

## A NON-PARAMETRIC ANALYSIS ON ANCHOR BANKS IN MALAYSIA

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**Abstract**—This study tries to identify the effects of the consolidation program on Malaysian anchor banks which was launched in 1999. Furthermore, the study tries to find out the technical and scale efficiency scores of 9 Malaysian anchor banks from 1993 to 2009 using DEAP program. Trend analysis tracks the technical and scale efficiency scores of banks in Malaysia in order to find out the effects of the consolidation program. Meanwhile, the cross-sectional analysis was conducted to compare the scale and technical efficiency of all Malaysian anchor banks to find the leading banks for each year. Finally, the study will specify which banks are the most successful in exercising consolidation program to increase their technical and scale efficiency as well as to find whether consolidation program in Malaysia is successful or not.

**Keywords** -bank consolidation, technical efficiency, scale efficiency

### I. INTRODUCTION AND BACKGROUND

The intention of many companies to consolidate has spread across the world. This phenomenon attracts a lot of companies in different sectors of the market. One of the sectors that really attracted is banking industry. In fact, bank consolidation is one of the most attractive issues in the field of financial market and banking. Research about this topic has increased in 1980. Most of these researches encompass the topic of the efficiency and effectiveness of the financial institutions. The scope of this research has become wider in recent years which talk about the systematic risk on the financial systems. The main idea underlying the consolidation policy is that bank consolidation program should reduce the insolvency risk through asset diversification (Shih, 2003). There are number of studies that state a risk diversifying has a positive effect on bank consolidation. On the other hand, many studies suggest that bank consolidation do not significantly improve the performance and the efficiency of banks (Berger et al, 1999; Amel et al, 2002). Because of the assumption that bank consolidation will help financial institutions and the economy, lawmakers allowed financial institutions such as insurance companies and saving institutions to use their funds in more flexible manner. After 1990s, many financial institutions use different types of financial products and services in order to gain more market share in a highly competitive environment. The appearance of World Wide

Web has also affected the consolidation program as well. Many of commercial banks found online entities to lower the cost. By lowering the cost, they can offer financial products and services better. For instance, they cut their operating costs and use their saving to offer loans with lower interest rate or they can offer higher rate to investors who made deposit. By using this policy, they attract more customers in a market. Therefore, the level of competition was increased. Commercial banks have merged with saving institutions, security firms, finance companies and mutual funds to share their resources and provide more diversified products and services. When regulations has allowed financial institutions to behave in more flexible manner, many financial institutions such as commercial banks merged or acquire other banks in order to benefit from economies of scales and economies of scope.

As discussed earlier, one of the advantages of bank consolidation is on the value of the firms. The value can be increased by increasing the economies of scale and also the economies of scope. Economies of scale and economies of scope can increase the cash flow of consolidated firm. Another advantage of the consolidation addresses consumers of banks. Conglomerates provide access to life insurance, mutual funds and loans at one point. In other words, the access or convenience of the services becomes easy. Therefore, consolidation diversifies the service offered by banks and the risk of the company in both financial and business perspectives is reduced. Bank consolidation is not limited into the borders. Many banks want to exploit more benefit by expanding globally. Many commercial banks, depository institutions and financial firms exercise merger activity internationally to gain more profit.

By merging two corporations, benefits obtained for both parties. For instance, two corporations merged. One of them is popular for giving different types of loan to its customers whereas the other is professional in underwriting activities. Let's say one of these corporations located in Malaysia and the other in Singapore. Malaysian banks whose professions are in underwriting activity can offer its services to Singaporean customers whereas Singaporean banks can make loan for Malaysian customers.

Change in legislation, regulation and competition in banking as well as trends in the economy have influenced the profitability and viability of many banks. There are some

phenomena that affect the long term profitability of the banks. As a result of these three phenomena that will be described below, many financial institutions are forced to exercise merger activity. In other words, it puts pressure on banks profit that can be removed by exercising mergers. New competition for banks has developed from both financial and non financial firms. Saving institutions compete for bank transactions account for traditional bank lending markets. Many of the banks are less regulated and able to exploit synergies of offering services in conjunction with activities forbidden to banks such as security underwriting and selling insurance. Banks and saving institutions have lost the legal protection of the cost of their funds and their monopoly on offering consumer saving accounts. Government forces to deregulate interest rates on consumer time and saving accounts to authorize interest bearing checking accounts to enable banks to compete with unregulated and booming money market funds. Banks position as credit granting intermediaries has been eroded by alternative lower cost form of credit extension. The financial markets such as bond markets, money markets and equity markets provide more credit to borrowers. The transaction cost of direct credit intermediation is only a small fraction of the cost the traditional arrangement of bank deposit-loan intermediation.

Another important issue to discuss is about the value of the potential merger. It's important to understand how to determine the value of a target bank. Two steps should precede the valuation itself. First, the acquiring bank should determine its acquisition goals and priorities. The goals should be ranked in order of importance, maximizing shareholders wealth, maximizing profits, minimizing risk, increasing management prestige, achieving growth rate, entering new market and economies of scale. The ranked goals should be consistent with bank's objectives. Second, the acquiring banks should carefully evaluate its performance. Self assessment enhances the ability of the acquiring bank to set objectives and permit flexibility in terms of what management considers as an important aspects of pre-acquisition conditions. There are several methods that can be used to evaluate the performance, risk and other aspects of bank after exercising merger. One of the methods is to develop a range of values and exchange ratios that compare a bank before and after the consolidation program. Some of the data that can be compared are book value, price-earning and earning.

## II. BANK CONSOLIDATION IN MALAYSIA

In Malaysia, consolidation program was important in order to survive following the Asian financial crisis. Many financial institutions loss great amount of money during the crisis because of factors such as non-performing loans, negative shareholders equity and also their inability to raise capital. As a result of the Asian financial crisis, Gross national product, GNP, of Malaysia decreased from 90 to 55 billion dollar. Bank Negara Malaysia announced the bank consolidation program for domestic banks on 29 July 1999. Following the announcement of bank consolidation in that time, Bank Negara Malaysia gave some flexibility for the program. It let domestic banks to choose their own merger

group and also the authority to elect their leader in order to lead the consolidated bank. Financial institutions are forced to revert to Bank Negara Malaysia by the end of January 2000 on their merger grouping. After approval of the principle of the new merger grouping by Bank Negara Malaysia, domestic banks were allowed to terminate their previous activities with their partners and launch their merger exercise by the end of December 2000. Another announcement released on 21 October 1999 that explained about the outline of the merger program.

Existence of an integrated financial system in Malaysia is necessary for the economy and also for the country. Fragmented financial systems and existence of many unrelated financial institutions and banks increase the vulnerability of the financial systems and also the aggregate economy. There were 55 financial institutions in Malaysia before 1999, which consist of 20 commercial banks, 23 finance companies and 12 merchant or investment banks. Then, the policy of consolidating domestic banks has become the first priority of Bank Negara Malaysia.

At first, bank consolidation program took place for finance companies in Malaysia. After that, Malaysian commercial banks shift themselves to this program as they perceived this program can benefit them in different aspects. At the end of March 1998, Bank Negara Malaysia has announced that all finance companies accept the program and also the proposed merger partners. At first stance, there were 15 finance companies that consolidated into 6 anchor finance companies. Bank Negara Malaysia intended to encourage other financial institutions to join this program. As a result, it agreed to extend a one year guarantee to the value of acquired assets. Then, commercial banks exercised merger activity and obtain assets and liabilities of 14 institutions. Commercial banks are not allowed to conduct any kind of hire purchase business. The business will be transformed to the portfolio of the existing finance companies in the respective banking group (Bank Negara Malaysia, 31 March 1998).

At the end of 2001, financial institutions are consolidated into 10 original anchor banks including Affin Bank Group, Alliance Bank Group, AmBank Group, Bumiputra Commerce, EON Bank Group, Hong Leong Group, Malayan Banking Group, Public Bank Group, RHB Bank Group, Southern Bank Group. Affin Bank Group consists of Perwira Affin Bank, Asia Commercial Finance and Perwira Affin Merchant that merged with BSN Commercial Bank, BSN Finance and BSN Merchant Bank. The entities after mergers are Affin Bank, Affin ACF Finance and Affin Merchant Bank (Bank Negara Malaysia, 2001). Alliance Bank Group had one sub-division which was called Multi Purpose Bank. This group merged with few firms including International Bank Malaysia, Sabah Bank, Sabah Finance, Bolton Finance, Amanah Merchant Bank, Bumiputra Merchant Bank. The entities after merger are Alliance Bank, Alliance Finance, Alliance Merchant Bank (Bank Negara Malaysia, 2001). AmBank Groups composed of Arab Malaysian Bank, Arab Malaysian Finance and Arab Malaysian Merchant. It merged with MBF Finance Berhad. The entities after merger are AmBank Berhad, AmFinance Berhad and AmMerchant

Berhad (Bank Negara Malaysia, 2001). Bumiputra Commerce Group consists of Bumiputra Commerce, Bumiputra Commerce Finance and Commerce International Merchant Bank. It merged with Commerce Bank and Commerce Finance. The entities after merger are BCB Bank Berhad, Bumiputra Commerce Finance Berhad and Commerce International Merchant Bankers Berhad (Bank Negara Malaysia, 2001). EON Bank Group comprised of EON Bank and EON Finance. It merged with Oriental Bank, City Finance, Perkasa Finance and Malaysian International Merchant Bank. The entities after merger are EON Bank, EON Finance and Malaysian International Merchant Bankers (Bank Negara Malaysia, 2001). Hong Leong Group consists of Hong Leong Bank and Hong Leong Finance. It merged with Wah Tat Bank and Credit Corporation Berhad. The entities after merger are Hong Leong Bank and Hong Leong Finance (Bank Negara Malaysia, 2001). Malayan Banking Group composed of Malayan Banking, Mayban Finance and AseamBankers Berhad. It merged with Pacific Bank, Philo Allied Bank, Sime Finance and Kewangan Bersatu Berhad. The entities after merger are Malayan Banking, Mayban Finance and AseamBankers Berhad (Bank Negara Malaysia, 2001). Public Bank Group consists of Public Bank and Public Finance merged with few firms including Hock Hua Bank, Advance Finance and Sime Merchant Bankers. The entities after merger are Public Bank, Public Finance and Public Merchant Bank (Bank Negara Malaysia, 2001). RHB Bank Group comprised of RHB Bank RHB Sakura Merchant merged with Utama Bank Berhad, Delta Finance Berhad and Inter-Finance Berhad. The entities after merger are RHB Bank, RHB Delta Finance and RHB Sakura Merchant Bank (Bank Negara Malaysia, 2001). Southern Bank Group that had a sub-division called Southern Bank Berhad merged with few companies including Ban Hin Lee Bank Berhad, United Merchant Finance, Perdana Finance, Cempaka Finance and Perdana Merchant Bankers. The entities after merger are Southern Bank, Southern Finance and Southern Investment Bank (Bank Negara Malaysia, 2001). In 2006, Bumiputra Commerce Group acquired the Southern Bank. Then, it delisted the Southern bank from Malaysian stock market. Furthermore, it acquired the investment division of Commerce International Merchant Bankers Berhad, CIMB, and decided to rename these three banks as a universal bank which later is called as CIMB Bank. Therefore, the number of anchor banks reduced to 9 banks. (Bank Negara Malaysia, 2006)

### III. LITERATURE REVIEW

Recent years, many studies conducted in order to examine the efficiency of the banks. DeYoung (1993) employed a frontier analysis in order to find the cost efficiency of banks. Das (1997) employed two different models including cross-sectional as well as data envelopment model to find the efficiency of banks. Bhattacharyya et al. (1997) used data envelopment model in order to find out the productive efficiency of Indian banks. The result of their research represented that public banks in India are the most efficient compared to private and foreign banks.

Akhavain et al (1997) used the price and efficiency effects on USA banking industry. He found that the banks that used consolidation program gain higher profit compared to those that do not employ the consolidation program. Another study has been done by Berger and Humphrey (1997) indicating that most of the bank efficiency examination have emphasis on USA or developed countries. Vennet (1996) tried to find the relationship between bank consolidation program and efficiency using financial ratios as well as stochastic frontier analysis. He found that bank consolidation improves the efficiency of financial sectors. Finally, the results of bank consolidation program were diverse significantly. In other words, some authors found a direct relationship between bank consolidation program and efficiency whereas others are not able to do so.

### IV. DATA ENVELOPMENT ANALYSIS (DEAP)

Data Envelopment Analysis, DEA, is linear programming technique where the set of best-practice or frontier observations are those for which no other decision making unit or linear combination of units have as much or more of every output or as little or less of every input (Charnes et al, 1978). Letters X and Y represent inputs and outputs respectively. Letters i and j identifies a particular input and output. Therefore, identifies the *i*th input and identifies the *j*th output of one decision making unit. In data envelopment analysis, multiple inputs and outputs are linearly aggregated using weights. The virtual input of a bank can be explained as a linear weighted sum of all its inputs.

$$\text{Virtual Input} = \sum_{i=1}^I W_i X_i$$

where  $W_i$  is the weight assigned to the input during aggregation. The virtual output of a bank can be explained as the linear weighted sum of all outputs.

$$\text{Virtual Output} = \sum_{j=1}^J Z_j Y_j$$

where  $Z_j$  is the weight assigned to output during aggregation. Therefore, the efficiency of a decision making unit, DMU, can be explained as the ratio of outputs to inputs.

$$\text{Efficiency} = \frac{\sum_{j=1}^J Z_j Y_j}{\sum_{i=1}^I W_i X_i}$$

For maximizing the output, the latest fraction should be less or equal to 1. On the other hand, the fraction should be equal or greater than 0.

$$0 \leq \frac{\sum_{j=1}^J Z_j Y_j}{\sum_{i=1}^I W_i X_i} \leq 1$$

## V. INPUTS AND OUTPUTS SPECIFICATION

The most important roles of each financial institution are intermediation as well as producing financial product and services to customers. This study uses financial intermediary approach in order to fully reflect the efficiency of financial institutions in Malaysia. Financial intermediary approach suggests some outputs and inputs that are more helpful to reflect the efficiency of financial institutions. The factors that are given below are comprehensive and selected as outputs and inputs for using Data Envelopment Analysis (DEA). Inputs are Overhead Expenses (Personnel, Marketing, Administrative and General); interest Expenses, deposits from Customers and taxation.

Outputs are cash and Short-term Funds, deposits with the Banks and Financial Institutions, loans and Advances, total Securities and interest Income and Revenue

This study tries to find the efficiency score for each Malaysian anchor bank from 1993 to 2009. Then, it compares the efficiency score trends before and after the consolidation program.

## VI. DATA ANALYSIS

The study employs two different methods to analyze the impacts of consolidation program on efficiency of Malaysian anchor banks. First, it analyzes raw data using data envelopment analysis program, DEAP, from 1993 to 2009. The technical and efficiency results are shown in table 1 and table 2. Second, it analyzes raw data on a cross-sectional basis. It compares the technical and scale efficiency results of 9 Malaysian anchor banks. The results are shown in table 3 and table 4.

TABLE1. TECHNICAL EFFICIENCY OF MALAYSIAN ANCHOR BANKS

Year/Bank	Affin	Alliance	AmBank	CIMB	EON	Hong Leong	Maybank	Public	RHB
1993	1	1	1	1	1	0.96	1	1	1

Table 3 Cross-sectional (comparison of technical scores)

Bank/Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Affin	1	1	1	1	1	1	1	1	1	1	1	1	1	0.95
Alliance	1	1	1	1	NA	1	1	1	1	1	1	1	1	1
AmBank	0.95	0.89	0.89	1	0.95	1	1	1	1	1	1	1	1	1
CIMB	1	1	1	1	1	1	0.93	1	1	0.89	0.89	1	1	1
EON	1	1	1	0.98	1	0.94	0.91	0.91	1	0.95	0.98	1	1	1
Hg Leong	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Maybank	1	1	1	0.96	1	0.94	0.96	1	1	1	1	0.96	0.99	0.95
Public	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RHB	1	NA	0.97	1	1	1	1	1	0.97	1	1	1	1	1

TABLE 4 CROSS-SECTIONAL (COMPARISON OF SCALE SCORES)

Bank/Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Affin	1	1	1	1	1	1	1	1	1	1	1	1	1	0.95
Alliance	1	1	1	1	NA	1	1	1	1	1	1	1	1	1
AmBank	0.98	0.89	0.89	1	0.95	1	1	1	1	1	1	1	1	1
CIMB	1	1	1	1	1	1	0.93	1	1	0.89	0.89	1	1	1
EON	1	1	1	0.98	1	0.99	0.97	0.97	1	0.99	0.98	1	1	1
Hg Leong	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Maybank	1	1	1	0.96	1	0.94	0.96	1	1	1	1	0.96	0.99	0.95
Public	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RHB	1	NA	0.97	1	1	1	1	1	0.97	1	1	1	1	1

## VII. DISCUSSION AND CONCLUSION

Anchor banks whose efficiency levels increased includes Alliance Bank, AmBank, CIMB Bank, EON Bank, Hong Leong Bank, and Public Bank. Other three anchor banks including Affin Bank, Maybank, and RHB Bank also have a very high level of efficiency in most years but the trend of

1994	1	1	1	0.77	1	1	1	1	1
1995	1	0.88	1	1	0.77	0.85	0.88	0.94	1
1996	1	0.98	1	1	0.85	0.82	0.98	0.82	1
1997	1	0.92	1	0.90	1	0.90	1	0.92	1
1998	1	1	0.92	1	1	0.99	1	1	1
1999	1	1	1	1	1	1	1	1	1
2000	1	1	0.91	1	1	1	1	1	1
2001	1	1	1	0.98	1	1	0.96	1	1
2002	1	0.99	1	1	1	1	1	1	1
2003	1	1	1	1	1	1	1	1	1
2004	1	1	1	1	1	1	1	1	1
2005	1	0.99	1	1	1	1	1	1	1
2006	1	1	1	1	1	1	1	1	1
2007	1	1	1	1	1	1	1	1	1
2008	0.93	1	1	1	1	1	0.87	1	0.91
2009	1	1	1	1	1	1	1	1	1

TABLE 2 SCALE EFFICIENCY OF MALAYSIAN ANCHOR BANKS

Year/Bank	Affin	Alliance	AmBank	CIMB	EON	Hong Leong	Maybank	Public	RHB
1993	1	1	1	1	1	0.96	1	1	1
1994	1	1	1	0.77	1	1	1	1	1
1995	1	0.88	1	1	0.77	0.94	0.88	0.94	1
1996	1	0.98	1	1	0.85	0.94	0.98	0.90	1
1997	1	0.97	1	0.99	1	0.93	1	0.97	1
1998	1	1	0.92	1	1	0.99	1	1	1
1999	1	1	1	1	1	1	1	1	1
2000	1	1	0.99	1	1	1	1	1	1
2001	1	1	1	0.98	1	1	0.96	1	1
2002	1	0.99	1	1	1	1	1	1	1
2003	1	1	1	1	1	1	1	1	1
2004	1	1	1	1	1	1	1	1	1
2005	1	1	1	1	1	1	1	1	1
2006	1	1	1	1	1	1	1	1	1
2007	1	1	1	1	1	1	1	1	1
2008	0.93	0.93	1	1	1	1	0.87	1	0.91
2009	1	1	1	1	1	1	1	1	1

efficiency scores for these three banks did not change after the consolidation program in 1999. The efficiency trend for Affin Bank and RHB Bank is constant and equals to 1 in all except one year. So, decision making in circumstances with constant efficiency level in most years is difficult and requires more analyses to discover the trend. Therefore, the study's suggestion for future research is to employ other outputs and inputs for Data Envelopment Analysis, DEAP, in order to find new results. The advantage of new outputs

and inputs is to find inefficiency points which are not obvious with current analysis. On the other hand, the efficiency trend of Maybank is symmetric from 1994 to 2009. In other words, the fluctuation of efficiency level before the consolidation program is similar to the fluctuation after the consolidation program. In this case, it is difficult to say whether the efficiency level of Maybank because of consolidation increased or decreased. Therefore, using other outputs and inputs for future research in order to find more inefficiency points for Maybank is suggested.

Another important issue which is discovered in this study is the impact of consolidation on each technical and scale efficiency separately. The study demonstrates that the technical and scale efficiency of each anchor bank were not affected at a same level because anchor banks are not good enough to reach the maximum of technical efficiency compared with scale efficiency or vice versa. In other words, the consolidation program changed the technical efficiency level of the bank in a way which was different from its scale level. 5 out of 9 Malaysian anchor banks prove that the consolidation program has more impacts on technical efficiency compared to scale efficiency because improvement in technical efficiency was higher than improvement in scale efficiency after the consolidation program. Other 4 anchor bank's efficiency level was affected at a same rate. Anchor banks that had different technical and scale efficiency include Alliance Bank, AmBank, CIMB Bank, Hong Leong Bank, and Public Bank. The reason for different result might be justified by numerous branches that remove the economies of scale. Therefore, scale efficiency decreased.

Trend analysis shows that most of the scale and technical inefficiency scores occurred before the consolidation program which was in 1999. Technical and scale efficiency scores was between 0.7 and 1 from 1993 to 1999. On the other hand, most of the scale and technical efficiency scores of Malaysian anchor banks increased to 1 after the consolidation program. It implies that consolidation program has positive impact on the efficiency of Malaysian anchor banks. The second analysis that conducted in this study was a cross-sectional analysis for 9 Malaysian anchor banks for each financial year. It demonstrates the technical efficiency scores of each banks compared to other Malaysian anchor banks Public Bank, Hong Leong Bank, and Alliance Bank are the most successful and efficient anchor banks from 1996 to 2009 because they have the highest efficiency score over 15 years which equals to 1. Therefore, these banks have the most stable and the highest level of technical efficiency in 15 years compared to other Malaysian anchor banks. EON Bank, Maybank, and AmBank have the most appearance below 1. The study relates the inefficiency of these three banks to very large branches which unbalanced the optimal size of bank as well as the economies of scale. It implies that these banks have the lowest level of scale efficiency among Malaysian

anchor banks. These banks are followed by CIMB Bank, RHB Bank and Affin Bank consecutively. Like technical efficiency results, Public Bank, Hong Leong Bank, and Alliance Bank have the most stable position among Malaysian anchor banks in terms of scale efficiency. These three banks constantly have the scale efficiency score of 1 for 15 years. Although the study employs cross-sectional analysis for Malaysian anchor banks in two aspects of technical and scale, the result for both technical and scale aspects prove a same thing indicating anchor banks including Public Bank, Hong Leong Bank, and Alliance Bank are the most efficient anchor banks in Malaysia. This result may vary by changing the inputs and outputs.

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