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Financial Merging of Banks: Is it a "Silver Bullet" for the Second Financial Reform?

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A particular focus in this paper will be on operating efficiency which is one of the crucial indexes of the profit-earning capability of banking industry. We provide a quantitative investigation of operating efficiency among banks inside and outside of Financial Holding Company in Taiwan. The Data Envelopment Analysis (DEA) is manipulated to evaluate the annual technical efficiency (TE), pure technical efficiency (PTE), as well as the scale efficiency (SE). Moreover, the Malmquist Productivity Index (MPI) is also used to evaluate the productivity growth rates of sampling banks.

Field of Research: Data Envelopment Analysis, Financial Holding Company, Operating Efficiency, Malmquist Productivity Index

1. Introduction

Due to the privatization of State-Owned Banks (SOBs) in Taiwan since1991, the total amount of domestic banks increased from 25 to 53 until 2000, but decreased thereafter. Under the rapid expansion of existing banks, however, the demand for financial services did not rise equally, which caused the slash of the profit-earning capability in banking industry. Although the Ministry of Finance has been actively guiding the financial companies to merge in order to reduce hugely the number of banks, totally 48 domestic and 36 foreign-owned banks still exist in Taiwan until the end of 2007.

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Owing to continuously aggravating operational environment of banking industry, the government was compelled to practice the Second Financial Reform with the aim to accelerate financial globalization and liberalization, as well as to enforce its competition. Firstly, “The Financial Institutions Merger Act” was enacted to offer the relative legality for financial institution, and to provide the foundation to establish Asset Management Corporation (AMC). After “Financial Holding Company (FHC) Act” taking effect, the establishment of 14 FHC began to merge different businesses including Banking, Insurance Company, Securities Company, etc. Then, the practice of “Resolution Trust Corporation” and “Financial Asset Securitization Act”, which supported the banking industry to promote efficiency of assets, to solve unhealthy debts and to purify the quality of assets, contributed immensely to the progress of banks. Meanwhile, the Financial Supervisory Commission (FSC) in Executive Yuan was founded to maintain the harmonization of financial supervisory system and to make relative policy, which also expand economic scale, international competition and development by carrying out the merger of financial industry.

In terms of empirical analysis, we are interested in mapping an accurate picture of the operating efficiency among banks inside and outside of FHC to support the financial reform. The central value of the establishment of the FHC is to upgrade its competitiveness and to pursue profit through efficient management. However, can the subsidiary banks provide performance guarantee for earning more profit? This study primarily focuses on clarifying whether commercial banks under the FHC were more efficient than those commercial banks not belonging to the FHC. Meanwhile, we also want to discuss the following:

(1) Comparing the operating performance among banks inside and outside of FHC.
(2) Analyzing the degree and direction of inputs reducible or outputs increasable on the inefficient banks by Slack Variable Analysis.
(3) Using the MPI to measure the different change of efficiency of banks inside and outside of FHC.
(4) Some suggestions were given appropriately for commercial banks in Taiwan to improve their efficiency and competitive abilities.

The commercial banks in Taiwan were divided into two groups, financial-holding banks and non-financial-holding banks. Investigating period started from 2003 to 2005, and 36 banks were chosen. There were 43 domestic banks in the end of 2005. The research background, motivation, and

purpose are described in the introduction. The ways to evaluate performance and how to choose inputs and outputs were discussed and relative literatures, which applied DEA on banking performance, were introduced as well as the introduction of the MPI. Finally the important conclusions of the study are summarized and useful suggestions for banks and further researchers are offered.

2. Literature Review

To analyze the operation efficiency, some literatures are reviewed to demonstrate the empirical findings. Haslem, Scheraga and Bedingfield (1999) use DEA to measure the operating efficiency of U.S banks with capital assets between 45.8 and 163.8 billion separately in year 1987 and 1992. The empirical results showed that 20% of banks were operated inefficiently, only banks with larger scope and higher earnings were more efficient, but the larger banks were in the situation of decreasing return to scale. From the financial points of view, it was proved by DEA approach were actually inefficient. Miller and Noulas (1996) also used DEA approach to measure the relative technical efficiency, pure technical efficiency and scale efficiency of banks with capital assets over 1 billion in U.S, and got the inefficiency of the banking industry was 5% lower than before.

It is obvious that the operating efficiency between the domestic and foreign banks is different. Saha and Ravisankar (2000) measured the efficiency of 25 Indian commercial banks from 1992 to 1995 and found that most government-owned banks had significant improvement in their operating efficiency. Sathye (2001) used DEA to investigate the X efficiency of 29 Australian banks in 1996 and found that banks operated and invested by European and American companies were relatively inefficient than the domestic-operating banks. But Jemric and Vujcic (2002) analyzed bank efficiency in Croatia found that foreign-owned, new, and small banks were more efficient. Therefore, we can see the difference in bank operating efficiency between the developed and developing countries.

After the deregulation of financial market, most of the economists used the DEA approach to analyze the efficiency of bank operation. Some of the domestic and foreign banks join the competitive market to get the share. Hsu (2001) examined the efficiency of Taiwan’s commercial banks to manipulated

the efficiency of banks established before and after the deregulation, and evaluated the effect of the percentage of nonperforming loans. He selected input variables（assets, capital, labor expense, other expenses, the percentage of nonperforming loans）and output variables（loans, investment income, other income）to evaluate the efficiency of Taiwan commercial banks. The results indicated that the efficiency of foreign banks was better than domestic banks, banks established after the deregulation were better than before. The percentage of nonperforming loans really affected the efficiency, but the efficiency was gradually decreasing.

More recently, the deregulated banks should be monitored by Financial Holding Company (FHC). To analyzed the banks' difference in efficiency before and after the establishment of the FHC institution, Wu (2003) used the Tobit regression to investigate 31 domestic banks; includes 14 subsidiary banks under FHC and found that the efficiency of banks are almost the same before and after the establishment of the FHC institution, the efficiencies of financial holding bank were better than non-financial holding bank, especially in scale efficiency. It is also proved that there were positive correlation between branches, market share and technical efficiency while negative correlation between scale, risk and pure technical efficiency.

To compare the operating efficiency and productivity growth, Chen (2003) polled 47 banks by utilizing DEA and the Malmquist Productivity Index (MPI). Taking into account three input variables (capital asset, deposits hold and number of employees) and three output variables (investments, loans and other income), he found that the overall bank operating efficiency improved and followed the formation of FHC. The operating efficiency of subsidiary banks under FHC performs better than that of independent banks.

From the above literature, the major reasons which led to bank inefficiency were i.e. excessive deposits hold, insufficient investments, drastic reduction of income. Moreover, the overall productivity growth rates between subsidiary banks under FHC and independent banks were both in a growing trend, and closely resembled each other. Therefore, we try to analyze the operating efficiency of banks after financial deregulation in Taiwan and show the different dimensions to understand the difference between commercial banks inside and outside of Financial Holding Company (FHC).

3. Economic Method

3.1 Methodology

The original DEA approach must retrace to “The Measurement of Productive Efficiency”, edited by Farrell (1957). He applied production frontier and deterministic non-parametric efficiency frontier, which formulated with mathematical programming approach to measure efficiency. From the previous literatures, we know that it has been wildly applied in the banking industry, as a tool for improving and evaluating the operating efficiency.

The DEA approach is based on three assumptions: (1) production frontier is composed of most efficient decision making units (DMUs), and less efficient DMUs are below the frontier (2) production technology is CRS (3) frontier is convex to origin, and the slope is negative. Farrell (1957) had divided efficiency into Technical Efficiency (TE), meaning “given constant input factor, the ability to produce more output, given constant output operating with the least input excesses”, Allocation Efficiency (AE), means “the assessment of efficiency value using given relative price of cost-function”, and Overall Efficiency (OE), obtained from TE into AE. We illustrate their relationship by Figure 1.

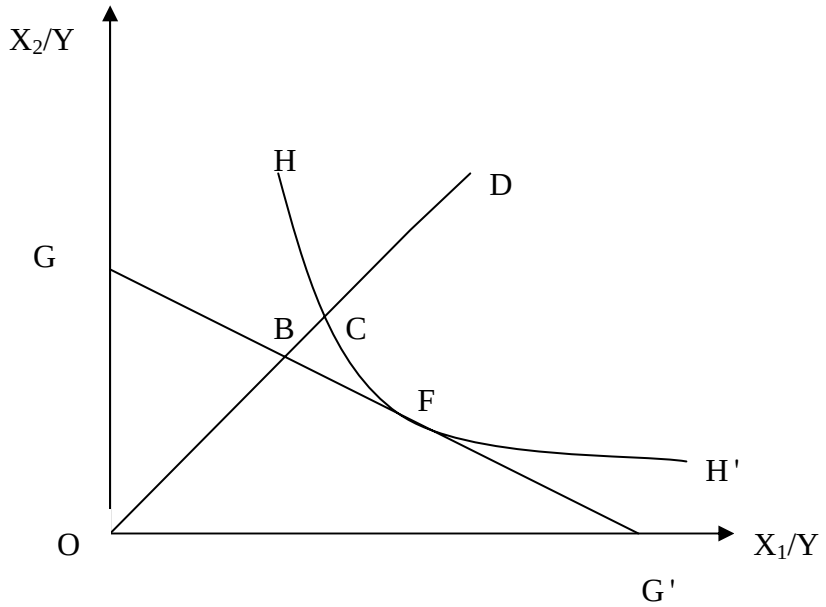

Figure 1: Technical and Allocative Efficiencies

We assumed two inputs (X_1, X_2) and one output Y, The curve HH' is isoquant satisfying technical efficient, also represents the minimum possible production

combination of (X_1, X_2) to produce one unit Y. Every point on isoquant is fully technical efficient with efficient score of 1. C is the projection of D, both of them can produce same units of Y. But the output quantity of C is OC/OD times of D, and then TE of C is OC/OD.

The line of GG' is isocost, its slope is the price ratio of (X_1, X_2), GG' interacts HH' at F. Minimization of the cost is possible if it produced at F; although C has identical TE as F, production cost of F is only OB/OC times of C. Further, D has identical AE as C, so AE of D is OB/OC. If D is complete efficient both on TE and AE, the output cost should be OB/OD. OE of D is OB/OD as well as multiplication of TE and AE. Therefore, we got OB/OD = OC/OD × OB/OC

3.2 CCR Model

Charnes, Cooper and Rhodes (1978) proposed a model assumed on constant return to scale (CRS) named as CCR model, which is only appropriate when all DMUs are operating at an optimal scale. In CCR model, output will proportionally increase in a constant rate as input increase, thus the efficiency score will be exactly the same under the output-oriented and input-oriented model.

The model assumes there are n DMUs, each DMU_j (j=1…n) uses m inputs, X_i (i=1…m), produce s outputs Y_r(r=1…s)

$$\text{Max} \quad H_k = \frac{\sum_{r=1}^{s} U_r Y_{rk}}{\sum_{i=1}^{m} V_i X_{ik}} \tag{1}$$

$$\text{s.t} \quad \frac{\sum_{r=1}^{s} U_r Y_{rj}}{\sum_{i=1}^{m} V_i X_{ij}} \leq 1$$

U_r、V_i 0 for all r and i

i= 1,2,..., m , j= 1,2,...,n , r= 1,2,...,s

We know the maximum efficiency score is 1 from equation (1), all DMUs could be objective function, corresponding constraint of them are the same. Efficiency score from DMU can be compared each other, also represents the TE. In order to solve the fractional programming model, Charnes, Cooper & Rhodes (1984) turned it into linear programming model. Two measurements are described as follows:

(1) Output-Oriented Measures

$$\text{Max} \quad H_k = \sum_{r=1}^{s} U_r Y_{rk} \qquad (2)$$

$$\text{s.t} \quad \sum_{r=1}^{s} U_r Y_{rj} - \sum_{i=1}^{m} V_i X_{ij} \le 0$$

$$\sum_{i=1}^{m} V_i X_{ik} = 1 \qquad U_r \cdot V_i \ge \varepsilon \ge 0 \quad \text{for all r and j}$$

i = 1,2,…..,m j = 1,2,….., n r = 1,2,….., s

The measurement aims to evaluate the efficiency score of DMU to produce the maximum output with a fixed amount of input.

(2) Input-Oriented Measures

$$\text{Min} \quad H_k = \sum_{i=1}^{m} V_i X_{ik} \qquad (3)$$

$$\text{s.t.} \quad \sum_{r=1}^{s} U_r Y_{rj} - \sum_{i=1}^{m} V_i X_{ij} \le 0$$

$$\sum_{r=1}^{s} U_r Y_{rk} = 1$$

$U_r, V_i \ge \varepsilon \ge 0$ for all r and j

i = 1,2,…..,m j = 1,2,….., n r = 1,2,….., s

The second measurement aims to solve the minimum of H_k with the fixed outputs. For equation (2) and (3), the solution of this linear programming is a best set of input and output weights (V_i,U_r). To consider DMU_k, there exists a best solution of weight (V_k,U_k) to produce max production efficiency score, and the weight is satisfied with all DMU.

3.3 The Malmquist Index

The CCR model assumes the technology level of each DMU unchanged when evaluating the efficiency. It might be inappropriate when panel data appears. Fare, Grosskopf, Lindgren and Roos (1992) defined a Malmquist Productivity Index (MPI) to solve the problem. The application of Malmquist index

decomposes the total factor productivity change (TFPch) into technical change (TECHch) and efficiency change (EFFch). Caves,Christensen & Diewert (1982) combined distance function with MPI to measure productivity. MPI is defined as the efficiency change of output between any two periods, using one as basic period. Distance ratio between period t and t+1 in terms of same technology is:

period t : $$M_0^t\left(X^{t+1},Y^{t+1},X^t,Y^t\right)=\frac{D_0^t\left(X^{t+1},Y^{t+1}\right)}{D_0^t\left(X^t,Y^t\right)} \quad (4)$$

period t+1 : $$M_0^{t+1}\left(X^t,Y^t,X^{t+1},Y^{t+1}\right)=\frac{D_0^{t+1}\left(X^{t+1},Y^{t+1}\right)}{D_0^{t+1}\left(X^t,Y^t\right)} \quad (5)$$

Fare et al (1994) specifies an output-based Malmquist productivity change index on CRS as:

$$M_0^{t,t+1}\left(X^t,Y^t,X^{t+1},Y^{t+1}\right)=\left[\frac{D_0^t\left(X^{t+1},Y^{t+1}\right)}{D_0^t\left(X^t,Y^t\right)}\times\frac{D_0^{t+1}\left(X^{t+1},Y^{t+1}\right)}{D_0^{t+1}\left(X^t,Y^t\right)}\right]^{\frac{1}{2}} \quad (6)$$

$M_0^{t,t+1} > 1$ → a positive TFP growth from period t to period t+1

$M_0^{t,t+1} < 1$ → a negative TFP growth from period t to period t+1

According to Fare, Grosskopf, Lindgren and Roos (1992), the Malmquist TFP index can be decomposed into technical change (TECHch) and efficiency change (EFFch), thus (6) can be decomposed into (7) and (8). Figure 2 is the illustration of MPI measurement.

$$\text{EFFch} = \frac{D_0^{t+1}\left(X^{t+1},Y^{t+1}\right)}{D_0^t\left(X^t,Y^t\right)} \quad (7)$$

EFFch > 1 → the managerial efficiency improved

EFFch < 1 → the managerial efficiency worsen

$$\text{TECHch} = \left[\frac{D_0^t\left(X^{t+1},Y^{t+1}\right)}{D_0^{t+1}\left(X^{t+1},Y^{t+1}\right)}\times\frac{D_0^t\left(X^t,Y^t\right)}{D_0^{t+1}\left(X^t,Y^t\right)}\right]^{1/2} \quad (8)$$

TECHch > 1 → the technology progressed

TECHch < 1 → the technology regressed

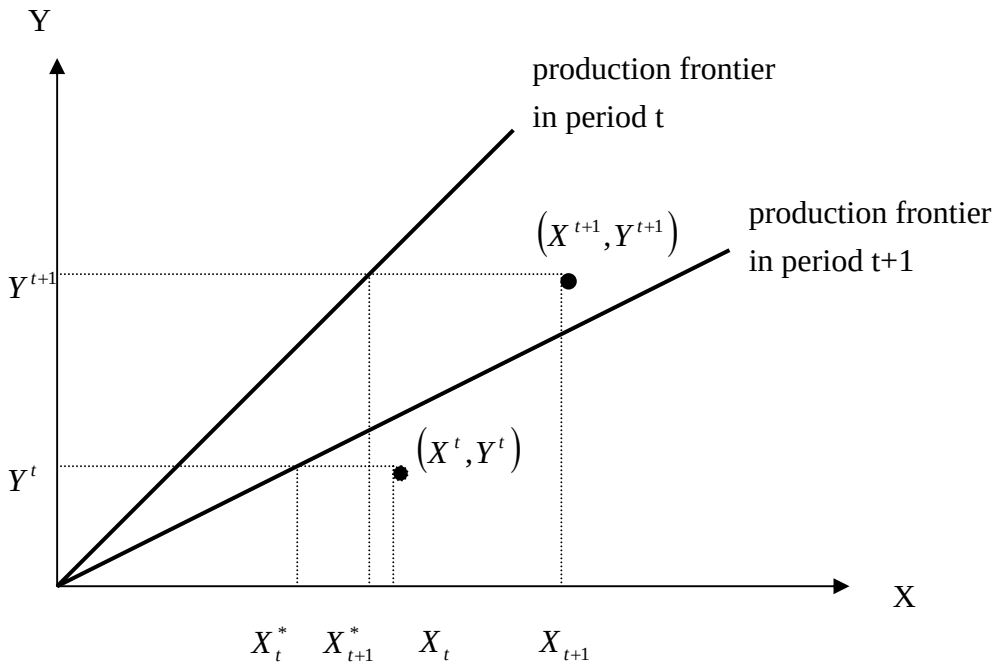

Figure 2 Malmquist Productivity Index

We can divide EFFch (7) into change of pure technical efficiency (PEch) and change of scale efficiency (SEch):

$$\text{PEch} = \frac{D_0^{t+1}\left(X^{t+1}, Y^{t+1} \mid VRS\right)}{D_0^{t}\left(X^{t}, Y^{t} \mid VRS\right)} \tag{9}$$

PEch > 1 → the efficiency improved

PEch < 1 → the efficiency worsen

$$\text{SEch} = \frac{D_0^{t+1}\left(X^{t+1}, Y^{t+1} \mid CRS\right) / D_0^{t+1}\left(X^{t+1}, Y^{t+1} \mid VRS\right)}{D_0^{t}\left(X^{t}, Y^{t} \mid CRS\right) / D_0^{t}\left(X^{t}, Y^{t} \mid VRS\right)} \tag{10}$$

SEch > 1 → the efficiency increased with raise of scale

SEch < 1 → the efficiency decreased with recession of scale

To sum up, MPI can be expressed as follows:

MPI = EFFch × Tech
= PEch × SEch × Tech

4. Empirical Analyses

4.1 Data Selection

Intermediation efficiency of bank's capital is very important, so we select variables by the general method, intermediation approach. In accordance with the proportion in the balance sheet and through the income statement, we choose the following variables.

1. Input factors

(1) Interest Expense: interest payment for deposits, loan capital and others
(2) Personnel Expense: wage pay for full-time and part-time employees
(3) Fixed Assets: fixed assets consist of land, property, equipment, etc.

2. Output factors

(1) Interest Income: interest revenue from loans, discount charge, placement, bonds and others
(2) Loans: including short-term, mid-term, long-term, overdraft, discount and negotiation
(3) Fee and Commission Revenue

3. The correlation between three inputs and three outputs

First of all, it is crucial to test if there is a high correlation between the selected outputs and inputs. Input and output variables must conform to the principle of Isotonicity. Pearson Correlation Coefficients Test was chosen as a test tool and results are listed in Table 1. All the inputs and outputs are highly correlated with each other. Thus it is appropriate to adopt the set input/output factors.

Table 1: Pearson Correlation Coefficients, N=36

	Output / Input	Interest income	Fee and commission	Loans
2003	Interest expense	0.930	0.485	0.979
	Personnel expense	0.970	0.762	0.915
	Fixed assets	0.910	0.669	0.879
	Output / Input	Interest income	Fee and commission	Loans
2004	Interest expense	0.894	0.497	0.963
	Personnel expense	0.959	0.727	0.927
	Fixed assets	0.901	0.666	0.882
	Output / Input	Interest income	Fee and commission	Loans
2005	Interest expense	0.890	0.557	0.963
	Personnel expense	0.930	0.712	0.938
	Fixed assets	0.881	0.654	0.901

Note: Correlation is significant at the 0.01 level (2-tailed)

4.2 Analysis of Annual Operating Efficiency

OE was firstly investigated, then the PTE and SE of 36 commercial banks from the beginning of 2003 to the end of 2005 by utilizing CCR and BCC model. The efficiency difference between financial holding bank and non-financial holding bank was later compared, and the reference relationship among DMUs was analyzed. Finally, the Slack Variable Analysis is performed for the discussion.

(1) Year 2003

Efficiency scores of all commercial banks in 2003 are described as follow: Average of OE is 0.905, average of PTE is 0.951, and average of SE is 0.951. OE of financial holding banks is better than non-financial holding banks (0.908 > 0.903).

(2) Year 2004

Efficiency scores of all commercial banks in 2004 are described as follow: Average of OE is 0.901, average of PTE is 0.946, and average of SE is 0.953. OE of financial holding banks is worse than non-financial holding banks (0.888<0.910).

(3) Year 2005

Efficiency scores of all commercial banks in 2005 are described as follow: Average of OE is 0.920, average of PTE is 0.971, and average of SE is 0.946. OE of financial holding banks is worse than non-financial holding banks (0.906<0.928).

4.3 Analysis of Malmquist Productivity Index

In order to assess changes in productivity over time, we apply the MPI to discuss the variation of bank's productivity in different periods, and provide for DMUs to improve productivity. MPI is the product of efficiency change (EFFch) multiplied by technical change (TECHch), i.e. MPI = EFFch × TECHch., EFFch represents the improvement degree of efficiency change of the bank from period t to period t+1, which can be expressed as below.

$$\text{EFFch} = \frac{\text{difference of input and output between any bank and efficient bank in period t+1}}{\text{difference of input and output between any bank and efficient bank in period t}}$$

Efficiency change is the degree of imitation, if EFFch is greater than 1, it indicated that the efficiency would be better than before; if EFFch is less than 1, efficiency would be worse. TECHch represents the variation degree of production technology of the bank from period t to period t+1; it is also the

geometric mean of the variation of production technology in period t+1 and that in period t. Technical change is the degree of innovation. If the values of TECHch are greater than 1, it suggested that there has an improvement in production technology; while values less than 1, it suggested the opposite. Total Factor Productivity change (TFPch; MPI) represents the variation degree of entire productivity of the bank from period t to period t+1. It is the product of EFFch and TECHch. If TFPch is greater than 1, productivity would be better; while TFPch is less than 1, productivity would be converse. Table 2 describes each index of variation from 2003 to 2005.

Table 2: The Variation of Index for Individual Bank from 2003 to 2005

DMU	EFFch	TECHch	PEch	SEch	TFPch	Rank
Chiao Tung Bank	1.000	0.990	1.000	1.000	0.990	23
ICBC	0.894	1.108	1.000	0.894	0.990	23
First Bank	0.987	0.948	0.956	1.032	0.935	33
Hua Nan Bank	0.974	0.953	0.990	0.984	0.928	34
China Trust Bank	1.000	0.949	1.000	1.000	0.949	30
TaiShin Bank	1.000	1.044	1.000	1.000	1.044	12
TaipeiFubon Bank	1.000	1.097	1.000	1.000	1.097	1
E. Sun Bank	1.005	0.970	1.001	1.004	0.975	27
Sinopac Bank	0.983	1.096	1.018	0.966	1.078	2
Shin Kong Bank	1.032	0.909	0.946	1.091	0.938	32
JihSun Bank	1.007	0.993	1.010	0.997	0.999	19
FuHwa Bank	1.000	1.029	1.000	1.000	1.029	14
Cathay United Bank	1.000	1.012	1.000	1.000	1.012	17
Lucky Bank	1.098	0.954	1.055	1.041	1.047	9
Average of FHBs	0.999	1.004	0.999	1.001	1.001	
Chang Hwa Bank	0.997	0.943	1.000	0.997	0.940	31
Bank Of Overseas Chinese	1.077	0.946	1.062	1.014	1.019	16
Shanghai Bank	0.938	0.994	0.937	1.001	0.932	35
Taiwan Cooperative Bank	0.935	0.975	1.000	0.935	0.912	36
The Farmers Bank of China	1.000	0.993	1.000	1.000	0.993	21
Sunny Bank	1.159	0.921	1.117	1.037	1.067	5
Bank Of Panhsin	0.994	0.981	1.007	0.987	0.975	27
COTA Bank	1.000	1.012	1.000	1.000	1.012	17
Union Bank Of Taiwan	0.957	1.069	0.998	0.959	1.023	15
The Chinese Bank	1.000	0.999	1.000	1.000	0.999	19
Far Eastern Bank	1.000	1.047	1.000	1.000	1.047	9
Hwatai Bank	1.154	0.926	1.050	1.099	1.069	4
Cosmos Bank	1.000	1.056	1.000	1.000	1.056	7
Bowa Bank	0.985	1.000	1.081	0.911	0.985	25
Ta Chong Bank	1.005	1.049	1.005	1.001	1.054	8
En Tie Bank	1.000	1.072	1.000	1.000	1.072	3
Makoto Bank	1.058	0.988	1.028	1.030	1.046	11
Chinfon Bank	0.924	1.059	1.039	0.890	0.979	26
International Bank of Taipei	1.004	1.027	1.000	1.004	1.031	13
Hsinchu Bank	1.046	0.932	1.030	1.015	0.975	27
Taichung Bank	1.087	0.982	1.086	1.001	1.067	5
Kaohsiung Bank	1.027	0.966	1.014	1.013	0.992	22
Average of non-FHBs	1.016	0.997	1.021	0.995	1.011	
Average of all banks	1.008	0.998	1.011	0.996	1.006	

From the results of Table 3, there were six financial holding banks and 12 non-financial holding banks whose MPI greater than 1; in other words, 43% financial holding banks and 55% non-financial holding banks performed better in productivity. Obviously, deregulation had a positive effect on all commercial banks.The productivity improvement of financial holding banks in the past three years mainly came from the raise of production technology (TECHch=1.004, EFFch=0.999). This indicated that the major strategy to upgrade productivity in the increasingly competitive market is to innovate and promote new financial commodities, and to lower cost by reorganizing operational system. The productivity improvement of financial holding banks in the past three years mainly generated from the raise of efficiency (TECHch=1.016, EFFch=0.997). For further analysis, the technical efficiency regression of financial holding banks was resulted by the aggravation of pure technical efficiency (PEch=0.999, SEch=1.001); the technical efficiency progress of financial holding banks was resulted by the raise of pure technical efficiency (PEch=1.021, SEch=0.995).Average EFFch of all banks in 2004 were better than that in 2003; however, average EFFch of all banks became worse in 2005.

Table 3 TFP of banks inside and outside of FHC

2003~2004	EFFch	TECHch	PEch	SEch	TFPch
FHBs	0.980	1.129	0.993	0.986	1.096
Non-FHBs	1.015	1.118	0.999	1.016	1.129
Average	0.996	1.117	0.995	1.001	1.112

2004~2005	EFFch	TECHch	PEch	SEch	TFPch
FHBs	1.025	0.896	1.005	1.022	0.918
Non-FHBs	1.021	0.894	1.045	0.976	0.910
Average	1.019	0.892	1.028	0.991	0.909

5. Conclusions and Suggestions

The study utilized the DEA to evaluate the operating efficiency of banking industry in Taiwan and discussed the difference between banks inside and outside of FHC. Besides, the MPI was also used to measure the variation of bank’s productivity in different periods. By Intermediation Approach, interest

payment, personnel expense and fixed assets were selected to be the input variables; while interest income, commission income and loans were the output variables. All of them conformed to the principle of Isotonicity, and are highly correlated with each other. Thus it is appropriate to adopt the input/output factors analysis we used. In respect of overall efficiency, financial holding banks performed averagely better than non-financial holding banks in 2003; but the situation became worse in 2004 and 2005. The average OE of non-financial holding banks in 2004 and 2005 were 0.910 and 0.928 respectively, while that of financial holding banks were 0.888 and 0.906.

Under the consideration of scale efficiency, we can see whether the banks were on IRS or DRS by analysis of scale efficiency. If it is on DRS, the bank should expand its production scale; if it is on IRS, the bank should reduce its production scale. We inferred the reason might be that the establishment time of FHC was too short for subsidiary bank to perform resources mutually and lower cost under the enormous scale of assets mergence. The DEA is a horizontal method to evaluate efficiency scores each year. The study used MPI to measure the EFFch, TECHch, PEch, SEch and TFPch of all banks. The empirical results revealed that there were six financial holding banks and 12 non-financial holding banks whose MPI greater than one; in other words, 43% financial holding banks and 55% non-financial holding banks make progress in productivity. Deregulation is a positive effect to all commercial banks. Besides, the average EFFch of all banks in 2004 were better off than that in 2003; however, the average EFFch of all banks were worse off in 2005.

The ignored side of the Second Financial Reform Policy is that the merger of financial organizations should be based on a sound market mechanism, instead of political intervention. In terms of the globe trend of financial industry merger, many successful examples, such as HSBC and Standard Chartered Bank (Hong Kong) Limited, were based on the robust, healthy and well regulated financial system. This study suggests that the bank should strengthen its financial system first to enhance the efficiency before pursuing the expansion of economic scale.

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