The Efficiency Effects of Mergers and Acquisitions in Malaysian Banking Institutions

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Abstract

This paper analyses the efficiency and financial performance using CAMEL-type variables, three years before and after the consolidation programme for the domestic banking sector initiated by Bank Negara as a result of the 1997 financial crisis. The results suggest that the mergers did not seem to enhance the productive efficiency of the banks as they do not indicate any significant difference. The financial performance suggests that the banks are becoming more focussed on their intermediation activities to generate high net interest income. However, due to their conservative loan loss reserve policies and cost inefficiencies after the merger, it has somehow resulted in the loan growth and interest earning ratio variable giving a negative impact on ROE.

Keywords: Bank Mergers; Efficiency; Performance; Data Envelopment Analysis; CAMEL Variables
JEL classification: G21, G34, C33, C67

1. Introduction

The process of getting banks to merge in Malaysia started in the mid 1980s as result of economic recession. Market forces were allowed to dictate the merger pace. Unfortunately, this process did not go as planned as the

shareholders of banking institutions were more interested in protecting their interests. The crisis led a number of weak commercial banks and finance companies into solvency and financial distress. A high level of NPLs, as a result of overlending to the property sector, really hit these institutions badly. To maintain the stability of the financial system, Bank Negara Malaysia implemented a rescue scheme. As a result, the number of commercial banks was reduced to 34 in 1997.

The 1997-1998 financial crisis again witnessed another banking calamity. The costly experience of the rescue scheme carried out during the mid 1980s crisis motivated Bank Negara Malaysia to make an early move in safe guarding the banking institutions. On 29 July 1997 the Governor of Bank Negara Malaysia (BNM) announced a merger programme for domestic banking institutions. Unlike the mid 1980s where the merger was market driven, the approach adopted by this second wave of mergers was a guided merger. This merger was expected to bring about greater efficiency to domestic banking operations. It was also hoped that the merger process would help the banking sector achieve economies of scale and therefore pave the way for a strong and competitive banking sector that will be able to handle the onslaught of globalization and the liberalization of the financial system.

The original plan was to merge 21 commercial banks, 12 investment banks and 25 finance companies into six core financial groups. The six core groups being Maybank, Multi-Purpose Bank, Bumiputra-Commerce Bank, Perwira Affin Bank, Public Bank and Southern Bank. This plan was not well accepted by the players of the banking sector. After more thought was given to the plan, the BNM finally announced its plan to merge 58 banking institutions into ten groups. The ten anchor banks are Malayan Banking Bhd, Bumiputra-Commerce Bank Bhd, RHB Bank Bhd, Public Bank Bhd, Arab-Malaysian Bank Bhd, Hong Leong Bank Bhd, Perwira Affin Bank Berhad, Multi-Purpose bank Berhad, Southern Bank Bhd and EON Bank Bhd (see Appendix for the list of anchor banks and the group of banks that they are leading).

This paper seeks to analyze the efficiencies of these locally incorporated banks, before and after the merger that took place in response to the 1997 financial crisis. It also attempts to assess the impact of these reforms on the performance of these consolidated banking institutions. After considering the various efficiency techniques, we conclude that the flexibility and sound framework offered by the Data Envelopment Analysis (DEA) represents the best tool for our study. From this analysis, the relative efficiencies of Malaysian local banks before and after the reform will provide a platform to determine if the reform resulted in a group of more efficient banks.

To relate the efficiency measures to bank performance, CAMEL[1]-type variables are employed. These variables reflect on the bank's current profitability, asset quality, and capital adequacy as well as the soundness of the bank's current management.

2.   Theoretical and empirical background

According to Pilloff (1996), the primary reason for the synergy is performance improvement after the merger, which may be obtained in several ways. First, there is a transfer of management skills from the superior firm to the less superior firm if the superior firm has complimentary skills to the target firm. The two firms once merged will become a large single entity, thus, a better management team will magnify the financial performance. Secondly, the merger can boost financial performance through the elimination of redundant facilities and human resources. Thirdly, there is a consolidation of technology, skills and resources when institutions merge. And finally, the fragmented market shares that each entity independently held prior to the merge are combined. As a result, the combined market shares are larger and the new entity will have an economy of scale advantage. Prior to Pilloff (1996), Rappaport (1986) suggested that apart from giving operational benefits such as economies of scale, asset restructuring, and technical and managerial skill transfer, bank mergers supposedly improve the financial position by risk reduction, increased debt capacity and lower interest rates as well as tax savings.

Although in theory the result of a merger may sound promising, such positive outcomes are still scarce based on several empirical findings. For example, Rhodes (1990) and (1993) shows that cost reduction and efficiency gains are not significantly related to mergers. Also, his findings indicate that both profitability and non-interest expense are unaffected by merger activity. Consistently, Linder and Crane (1992) offer some indication that interstate mergers do not improve operating income. Similarly, Srinivasan (1992) concludes that mergers do not cut cost on the non-interest expenses of the financial institutions. Also, Berger and Humphrey (1992), who compare each merged bank's performance with non-merged banks, do not find any significant cost efficiency gains on average and the small insignificant gains identified were offset by reductions in scale efficiency. Even when the wealth creation effect of a merger announcement in the United States is examined by Hannan and Wolken (1989), Houston and

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[1] CAMEL refers to the five components of a bank's condition that are assessed: *C*apital adequacy, *A*sset quality, *M*anagement, *E*arnings, and *L*iquidity. Ratings on a scale from 1 to 5 are assigned for each of these components in addition to the overall rating of a bank's financial condition. Banks with ratings of 1 or 2 are considered to present few, if any, supervisory concerns, while banks with ratings of 3, 4, or 5 present moderate to extreme degrees of supervisory concern.

Ryngaert (1994), Pilloff (1996) and Smith (1998), identical results are found, inferring the potential benefits of bank mergers are often not achieved.

Notwithstanding the non-promising effect of the merger process discussed above, there is also some evidence of the advantages of merger. For instance, a case study by Hoffman and Weinberg (1998) reported that the Chemical Banking Corp and the Chase Manhattan Bank NA accomplished economies of scale and a $1.5 billion cost saving after three years of merger. Furthermore, Murray (1997) proves a cost saving of $50 million in updating banking information systems for the First Union Core States bank merger.

Rhoades (1998) investigates the efficiency effect of bank mergers by using case studies of nine mergers in America. The same basic analytical framework was employed in all of the case studies, such as financial ratios, econometric cost measures and the effect of the merger announcement on the stock of the acquiring and acquired firms. All nine mergers resulted in significant cost cutting in line with pre-merger projections. Four of the nine mergers were clearly successful in improving cost efficiency but five were not. The most frequent and serious synergies experienced in bank mergers, that increase bidder returns relative to non-financial mergers, are unexpected difficulties in integrating data processing systems and operations.

Calomiris (1999) suggests that by many measures, bank consolidation waves, historically and currently, produce substantial efficiency gains associated with reduced operating costs, enhanced diversification, and the enrichment of bank-customer relationships. A recent study by Sherman and Rupert (2006) also reports some efficiency benefits following bank mergers but that the benefits are not realized until four years after the merger.

The efficiency and performance of banks in developing countries has also received considerable attention. Using data from 1980 to 1994, Gilbert and Wilson (1998) found that financial deregulation has a positive effect on the productivity of Korean banks. Hao *et al.*, (2001), however do not agree with this finding and argue that deregulation has not yielded any significant association with bank efficiency. Leightner and Lovell (1998) found that financial liberalisation led to an improvement in bank efficiency and productivity in Thailand between 1989 and 1994.

The possibility that bank mergers in Malaysia have offered efficiency gains has also been an issue that was subjected to considerable debate even before the 1997 financial crisis. Katib and Mathews (2000), for example, employed Data Envelopment Analysis (DEA) to estimate the efficiency of 20 Malaysian commercial banks from 1989 to 1995. They found that medium-sized banks are more efficient in Malaysia compared to larger banks. Isa and Yap (2004) performed a study on market reaction to bank merger announcements in Malaysia for the period 1999-2000. Their findings indicate that there was an overall positive market reaction to the announcement of the merger of banking institutions. In a related study,

Mat-Nor and Mohd-Said (2004) examine the stock market's perception of bank mergers prior to and after Bank Negara Malaysia's announcement of the merger exercise. They found that there were negative cumulative average residuals before the announcement of the merger programme for domestic banks was made while positive cumulative average residuals were observed after the announcement. Mahmood and Mohamad (2004) investigated the performance of the domestic banks following the merger exercise. Using data from the period 1997 to 2002, they found that the operating performance of the banks improved following the merger exercise.

The purpose of this paper is to provide evidence of the efficiency gains that banks experienced from the 1998-2001 merger exercise in Malaysia and also to evaluate the performance of these institutions. The study will be carried out using two approaches. The first approach is to analyze the efficiency gains of the merger of Malaysian banks using DEA and the second approach is using panel data analysis to examine the relationship between bank profitability and CAMEL-type variables.

3.   Data and Methodology

The data used in this study is gathered from the annual reports of all ten anchor-banks for the period 1998 to 2004. The data was divided into pre and post merger according to each individual bank's completed merger date for the descriptive equality test analysis. If a merger was completed before the middle of the year, that year is considered as the starting period of the post merger analysis. On the other hand, if it was completed after the middle of the year, then that year is considered as pre-merger period. Finally, analysis was carried out on a three-year pre-merger period and a three-year post-merger period.

The analysis is divided into two parts; namely, data envelopment analysis (DEA, hereafter) and panel data regression analysis. With a sample size of 10 banks over the period of 1998-2004, we have seventy observations, which is deemed sufficient to perform a panel data regression. In the first part, we use DEA to examine the relative indicators of technical or productive efficiency of commercial banks[2]. DEA was originally developed by Charnes, Cooper and Rhoader (1998) who used linear programming methods to identify the efficient units. Up to now, DEA has been applied in different fields ranging from education to banking. The common method for measuring efficiency is to take a ratio of output over input. In DEA, linear programming is used to maximize this ratio. The underlying linear method assumes that there are s inputs and m outputs for every decision making

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[2] Please refer to Charnes, Cooper and Roades (1978) for greater understanding and derivation of DEA. The DEA methodology has been used in Mat Nor, Mohd Said and Yahya (2006).

unit, DMU (in our case, banks). Therefore, the model for the DMU is as given below:

$$\boxed{} \tag{1}$$

subject to: $v_1 x_{1o} + v_2 x_{2o} + \ldots + v_m x_{mo} = 1$ (2)

$u_1 y_{1j} + \ldots + u_s y_{sj} \leq v_1 x_{1j} + \ldots + v_m x_{mj} \ (j = 1, \ldots, n)$ (3)

$v_1, v_2, \ldots, v_m \geq 0$ (4)

$u_1, u_2, \ldots, u_s \geq 0$ (5)

where

$\theta =$ Objective value (efficiency score)

u_i (i+ 1,…, s) + output weights, s= number of inputs

y_{io} (i+1,…, s) = output of DMU

v_1 (i=1,…, m) = input weights, . = number of outputs

x_o (i+1,…, s) = inputs of DMU

n = number of DMUs

The DMU is efficient if:

i) $\theta = 1$, and

ii) there exists one optimal v^* or u^* in which $v^* > 0$ and $u^* > 0$

Bank behaviour can be modelled using two approaches – production and intermediation. Under the production approach, inputs are physical entities such as labour and capital. Number of accounts (which includes both interest income and non-interest income) is a measure of output. The intermediation approach views bank as an intermediary; it collects deposits and purchases funds using labour and capital, and then, uses this fund to make loans to others for profit (Mester, 1987; Berger and Humphrey, 1991; Miller and Noulas, 1996; Avkiran, 1999; Chu and Lim (1998)).

Berger and Humphrey (1997) argue that the intermediation approach might be appropriate for evaluating entire financial institutions since this approach is inclusive of interest expense. Consequently as the objective of this paper is to evaluate entire financial institutions, the intermediation approach is adopted in this study. The variables used as inputs are total deposit, overhead expenses, and interest expenses while the outputs are net income, gross income and total loans.

A bank's performance is affected by the management of the bank. Because management is so important in a bank's success, it receives particular attention during safety-and-soundness examinations. Safety-and-soundness ratings, which are more popularly known as CAMEL ratings, reflect not only the soundness of a bank's management but also its profitability. In short, a bank's management through CAMEL rating plays a very significant role in determining the bank's performance. Prior research by FDIC has suggested that CAMEL rating attributes have an important influence on a bank's performance (Nuxoll et.al, 2003). Following this evidence, in the second part of this paper the relationship of bank profitability and CAMEL-type variables is examined.

By performing tests of mean differences for the CAMEL-type variables it can be determined whether there are significant differences in the average values of those variables during the pre- and post-merger periods. Based on the study by Bongini et. al (1999), the following CAMEL-type variables were employed in this study; loan loss reserves to capital; loan growth; net interest income to total income as a proxy for the banks' earnings; total loans to total deposits as a proxy for a banks' liquidity risk; total expenses to total revenue as a proxy for the banks' inefficiency and finally as a proxy for the banks' capitalization, a measure which defines capital as the sum of equity and loan loss reserve divided by total loans is used. Detailed description of the variables will be provided in the following section when the empirical findings are discussed. An examination of the impact of the CAMEL-type variables on the ROE of the banks is conducted by pooling the data to perform panel regressions for the whole study period as well as for the pre- and post-merger periods.

The empirical analysis is based on the panel data fixed effect model (FEM), which incorporates the annual data series of locally incorporated commercial banks in Malaysia. The intercept of each bank is allowed to vary but the slope coefficients are assumed to be constant across different banks. The following equation can be used to establish the evidence for profitability-CAMEL variable links in these banks:

$$Profitability_{it} = \alpha_1 + \alpha_2 DB_{2i} + \alpha_3 DB_{3i} + \ldots + \alpha_9 DB_{9i} + \beta_2 CAMEL_{2it} + \beta_3 CAMEL_{3it} + \ldots + \beta_7 CAMEL_{7it} + \mu_{it} \qquad (6)$$

where DB are dummy variables for banking institutions, profitability is measured by ROE while CAMEL-type variables include capital buffer ratio, loan growth, loan loss reserve, cost efficiency, interest earning ratio and loan deposit ratio. The variations in the intercepts of each bank are captured by the dummy variables. Since there are ten banks, nine dummies are used.

There is no dummy for the benchmark bank which is the Maybank.[3] The intercept value α_1, is the intercept of the benchmark bank and it provides the direct influence of the CAMEL-type variables on the profitability of Maybank. The remaining intercept coefficients, $\alpha_2, \alpha_3,..., \alpha_9$ measure the intercept differential of the remaining banks. These values show us how the intercepts of the nine banks differ from that of the benchmark bank.

4. Empirical Findings

The results of the DEA analysis are presented in Table 1, showing the average efficiency scores of banks during the pre- and post-merger periods. On an individual bank basis, several banks such as RHB, Alliance Bank, Southern Bank and AmBank show an efficiency score of 1 or unity during the pre and post merger period. An efficiency score of 1 means that the banks are on the efficiency frontier and thus are technically efficient.[4] Three banks namely Public Bank, EON Bank and Affin Bank recorded improvement in their efficiency scores after the merger. For Maybank and BCB, both of which were initially on the efficiency frontier before the merger, show efficiency scores lower than unity after the merger. On average, as reported, all the banks seem to have similar average efficiency scores before and after the merger. The average scores before and after the merger are 0.977132 and 0.977127 respectively. Practically, this means that on average, the merger does not seem to enhance the productive efficiency of the banks. Given such findings, unsurprisingly enough, banks still continue to consolidate in order to benefit from the economic efficiency of consolidation for example the synergy effect. It should be noted that the DEA model focuses only on the productive or technical efficiency rather than economic efficiency and hence the interpretation of the scores should be confined to just the productive efficiency of the institutions.

Table 2 reports the average values of the CAMEL variables, the ROE of banks and the capital adequacy ratio of banks before and after the merger. As shown, the average interest earnings ratios (IER) for banks after the merger is better than that before the merger and the mean difference between the two periods is significant at the 5 percent level. Since the interest earnings ratio is defined as the net interest income of the banks divided by the total

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[3] Maybank is considered as the benchmark bank because it is the largest domestic bank in Malaysia in terms of assets as well as network distribution (Vijayan, P. and Shanmugam, B., 2003).

[4] However, when interpreting efficiency scores generated by the DEA analysis, it is important to bear in mind that the scores *do not* capture all aspects of efficiency of the institutions. The fact that RHB, Alliance Bank and Southern Bank have efficiency scores of 1 and yet these banks need to be rescued by the government, could suggest that some level of inefficiency for these institutions may not be captured in the scores.

Table 1. Results of DEA analysis

DMUs	Score (Pre-merger)	Score (Post-merger)
Public Bank	0.915896	0.942008
RHB	1	1
Hong Leong Bank	0.993372	0.990473
Alliance Bank	1	1
EON Bank	0.944334	0.990473
Maybank	1	0.997509
BCB	1	0.954055
Southern Bank	1	1
Affin	0.917715	0.896754
AMBank	1	1
Average	0.977132	0.977127

revenue, this measure is a good reflection of the banks' core business activities. A higher average interest earnings ratio after the merger event suggests that banks have stayed focused on their main activities since the merger and thus are able to generate more interest income. As for the loan growth variable (LG), the mean figures before and after the merger are not statistically different. Given a similar level of loan growth during the pre and post merger periods but a higher level of interest earning ratios (IER) after the merger, it suggests that banks have been practicing prudent lending activities. It is also reported that the loan deposit ratio (LDR), which proxies for the liquidity risk of the banks has not changed following the merger. The insignificant t-statistics for the mean differences of the loan loss reserve ratio (LLRR) suggests that banks maintained similar loan loss provisioning policy during the pre and post merger periods. It is also shown that the risk aversion of banks has not changed following the merger as reported by the insignificant mean differences of the capital buffer ratio and the capital adequacy ratio. The insignificant t-statistics for the mean differences of the remaining variables in Table 2 indicate that the merging of banks does not have an important impact on the cost efficiency and profitability of the banks as measured by the ROE.

Table 3 shows the results of the panel regressions for the whole study period as well as for the sub-periods; pre-merger and post-merger periods. For the whole study period, as shown in Panel A of Table 3, the loan loss reserve ratio (LLRR) is the only significant predictor of the ROE of banks and it is inversely related to the profitability figures. In other words, as the loan loss reserve ratio of the banks increase, the ROE decreases. This is because high loan loss reserves eat away a large portion of banks' profits. Therefore, banks with a high level of loan loss reserves tend to have a low level of profitability. Similarly, the regression results during the pre-merger period shown in Panel B also indicate that banks with high loan loss provisioning policy have low ROE figures.

Table 2. Descriptive Statistics of the CAMEL Variables

Variable	Mean Before	Mean After	T-Statistics for (Mean Before-Mean After)
Capital Buffer Ratio (CBR)	0.337388	0.384857	-0.3253
Loan Growth (LG)	0.160183	0.196833	-0.2211
Loan Loss Reserve Ratio (LLRR)	0.168502	0.111874	1.6002
Cost Efficiency (CE)	0.746279	0.765731	-0.2563
Interest Earning Ratio (IER)	0.342997	0.444714	-2.2651[*]
Loan Deposit Ratio (LDR)	0.787499	0.684532	1.3278
ROE	-1.474438	0.324396	-1.1310

Notes:
1. Single asterisk indicates significant at the 5 percent level.
2. Formula: Capital Buffer Ratio = (Equity + Loan Loss Reserve)/Loan
Loan Growth = $Loan_t - Loan_{t-1}$
$\qquad\quad Loan_{t-1}$
Loan Loss Reserve = Loan loss Reserve/(Equity + Loan Loss reserve)
Cost Efficiency = Total Expenses/Total Revenue
Interest Earning Ratio = Net Interest Income/Total Revenue
Loan Deposit Ratio = Total Loans Total Deposits

Panel C of Table 3 reports the findings during the post-merger period. Consistent with the results during the whole study and pre-merger periods, the coefficient of the loan loss reserve ratio during the post-merger period is also negative and significant at the 5 percent level. The findings seem to suggest that, regardless of the merger, maintaining a policy of high loan loss reserve involves a trade-off between risk and return for the banks. On the one hand, a high level of loan loss reserve means banks will have enough resources to help cover future loan losses and therefore reduce the operating risk of the banks. On the other hand, a high provisioning policy requires banks to set aside a large amount of funds as loan loss reserve and this contributes to bringing down the ROE of the banks. The results on the loan loss reserve ratio suggest that banks were equally risk-averse during the pre and post merger periods and this is reflected in their conservative loan loss reserve policies.

Table 3. Panel Data Regression Estimates for Performance of Banking Institutions

Dependent Variable: ROE	Panel A Whole Study Period		Panel B Pre-Merger Period		Panel C Post-Merger Period	
Independent Variables	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat
Constant	4.565	2.171**	7.581	3.189**	0.634	9.821**
Capital Buffer Ratio (CBR)	-1.995	-1.319	-4.996	-1.499	0.387	3.063**
Loan Growth (LG)	-0.003	-0.007	-1.163	-0.881	-0.101	-2.356**
Loan Loss Reserve Ratio (LLRR)	-50.444	-3.229**	-55.324	-3.714**	-1.816	-3.423**
Cost Efficiency (CE)	0.853	1.165	2.195	0.837	-0.059	-1.647**
Interest Earnings Ratio (IER)	2.427	1.194	13.283	1.534	-0.826	-2.403**
Loan Deposit Ratio (LDR)	0.931	0.617	-0.330	-0.140	0.958	3.214**
Differential Intercept:						
AMBank	7.374	1.838**	8.540	1.432	0.204	1.571
BCB	0.881	0.556	0.220	0.095	0.018	0.741
EON Bank	3.698	1.288	8.087	1.352	0.608	1.944*
Hong Leong	-1.112	-0.726	-1.703	-0.839	-0.025	-0.350
Southern Bank	-3.643	-2.042**	-6.081	-2.101**	-0.195	-3.493**
Public Bank	-3.798	-1.939*	-5.994	-2.106**	-0.273	-4.473**
RHB	0.399	0.240	-1.494	-0.534	0.038	0.718
Affin Bank	5.117	1.873*	3.502	0.899	0.112	1.088
Alliance Bank	-3.558	-1.965**	-3.945	-1.582	-0.155	-3.079**
Adjusted R Square	0.672		0.734		0.506	

Notes:
1. Single asterisk indicates significant at 10 percent level and double asterisks indicate significant at 5 percent level.
2. All estimates are Newey-West heteroscedastic-autocorrelation consistent (HAC).
3. Given the potential interrelationships among the explanatory variables, a pairwise correlation of the independent variables included in the regression model was performed. Only one pair of positive significant correlation between the loan growth (LG) and the interest earning ratio (IER) was found. Given the correlation results, the problem of multicollinearity in the regression model can be ruled out.

Interestingly, the result for the loan growth variable indicates that as banks increase their lending activities, their profitability decreases. The coefficient for the loan growth variable is negative and significant at the 5

percent level. It may be that, during the post-merger period, as their loan growth increased, banks have become more conservative in maintaining their loan portfolios by providing a relatively high loan loss reserve that will eventually eat up a large portion of the banks' income. When this happens, an increasingly high loan growth will have a negative impact on the ROE of banks. The results imply that banks are so conservative to the extent that an increasingly high loan growth does not seem to contribute to increasing the banks' profitability figures. Such findings reinforce our earlier conclusion on the loan loss reserve ratio that banks are indeed risk averse.

As for the interest earning ratio (IER), the coefficient is significantly negative at the 5 percent level, meaning that, as the interest earnings ratio of the banks increase, their ROEs decrease. Since the interest earnings ratio is defined as the net interest income of the banks divided by the total revenue, the variable also serves as a control variable to reflect the nature of the banks' business activities. The negative coefficient of earnings indicates that, as banks increase their net interest income through the expansion of their intermediation activities, their ROEs, which are defined as total net income (interest and non-interest income) divided by common equity, tend to fall. The overall decrease in the ROE could be due to either a decline in the net income or an increase in the capital base of the banks. While banks can be actively involved in intermediation activities to generate high net interest income, their activities may still have a negative impact on their overall income if at the same time they are conservative in maintaining their loan portfolios. This is because in response to their conservative loan loss policy, banks tend to make huge provision for loan losses, which has the effect of drawing down on the banks' overall income and the ROE. The results of the interest earnings ratio further reinforce the findings of a negative relationship between the growth of loans and the ROE and between the loan loss ratio and the ROE.

Another variable which is closely related to the intermediation activities of banks is loan deposit ratio (LDR), defined as total loans divided by total deposits. This serves as a proxy for the liquidity risk of banks. As reported in Panel C of Table 3, a significant positive coefficient of the loan deposit ratio suggests that as the liquidity position of the banks becomes more risky, the ROE of banks becomes higher. Based on this measure, a high loan deposit ratio could be caused by either a high level of loans or a low level of deposit base. Since the loan deposit ratio serves as a proxy for the liquidity risk of banks, a high loan deposit ratio indicates that the liquidity position of banks is risky. Such a risky position for the banks could be caused by either an increasing loans portfolio or a decreasing deposits base. From the perspective of loan increase, in order to issue more loans, banks obtain funds from the depositors as well as other sources of borrowing. Nevertheless, such ventures will yield positive returns if the banks are indeed practicing prudent lending activities. That means aggressive lending

activities will increase the profitability of banks if, and only if, the loans issued by the banks are of good quality. Under such circumstances, a riskier liquidity position will lead to a higher level of ROE for banks. In other words, during the post-merger period, our findings appear to suggest that banks are cautious or watchful in their lending activities. Alternatively, a high loan deposit ratio could also be caused by a low level of deposit base. A low deposit base suggests that the liquidity position of banksbecomes more risky. However, the significant positive coefficient of the loan deposit ratio suggests that as the liquidity position of the banks becomes more risky, due to a low deposit base, the ROE of banks becomes higher. Such findings suggest that the higher level of ROE, given the low level of deposit base, could mean that banks have more of their overall net income coming from the non-interest income and less from the interest income portion.

Concerning the capital buffer ratio, it is measured as the sum of equity and loan loss reserve divided by the total loan and it serves as a control variable for the size of the banks. Larger banks or banks with high capitalization tend to have a higher equity base and a higher loan loss reserve than their smaller counterparts. The coefficient of capital buffer ratio is positive and significant at the 5 percent level, suggesting that as the amount of capital of the banks increases, the ROE also increases. Based on this measure, the higher capitalization of banks could be due to a higher equity base, higher loan loss reserve or a combination of both. The finding of a positive relationship between capital and ROE implies that very likely the higher capitalization of banks is due to the higher equity base of the merged banks and not due to the higher loan loss reserves. This is because the loan loss reserve has a negative impact on the ROE of banks.

A cost efficiency variable which is related to the efficiency of the banks' management team is also included. Since this variable is commonly measured as the ratio of total expenses to total revenue, it is also often known as the inefficiency ratio. As reported in Panel C of Table 3, the coefficient of cost efficiency is negative and significant at the 5 percent level. This suggests that as the level of inefficiency of the management increases, the ROE of banks decreases. In other words, the inefficiency of the management will be reflected in relatively high expenses incurred by the banks and consequently a negative impact on the overall profitability.

Estimations of Equation 6 also provide a direct influence of CAMEL-type variables on bank profitability. In addition to the case for the benchmark bank (Maybank) that is represented by the intercept coefficient, the estimated regressions also generate additional insights into the experience of each of the individual banks examined as reflected by the differential intercepts. As shown by the intercept coefficient in Table 3, CAMEL-type variables contribute significantly to the profitability of Maybank for the whole period of study, pre merger as well as for the post merger period. The intercept

coefficients for these periods are significantly greater than zero at 5 percent level of significance.

As shown by the bottom part of Panel A in Table 3, the differential intercept coefficients for AMBank, Southern Bank and Alliance Bank are statistically significant at 5 percent level of significance while Public Bank and Affin Bank are statistically significant at 10 percent level of significance for the period 1998-2004. These differences in intercepts suggest that although the CAMEL-type variables contribute towards these five banks' profitability, the contributions are not common across the banks but vary according to the special features of each bank.

Intercept coefficients for the pre- and post merger periods are presented at the bottom part of Panel B and Panel C, respectively. For the pre-merger period, CAMEL-type variables are found not having any effect on the banks individually except for Southern Bank and Public Bank. Consistent with the results during the whole study period and pre-merger period, CAMEL-type variables once again contribute significantly to the profitability of Southern Bank at 5 percent level of significance for the post-merger period. The differential intercept coefficients for Public Bank and Alliance Bank are also statistically significant at 5 percent level of significance while EON Bank is statistically significant at a10 percent level of significance indicating CAMEL-type variables have an influence on the profitability of these banks. The findings of the study imply that the affect of CAMEL-type variables on banks' profitability is not unambiguous but possibly conditional upon several other underlying bank-specific factors. Generalization of the effect must therefore be bank specific.

5.   Conclusion

This paper attempts to analyze the efficiencies of Malaysian locally incorporated banks before and after the merger. The DEA and performance measure based on CAMEL-type variables was employed, which includes loan loss reserves to capital; loan growth; net interest income to total income as a proxy for the banks' earnings; total loans to total deposits as a proxy for banks' liquidity risk; total expenses to total revenue as a proxy for the banks' inefficiency and finally as a proxy for the banks' capitalization, which defines capital as the sum of equity and loan loss reserve divided by total loans. The impact of the CAMEL-type variables on the ROE of the banks was examined by pooling the data to perform panel regressions for the whole study period as well as for the pre-and post-merger periods.

Generally, all the banks seem to have similar average efficiency scores before and after the merger. The average scores before and after the merger are 0.977132 and 0.977127 respectively. Practically, this means that on average, the merger did not seem to enhance the productive efficiency of the banks.

The results for the overall, during and after merger show that the loan loss reserve ratio (LLRR) is the only significant predictor of the ROE of banks and it is inversely related to the profitability figures. In other words, as the loan loss reserve ratio of the banks increases the ROE decreases. The results on post merger show that the coefficient of the loan growth and interest earnings ratio variable give a significant and negative impact on ROE. While banks can be actively involved in their intermediation activities to generate high net interest income through loan growth, their activities could still have a negative impact on their overall income, if at the same time they are conservative in maintaining their loan portfolios in the form of loan loss provision. The coefficient of cost in efficiency, which is negative and significant at the 5 percent level, suggests that as the level of inefficiency of management increases, the ROE of banks decreases. In other words, the inefficiency of the management will be reflected in a relatively high amount of expenses incurred by the banks and consequently a negative impact on the overall profitability of banks.

In conclusion, the results on the post merger performance suggest that banks are becoming more focused on their intermediation activities to generate high net interest income. However, due to their conservative loan loss reserve policies and cost inefficiencies after the merger, this has somehow resulted in the loan growth and interest earning ratio variable giving a negative impact on ROE.

The effect of these variables on the ROE of banks vary, which implies that the ultimate effect of CAMEL-type variables on banks profitability is critically influenced by other qualifying bank-specific factors.

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Appendix
The 10 Banking Groups

Original Banking Group	Merged with	Entity After Merger
1. **Affin Bank Berhad Group** Perwira Affin Bank Berhad Asia Commercial Finance Berhad Perwira Affin Merchant Bank Berhad	BSN Commercial Bank (M) Berhad BSN Finance Berhad BSN Merchant Bankers Berhad	Affin Bank Berhad AFFIN ACF Finance Berhad Affin Merchant Bank Berhad
2. **Alliance Bank Berhad Group** Multi-Purpose Bank Berhad	International Bank Malaysia Berhad Sabah Bank Berhad Sabah Finance Berhad Bolton Finance Berhad Amanah Merchant Bank Berhad Bumiputra Merchant Bankers Berhad	Alliance Bank Berhad Alliance Finance Berhad Alliance Merchant Bank Berhad
3. **Arab-Malaysian Bank Berhad Group** Arab-Malaysian Bank Berhad Arab-Malaysian Finance Berhad Arab-Malaysian Merchant Bank Berhad	MBF Finance Berhad	Arab-Malaysian Bank Berhad Arab-Malaysian Finance Berhad Arab-Malaysian Merchant Bank Berhad
4. **Bumiputra Commerce Bank Berhad Group** Bumiputra Commerce Bank Berhad Bumiputra Commerce Finance Berhad Commerce International Merchant Bankers Bhd		Bumiputra Commerce Bank Berhad Bumiputra Commerce Finance Berhad Commerce International Merchant Bankers Bhd

Appendix (continued)

5. **Eon Bank Berhad Group** Eon Bank Berhad Eon Finance Berhad	Oriental Bank Berhad Eon Finance Berhad Perkasa Finance Berhad M a l a y s i a n International Merchant Bankers Berhad	Eon Bank Berhad Eon Finance Berhad M a l a y s i a n I n t e r n a t i o n a l Merchant Bankers Berhad
6. **Hong Leong Bank Berhad Group** Hong Leong Bank Berhad Hong Leong Finance Berhad	Wah Tat Bank B e r h a d C r e d i t C o r p o r a t i o n (Malaysia) Berhad	Hong Leong Bank Berhad Hong Leong Finance Berhad
7. **Malayan Banking Berhad Group** Malayan Banking Berhad Mayban Finance Berhad Aseambankers Malaysia Berhad	The Pacific Bank Berhad PhileoAllied Bank (M) Berhad Sime Finance Berhad Kewangan Bersatu Berhad	Malayan Banking Berhad Mayban Finance Berhad A s e a m b a n k e r s Malaysia Berhad
8. **Public Bank Berhad Group** Public Bank Berhad Public Finance Berhad	Hock Hua Bank Berhad Advance Finance Berhad Sime Merchant Bankers Berhad	Public Bank Berhad Public Finance Berhad Public Merchant Bank Berhad
9. **RHB Bank Berhad Group** RHB Bank Berhad RHB Sakura Merchant Bankers Bhd	Delta Finance Berhad Interfinance Berhad	RHB Bank Berhad RHB Sakura M e r c h a n t Bankers Bhd RHB Delta Finance Berhad
10. **Southern Bank Berhad Group** Southern Bank Berhad	Ban Hin Lee Bank Berhad Cempaka Finance Bhd. United Merchant Finance Berhad Perdana Finance Bhd Perdana Merchant Bankers Bhd	Southern Bank Berhad Southern Finance Berhad S o u t h e r n Investment Bank Berhad