Cost Efficiency Affects Sustainable Operations

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ABSTRACT

This study adopted a cost efficiency model to assess the operational efficiency of the banking industry in Taiwan. Empirical results show that the Bank of Taiwan, Taiwan Cooperative Bank, and First Commercial Bank have higher operational efficiency than the other banks. Banks with relatively low operational efficiency include Taipei Star Bank, the Enterprise Bank of Hualien, which was merged into the CTBC Bank, and the ABN AMRO-acquired Taitung Business Bank, which together with ABN AMRO's other business in Taiwan, was later acquired by the Australia and New Zealand Banking Group (ANZ) and renamed ANZ Bank (Taiwan). These findings show that banks with low operational efficiency are unable to maintain sustainable operations.

Keywords: Operational Efficiency, Cost Efficiency, Data Envelopment Analysis
JEL Classifications: C1, G1, J3

1. INTRODUCTION

Although financial indicators can be used to measure operational efficiency objectively, they are unable to reflect comprehensively the differences between business units. Stochastic frontier analysis (SFA) is one such commonly applied parametric analysis technique that does not utilize financial indicators. Its functional form is unconvincing and lacks popular support. Data envelopment analysis (DEA) is one of the main non-parametric analysis methods. DEA is not restricted to a set form or sample size, is applicable to the analysis of issues with multiple inputs and outputs, and is free from subjective influence. In addition, DEA can provide a wide range of information regarding resource usage and the efficiency improvement of relevant units. Berger and Mester (2003), Sturm and Williams (2004), Singh and Kaur (2016), Defung et al. (2016), and Apergis and Polemis (2016) have all utilized DEA to assess the operational efficiency of banks.

Most studies that have applied DEA to the evaluation of efficiency in the banking industry have adopted the intermediation approach. This approach views banks as intermediaries for the transfer of capital between suppliers and users of funds (Ho et al., 2008). This approach agrees with Kamau's (2011) suggestion

that the banking industry plays an important role as a financial intermediary. However, the efficiency values between business units are notoriously difficult to obtain and the majority of DEA analysis only provides approximate values, making it difficult to conduct a comparative analysis. Therefore, this study adopted the intermediation approach to conduct DEA analysis to assess the efficiency of the banking industry in Taiwan. In addition, the cost efficiency model proposed by Nguyen et al. (2016) was also considered to improve the DEA model efficiency assessment.

To our knowledge, no studies have applied a cost efficiency model assessment of the operational efficiency of Taiwan's banking industry. This study's findings reveal that the Bank of Taiwan, Taiwan Cooperative Bank, and First Commercial Bank have a relatively higher operational efficiency, whilst the Taipei Star Bank, the Enterprise Bank of Hualien, and the Taitung Business Bank, have a significantly lower operational efficiency. Among the banks with low efficiency, Taipei Star Bank was assigned a National Long-Term Rating of "A-(twn)" by Fitch Ratings in 2008, the Enterprise Bank of Hualien was acquired by the CTBC Bank, and the Taitung Business Bank was acquired by ABN AMRO from the Netherlands. ABN AMRO then sold its business in Taiwan to ANZ which on completing the merger and acquisition process,

renamed the Taitung Business Bank as ANZ Bank (Taiwan). From this information, it is apparent that banks with low operational efficiency lack the ability to maintain sustainable operations.

The remainder of this paper is arranged as follows. Section 2 reviews past literature, Section 3 introduces the research design, Section 4 presents the results of the empirical analysis including a descriptive analysis of the sample and an analysis of the banks' operational efficiency, and Section 5 presents the conclusion.

2. LITERATURE REVIEW

The majority of a banks funding is derived from public deposits and financial markets which makes the banking industry an important financial institution (Edwards and Mishkin, 1995) and Chin (2007). Most studies that have applied the DEA method to assess the operational efficiency of the banking industry have adopted an intermediation approach, which accepts that banks act as a financial service intermediary providing loans, economic surplus, and investments as their outputs, and various capital costs such as interest costs, labour costs, and operating costs as their inputs (Chen and Fang, 2011).

Farrell (1957) illustrates how operational efficiency can be measured under the assumption of constant returns to scale, a company invests multiple inputs to obtain a single output. Its technical efficiency can thus be measured. If information of the input price can be obtained, then the cost efficiency can also be measured. Let w represent the input price vector and X be the input vector used at P. Q is the degree of technical efficiency, and X* is the input vector of Q. X* represents the input vector at the minimum cost point.

Cost efficiency is a quality indicator that measures cost effectiveness, that is, it indicates the relative efficiency of inputs and outputs. Specifically, it is the efficiency of using minimum cost to produce a certain number of units of output. Cost efficiency is used to measure the proximity between the actual cost of a decision-making unit (DMU) and the unit cost at an efficient frontier or ideal operating level when the market environment and number of outputs remain constant (Farrell, 1957; Nguyen et al., 2016). This study referred to the assessment models proposed by Farrell (1957) and Nguyen et al. (2016) and employed the intermediation approach of the DEA method to assess the operational efficiency of Taiwan's banks.

3. RESEARCH DESIGN

The study utilized Taiwanese banks as research subjects and collected the total value of accruals declared from 2005 to 2015. These were deflated by the total value of assets at the beginning of the fiscal year for further analysis. After excluding incomplete data, data on 435 accruals of 51 banks were available for analysis. All data were extracted from the Taiwan Economic Journal database.

First, we defined the costs of a given DMU as C, and the minimum cost of the unit at the efficient frontier as C*; the cost efficiency of the DMU was defined as CE=C*/C. This means that when output remains constant, the saved costs of the DMU is defined as (1-CE) × 100%. Therefore, the values of banks' cost efficiency (CE), calculated based on this model, should be within the range of (0, 1). The efficiency of the banks can then be ranked based on the value of CE.

Table 1: Average rankings of banks' annual efficiency (2005–2015)

1	Bank of Taiwan	11	Taipei Fubon Bank	21	Standard Chartered	31	Ta Chong Bank	41	Bank of Panhsin
2	Taiwan Cooperative Bank	12	Farmers Bank of China	22	International Bank of Taipei	32	Taichung Commercial Bank	42	King's Town Bank
3	First Commercial Bank	13	Bank SinoPac	23	Asian Development Bank	33	Entie Commercial Bank	43	KGI Bank
4	Land Bank of Taiwan	14	Central Trust of China	24	HSBC Bank (Taiwan)	34	Sunny Bank	44	ANZ (Taiwan)
5	Mega International Commercial Bank	15	E.SUN Commercial Bank	25	Shin Kong Bank	35	Bank of Kaohsiung	45	COTA Bank
6	Hua Nan Bank	16	Bank of Communications	26	Citibank Taiwan	36	Bowa Bank	46	Export–Import Bank of the Republic of China
7	CTBC Bank	17	The Chinese Bank	27	Yuanta Commercial Bank	37	Jih Sun International Bank	47	Hwatai Bank
8	Cathay United Bank	18	Taishin International Bank	28	OCBC Bank	38	DBS Bank Taiwan	48	Chinfon Commercial Bank
9	Chang Hwa Bank	19	Shanghai Commercial and Savings Bank	29	Union Bank of Taiwan	39	Industrial Bank of Taiwan	49	Taitung Business Bank
10	Taiwan Business Bank	20	Agricultural Bank of Taiwan	30	Far Eastern International Bank	40	Lucky Bank Taiwan	50	Taipei Star Bank
								51	Enterprise Bank of Hualien

4. RESULTS AND ANALYSES

Table 1 shows the average rankings of the banks' annual efficiency. The top three were the Bank of Taiwan, Taiwan Cooperative Bank, and First Commercial Bank, indicating that they have a higher operational efficiency. The bottom three banks were the Taitung Business Bank, Taipei Star Bank, and Enterprise Bank of Hualien.

5. CONCLUSION

This study adopted an intermediation approach and utilized cost efficiency values to assess the operational efficiency of banks, which complemented the shortcomings of using DEA for efficiency analysis. The Bank of Taiwan, Taiwan Cooperative Bank, and First Commercial Bank were found to have higher operational efficiency than the other banks, while the Taitung Business Bank, Taipei Star Bank, and Enterprise Bank of Hualien were found to have lower efficiency.

Furthermore, the Taipei Star Bank was assigned a National Long-Term Rating of "A-(twn)" by Fitch Ratings in 2008, the Enterprise Bank of Hualien was acquired by the CTBC Bank, and the Taitung Business Bank was acquired by ABN AMRO from the Netherlands and after a subsequent sale was renamed the ANZ Bank (Taiwan). In conclusion, the results show that it is extremely difficult for banks with low efficiency to maintain sustainable operations.

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