Rather, we find that independent banks are more cost-efficient than are banks affiliated with BHCs. However, we should be cautious in drawing a final conclusion because of the brief history of each BHC. Therefore, it is fair to conclude that the formation of regional bank holding companies has not realized efficiency gains *so far*.

Second, we find that banks affiliated with bank holding companies are more profit-efficient than are independent banks. This is particularly apparent in that the establishment of the bank holding companies increases its regional market powers. The actual motivation for regional bank consolidation is apparently to obtain greater market powers. This supports the FSA's policy to increase the profitability of regional banks through bank consolidation. Of course, such increased profitability may be realized at the expense of the bank's customers. The total impact of the bank consolidation on social welfare is a topic for future study.

Finally, we used the market valuation approach to supplement the stochastic frontier approach. Based on the standard event study methodology, we found that the market does not regard news of the establishment of bank holding companies as significant events.

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### Notes

1. Of course, there is an agency problem between bank managers and shareholders. So, some consolidations are chosen by the managers due to their own interests. For example, Hughes et al. (2003) finds that some bank M&As in the United States are not value-enhancing and have been associated with managers' incentives for empire-building.
2. The Yen-Dollar Agreement in 1984 and the Japan-U.S. Insurance Talks in 1996 are examples. See Yamori and Baba (2000) for the Yen-Dollar Agreement and Yamori and Kobayashi (2004) for the Japan-U.S. Insurance Talks.
3. Kyushu Bank and Shinwa Bank were merged into a new Shinwa Bank in April 2003.
4. Ashikaga Bank failed in November 2003. Then, Ashikaga Bank was nationalized by the government and is owned by the Deposit Insurance Corporation. Since then, the Ashigin Financial Group had no bank subsidiary. Ashigin FG was forced to file a bankruptcy-reorganization plan in December 2003.
5. Among regional banks, Sapporo-Hokuyo Holdings is the fourth largest in assets (i.e., 6.7 trillion yen as of March 2003), following Yokohama Bank, Chiba Bank, and Shizuoka Bank.

6. The log likelihood function for the estimation is derived from the marginal density function of  $\varepsilon$ . The log likelihood function for the profit frontier estimation, described later, is also defined in the same way. See Kumbhakar and Lovell (2000) for more details.
7. The standard profit function is generally specified as a function of input and output prices. However, as Berger and Mester (1997) noted, it will be more appropriate for us to employ this alternative profit specification because information regarding output prices are not available.
8. Note that as the Hokugin Financial Group was established in September 2003, Hokuriku Bank is regarded as an independent bank in the following estimation.
9. Estimation results are available from the authors upon request.
10. As already mentioned, Ashikaga Bank failed in November 2003. Moreover, in June 2003, the Japanese Government quasi-nationalized the Resona Holdings by injecting 2 trillion yen into the Resona Holdings that has Kinki-Osaka Bank and Nara Bank as subsidiaries. As these failed BHC banks may unduly affect average efficiencies of the BHC group, we estimated the cost and profit inefficiency for the sample excluding these banks. First, for the sample excluding Ashikaga Bank, cost and profit inefficiency of the BHC banks remained almost the same as before. Second, for the sample excluding three banks, inefficiencies of the BHC banks became significantly smaller. The average cost inefficiency for BHC banks is 0.1194, and the average profit inefficiency for them is 0.1023. However, as BHC banks are less cost efficient and more profit efficient than independent banks, we conclude that the results are qualitatively the same as the results in Table III.
11. In fact, we estimated the frontier cost function for fiscal 1999. The average cost inefficiency for all banks is 0.070, while that for nine banks is 0.096. Therefore, nine banks were on average inefficient before the establishment of bank holding companies.
12. For example, Sapporo-Hokuyo Holdings' share of the loan market in Hokkaido has risen from 32% to 35% from 2000 to 2003.
13. We exclude Kinki-Osaka Bank and Nara Bank from our investigation in this section. These banks had been subsidiaries of Daiwa Bank before becoming a part of Resona Holdings (formerly Daiwagin Holdings). Therefore, it is very hard to specify the event date regarding these two regional banks.
14. We also test the AR and CAR by using a value-weighted portfolio of each bank holding company. In the case of a value-weighted portfolio, the weight is the ratio of the total value of the stocks of bank  $i$  at  $t$  to the total value of the stocks of all banks in the portfolio at  $t$ . As the results are essentially the same as those of an equally-weighted portfolio, we do not report them. That is,  $AR_0$  and  $CAR(0,1)$  are insignificant in all cases.
15. The full results are not reported in this paper due to space limitations. However, they are available from the authors upon request.
16. We also conducted the analysis by setting the event date at September 17, 1999, but failed to find significant abnormal returns.
17. Kohers et al. (2000) also finds that the market reaction to bank mergers depends on the method of payments to finance the merger (i.e., cash or stock offers) in the United States. Although this is an interesting issue, no Japanese bank holding companies paid cash at their establishment.
18. The prime markets of Hokkaido Bank, which will be merged into Hokugin FG in 2004, and Hokuriku Bank are Hokkaido and Toyama Prefectures, respectively. In this respect, Hokugin FG is the first regional bank holding company to diversify its geographical risks. However, as Hokuriku Bank had 25 branches in Hokkaido, Hokugin FG also aims to increase its market power in Hokkaido.
19. Although an event study can be performed in terms of Hokuriku Bank, it is not included in Table VI, because the inefficiencies in Section 3 were estimated for fiscal 2002, when Hokuriku Bank was an independent bank.
20. The 1999 results are not reported in this paper due to space limitations. However, they are available from the authors upon request.

## References

- Allen, L. and Rai, A. (1996) Operational efficiency in banking: An international comparison, *Journal of Banking and Finance* **20**, 655–672.
- Berger, A. N., Kashyap, A. K., and Scalise, J. M. (1995) The transformation of the US banking industry: What a long, strange trip it is been, *Brookings Papers on Economic Activity* **2**, 55–218.
- Berger, A. N. and Mester, L. J. (1997) Inside the black box: What explains differences in the efficiencies of financial institutions?, *Journal of Banking and Finance* **21**, 895–947.
- Japanese Bankers Association. (2001) *The Banking System in Japan*, Research Department of Japanese Bankers Association, Tokyo.
- Jondrow, J., Lovell, C. A. K., Materov, I. S. and Schmidt, P. (1982) On estimation of technical inefficiency in the stochastic frontier production function model, *Journal of Econometrics* **19**, 233–238.
- Hsu, R. C. (1999a) Antimonopoly Law, in his *The MIT Encyclopedia of the Japanese Economy (Second Edition)*, The MIT Press, Cambridge MA.
- Hsu, R. C. (1999b) Holding Companies, in his *The MIT Encyclopedia of the Japanese Economy (Second Edition)*, The MIT Press, Cambridge MA.
- Hughes, J. P., Lang, W. W., Mester, L. J. and Moon, C. (1999) The dollar and sense of bank consolidation, *Journal of Banking and Finance* **23**, 291–324.
- Hughes, J. P., Lang, W. W., Mester, L. J., Moon, C. and Pagano, M. S. (2003) Do bankers sacrifice value to build empires? Managerial incentives, industry consolidation, and financial performance, *Journal of Banking and Finance* **27**, 417–447.
- Kasuya, M. (1986) Economies of scope: Theory and application to banking. *BOJ Monetary and Economic Studies* **4**, 59–104.
- Kohers, T., Huang, M. and Kohers, N. (2000) Market perception of efficiency in bank holding company mergers: the roles of the DEA and SFA models in capturing merger potential, *Review of Financial Economics* **9**, 101–120.
- Kumbhakar, S. C. and Lovell, C. A. K. (2000) *Stochastic Frontier Analysis*, Cambridge University Press.
- McAllister, P. H. and McManus, D. A. (1993) Resolving the scale efficiency puzzle in banking, *Journal of Banking and Finance* **17**, 389–405.
- Mester, L. J. (1996) A study of bank efficiency taking into account risk-preferences, *Journal of Banking and Finance* **20**, 1025–1045.
- Mitchell, K. and Onvural, N. M. (1996) Economies of scale and scope at large commercial banks: Evidence from Fourier flexible functional form, *Journal of Money, Credit, and Banking* **28**, 178–199.
- McKillop, D. G., Glass, J. C., and Morikawa, Y. (1996) The composite cost function and efficiency in giant Japanese banks, *Journal of Banking and Finance* **20**, 1651–1671.
- Stiroh, K. J. (2000) How did bank holding companies prosper in the 1990s? *Journal of Banking and Finance* **24**, 1703–1745.
- Yamori, N. and Baba, T. (2000) Wealth effects of the financial internationalization: A case of the Yen-Dollar Agreement between the United States and Japan, *Applied Financial Economics* **10**, 193–198.
- Yamori, N. and Kobayashi, T. (2004) Does regulation benefit incumbent firms? An investigation of Japanese insurance market deregulation, *Journal of Insurance Regulation* **22**, 35–48.

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