Factors Determining Mergers of Banks in Malaysia's Banking Sector Reform

Rubi Ahmad
University of Malaya, Malaysia

Mohamed Ariff
Bond University, Australia

Michael Skully
Monash University, Australia

What was termed government-guided merger was a unique banking sector reform implemented in 2002 by the central bank of Malaysia guiding a larger number of depository institutions to form 10 large banks. This paper identifies the factors entering this massive merger exercise. Similar to the finding in bank merger literature, we find larger banks became acquirers. Also, low risk banks had higher probability of becoming an acquiring bank while high-risk banks became targets for takeover. Surprisingly managerial performance—financial ratios and changes in productivity reported as significant factors in prior market-based merger studies—was not significant in this study. Banks closely connected to government had greater chance of becoming acquiring banks while the reverse is true of target banks. These findings have not been reported in other studies of mergers, and are likely to be useful to central banks considering similar reforms (JEL: G21, G34).

Keywords: bank mergers, acquiring banks, managerial performance, government connections.

I. Introduction

Much of the prior work on bank mergers has focused on market-driven mergers in developed countries. This paper extends this literature by

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investigating the motives behind guided mergers which was implemented by the central bank of Malaysia to consolidate all 54 domestic deposit taking institutions into ten large-capitalized banks. This was partly a response to the banking crisis perpetrated by the 1997 – 1998 Asian financial crisis. Under a guided merger, a bank likely to fail was guided by the central bank to merge with a larger bank. We use the term "guided merger" as the initiative comes from regulator rather than the market. As noted in the literature, guided bank mergers are widely accepted by policymakers as one strategy to resolve banking problems. Similar government pressure and intervention have been used in varying degrees in Spain and other European banking systems (Tortella [2001]), in the United States with the savings and loan (S&L) crisis in the 1980s, in Sweden and Norway after the 1990s banking crises and in Mexico's bank restructuring in the mid-1990s. None of these events have yet been subjected to a scrutiny as a merger phenomenon, and this paper reports new findings that are likely to be significant to policymakers.

On 29 July 1999, the central bank (Bank Negara Malaysia, BNM) proposed a major restructuring plan for its 54 domestic deposit-taking financial institutions to be consolidated into just six institutions (BNM, [1999]). The view was that a merger plan was fundamentally desirable because Malaysia had too many banks for a small economy: policymakers showed the very high banking density (total population divided by total number of bank branches) in this small economy as evidence to support this argument: see *BNM Quarterly Bulletin* (1999: p. 192). Moreover, several banks suffered severe non-performing loan problems due to the 1997 – 1998 Asian financial crisis and were in need of recapitalization. Another reason was the World Trade Organization (WTO) pressure to remove regulations that restricted foreign institutions entry into the local markets. The government's initial announcement, however, provoked serious criticisms (Chin and Jomo [2001]). For example, many market participants viewed the mergers as politically motivated particularly since the policymakers had handpicked the original six acquiring banks (Maybank, Bumiputra Commerce Bank, Public Bank, Perwira Affin Bank, Multipurpose Bank and Southern Bank) selected to lead the exercise. Critics suggested that market forces should dictate these mergers as well as the time of merger, but the regulators placed a deadline for the consolidation of all banks. This criticism led to a softening of the merger policy with the number of acquiring banks increased in February 2000 from 6 to 10 and

an assurance that market forces will determine the process.[1]

Of the many questions regarding guided mergers, no issue has been more intriguing than ascertaining the government motives (rather than shareholders' or management's motives) and those bank characteristics the merger partners were most likely to value in their decisions. In contrast to previous studies, the major research question here is how a bank's pre-acquisition characteristics (non-financial and financial) may have influenced the decisions of government or other parties in the merger-like consolidation program to select them as an acquiring or target bank in an exercise apparently designed to achieve greater bank efficiency and stability over the long term.[2]

The logit regression is presented as an appropriate procedure to identify these characteristics entering the decision of the parties. The variables include those normally used in market-based merger studies plus a possible proxy variable for government's role in this process. This research design would resolve if the variables entering the guided mergers are akin to those of the market-based non-interventionist mergers.

Our findings reveal that the dynamics of the guided mergers are dissimilar, in some aspect, to that of market-based mergers. First, larger banks were more likely to become acquiring banks, which is consistent with market-driven merger studies: also, since risk reduction is a major motivation for the consolidation, variables representing bank risk are also statistically significant in the guided mergers. Surprisingly, contrary to prior findings, large banks with poor performance (low profits, high costs and low productivity) had higher probability of becoming an acquiring bank. To ensure this result is not spurious, a non-parametric approach to measuring bank efficiency was also applied with the results being the same. Finally, the strong positive coefficient for a variable for government connection indicates that bank's relationship with government was crucial for a given bank to become an acquiring or acquirer bank.

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1. The final merger was between Rashid Hussain Bank (RHB) and Bank Utama on 20 March 2002 with the latter attaining acquirer bank status. This completed the Malaysian domestic banking consolidation program of combining 54 domestic financial institutions into just 10 groups.

2. The approach taken differs slightly from Dietrich and Sorenson (1984) and Hannan and Rhoades (1987) who perform a logit estimation to predict the likelihood of merger in United States. They estimate the relationship between the likelihood of acquisition and the characteristics of the target bank.

The remainder of this paper is organized as follows. Section II provides a review of literature on bank mergers while section III describes in detail the methodology used. In section IV and V we present the empirical results and the conclusions of this study.

II. Literature review

A major motive for bank mergers and acquisitions is to maximize shareholder value. This is accomplished by increasing a bank's market power, efficiency, and risk diversification.[3] Managers may also pursue consolidation for their own self-interest by decreasing their largely undiversified employment risk (Treynor and Black [1976]), obtaining additional perks and gaining higher growth or empire building (Berger et al. [1999]). In addition, both shareholders and managers may use mergers to increase a bank's access to government safety nets such as deposit insurance or a discount window. As explained earlier, the government can also pursue its own objectives in consolidation decisions. The remainder of this section addresses the prior research on these efficiency improvement and risk reduction motives.

Efficiency improvement hypothesis

Past empirical studies strongly suggest that the relative performance of targets and acquirers plays a significant role in the post-acquisition performance of merger participants, indeed in the pre-acquisition decision-making as well. According to this hypothesis, mergers may improve efficiency particularly when weak, poorly managed banks are acquired by stronger, competently managed banks.[4] Shaffer (1994) shows that large cost efficiency gains are possible when more efficient banks merge with less efficient banks. While Peristiani (1997) discovers that the U.S. acquiring banks are more profitable than target banks, Berger and Humphrey (1992) find that the acquiring bank is more cost efficient too and can make post-merger gain by restoring its inefficient

3. Berger et al. (1999) discusses the findings of previous research on the causes, consequences and future implications of financial services industry consolidations.

4. Refer to Jensen and Ruback (1983), Hawawini and Swary (1990), Berger and Humphrey (1992), De Young and Whalen (1994), Berger and Humphrey (1997) and Amihud and Miller (1997).

targets to similar profitability.

Studies of European banks also confirm those results. Focarelli et al. (2001), for example, analyze bank mergers in Italy, and find that the acquiring banks are more profitable and bigger than their targets. Large, efficient European banks tend to acquire smaller, less efficient ones. De Young and Whalen (1994) explain that consolidation may benefit the economy if it drives inefficient banks from the market and facilitates increased efficiency in the newly formed banking organizations. The cutting of redundant operating costs including unproductive managers should help to increase the new bank's overall efficiency. This is easier when the acquiring bank is stronger and more efficient than its target. At the same time, whether such acquisitions lead to significant economies of scale is uncertain as the past empirical results provide mixed findings. For example, Peristiani (1997) and Akhavein et al. (1997) found no significant improvements in cost efficiency from U.S. bank mergers.[5] Similarly the Group of Ten (2001) reported a lack of evidence on the economies of scale and scope for large European banks (Group of Ten [2001]). In contrast, Focarelli et al. (2001) provide strong evidence that mergers do benefit Italian consumers in the long run.

Risk reduction hypothesis

Risk reduction is another reason why banking authorities and bank managers support mergers and acquisitions.[6] Research on bank acquisition risk normally concentrates on the benefits of diversification from consolidating across financial products and services as well as geographic expansion through inter-industry mergers.[7] This in turn can reduce the overall credit risk of a bank's asset portfolio and thereby bank-specific risk falls. On the other hand, banks may use these diversification benefits to increase their risky lending (Berger et al. [1999]). In addition, other problems arise from creating a small number of large financial institutions. These banks may use acquisitions as a

5. If gains are recorded, they are found to be either small or insignificant. See for example Berger and Humphrey (1992), Rhoades (1993), Peristiani (1997), Akhavein et al. (1997), Berger and Humphrey (1997), Rhoades (1998), Boyd and Graham (1997), Hughes et al. (1999) and Delong (2001).

6. See Rose (1989), Craig and Santos (1996) and Demstez and Strahan (1997).

7. See Amel et al. (2003) for discussions on inter- and intra-mergers. Inter- refers to merging with banks of different loan portfolios or operating in different markets. Intra-mergers involve banks that engage in similar activities and located in the same market.

means to boost their deposit insurance subsidy (implicit and explicit guarantees) or to take advantage of the too-big-to-fail doctrine.[8]

Past studies indicate that the potential for risk reduction depends on the financial characteristics of the merger and acquisition participants. Benston, Wall and Hunter (1995) suggest that banks seeking to reduce their default risk via increased size may prefer targets with lower credit risk.[9] They claim that a post-merger bank risk reduction is most likely in mergers between high-risk acquirers and low-risk targets as discovered by Dietrich and Sorensen (1984) and Hannan and Rhoades (1987). The former study reports that the banks with low capital to asset ratios are more likely to be acquired than those with high ratios. Similarly, Dietrich and Sorensen (1984) suggest that acquiring banks prefer to acquire small, low risk targets (low debt ratio). In contrast, Peristiani (1997) finds that acquiring banks have smaller non-performing loan ratios than targets. Indeed, risk reduction is seemingly one of the least important motives for consolidation in the U.S. and other developed countries.

Given the above findings, it is reasonable to hypothesize that the Malaysian government would be most likely to select large, efficient and low risk banks as acquiring banks. The rationale behind the consolidation, among other things, was to resolve the banking problems precipitated by the 1997 – 1998 Asian financial crisis. Therefore, if the merger wave was driven by a desire to enhance safety and soundness as well as efficiency, the performance and risk differences reflected on the bank financial statements should significantly affect the likelihood of a bank becoming an acquirer or a target.

III. Methodology and Data

A. Methodology

Following the practice in the empirical literature, a logit model is preferred over other models as it allows an assessment of the

8. Refer to Boyd and Graham (1997), Benston, Hunter and Wall (1995) and Amihud and Miller (1997).

9. Benston. Hunter and Wall (1995) postulate that the purchase premium of a target bank should be positively related to and no more than the present value of the change in the net cash flows of the newly-formed entity (target plus acquirer). In general, the value of the cash flows depends on banks' relative size, efficiency and risk.

relationship between the probability of a bank becoming an acquirer (or earning anchor bank status) and thus help identify banks' characteristics prior to the acquisition.[10] This allows for the examination of the acquirers' pre-acquisition characteristics as well rather than just concentrate on the target.[11] For any given period, a bank may either be an acquiring bank or a target depending on its pre-acquisition characteristics.

Therefore, a functional relationship is assumed between the probability of being an acquiring bank during year *t* and several explanatory variables expressed in matrix form in the following equation:[12]

$$P(Y_{it}) = f(X_{it}, \beta_{it}) \tag{1}$$

where, $P(Y)$ denotes the probability that the observed bank, i, will fall in the category of acquiring bank (using the regulatory term anchor bank) during year t. The explanatory variables, X_i, are the financial and non-financial variables. Parameters, β_i, are estimated using the maximum likelihood estimation (*MLE*) method. We are particularly interested in β's which measure the change in a bank-specific factor (X_i) effects on the probability that the bank becoming an acquiring bank ($Y = 1$) after controlling for other factors.

The financial determinants in guided bank mergers

In order to achieve greater post-acquisition efficiency, an acquiring bank should be more efficient and most often larger than its targets, as discovered in several studies such as Allen and Rai (1996) and Berger and Humphrey (1997). Mergers of two fundamentally different banks

10. Dietrich and Sorenson (1984) claim that with logit analysis, the interpretation of the estimation results are direct and impose less restriction assumptions on the statistical properties of the data.

11. This approach differs slightly from Dietrich and Sorenson (1984) and Hannan and Rhoades (1987). They perform a logit estimation to estimate the relationship between the likelihood of acquisition and the financial characteristics of the target bank. Cheng, Gup and Wall (1989) is one of the few that focus on acquiring bank characteristics when examining the determinants of bank merger pricing.

12. The assumed functional form of Equation (1) in the logit model is: $P(Y) = (1 + e^{-Y}) - 1$ where Y is a linear combination of the observable independent variable, X_i's, and the parameters β and β_i, which are to be estimated in $Y = \alpha + \Sigma\beta_i X_i$.

are more likely to gain from diversification (Estrella [2001]). If the main motivation is improved efficiency, then large and efficient banks should have higher probability of becoming the acquirers. Hence, the variables representing bank size and bank efficiency are expected to be highly significant with positive signs. Given that the initiative for mergers came from government concerns over the systematic stability of its financial markets, the selected risk variables are hypothesized to be statistically significant also. This study expects a negative relationship between bank risk and likelihood of becoming an acquiring bank.

The most commonly used indicators of bank performance or efficiency are the accounting ratios and efficiency scores obtained from various frontier efficiency approaches.[13] In this study, bank performance is measured by accounting ratios and the Malmquist Total Factor Productivity (*TFP*) change indices generated using the non-parametric frontier approach, Data Envelopment Analysis (*DEA*).[14] Both methods are useful in distinguishing 'good' management from 'bad' management given that poorly managed firms normally exhibit poor performance—low profits and operating inefficiencies.[15] Since the balance sheet approach does not fully take into account differences in exogenous prices of banks' inputs and outputs (Amel et al. [2002]), incorporating the Malmquist *TFP* as indicators of efficiency in the banks helps to mitigate this problem and more importantly, increases the robustness of this study.

Subsequently, a series of logit models are utilized. Model 1 and model 2 employ the accounting ratios as proxies for bank performance. Model 3, on the other hand, incorporates the Malmquist *TFP* as proxies for bank performance instead of the accounting ratios. To our knowledge, this study is the first to incorporate both accounting ratios and indices of Malmquist *TFP* change in investigating the relationship between the pre-acquisition bank characteristics and the likelihood of a bank becoming an acquiring bank.

Given the small population size, this study utilizes the *DEA*

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13. Berger and Humphey (1997) review the bank literature. Their survey covers 130 efficiency studies on 21 countries employing 5 different frontier efficiency approaches.

14. Refer to Coelli, Rao and Battese (1998) and Thanassoulis (2001) for a detail description of the theory and application of *DEA*.

15. For example, studies by Hannan and Rhoades (1987), Rose (1989), Cheng, Gup and Wall (1989), Hawawini and Swary (1990), Benston, Hunter and Wall (1995) and Focarelli and Panetta (2001) employ accounting ratios while others such as Drake and Hall (2003) and Avkiran (1999) employ *DEA* approach.

approach to measure and decompose the Malmquist productivity index as another alternative measurement of bank efficiency in our logit model.[16] Using a linear programming method, *DEA* constructs a non-parametric piece-wise frontier over the data, over any two periods, that is also called the best practice production frontier (Coelli, Rao and Battese [1998]). Hence, we estimate the overall performance of a domestic bank relative to "best practice" in a period. The Malmquist *TFP* is simply the product of efficiency change (*EFF*) and technology change (*TECH*): the value can be greater than, equal to, or less than unity depending on whether the bank experiences productivity growth (increasing return), stagnation (constant return) or productivity decline (decreasing return) during the one-year period.[17]

On the other hand, accounting ratios are represented by profitability and cost ratios. The three profitability ratios are the return on average equity (*ROAE*), net interest margin (*NIM*) and ratio of other operating income to average assets (*OOIAA*). Other operating income is the bank's non-interest income which comprises mainly of fees earned from selling services other than loans. *ROAE* is defined as net income divided by average equity, and is well-accepted as an indicator of overall bank performance.[18],[19] *NIM* is the ratio of the net interest income to total earning assets. Net interest income equals interest income minus interest expense; it represents the "bread and butter" of the banking business. The earning assets refer to total loans and investments: total loans are

16. Quite often, the past use of the *DEA* has been motivated by the small sized sample (Sathye [2001], Isik and Hassan [2003]). Following the prior literature, this study employs the intermediation approach whereby banks are viewed as financial intermediaries employing labor, capital and deposit to produce outputs in the form of loans, investment securities and off-balance sheet items. Thus, our input variables are deposits, fixed assets and interest expense. To capture the core activity of the banks, the output variables comprise of bank loans in addition to other earnings assets. Katib and Matthews (1999) apply the *DEA* analysis to measure technical efficiency of 20 Malaysian commercial banks for the period 1989 – 1995. Their average technical efficiency ranged from 68% to 80% and found that most of these banks operate with constant returns to scale.

17. A recent study by Isik and Hassan (2003) provides a clear description of the *DEA*-type Malmquist *TFP*. *EFF* measures how much closer is a bank gets to the efficient frontier while *TFCH* indicates how much the benchmark production frontier shifts at each bank's observed input mix.

18. The average equity and asset are both calculated using the arithmetic mean of the value at the end of year t and $t - 1$ (Bankscope [2002]). This applies also to the other ratios with average assets as the denominator.

19. See for example Focarelli and Panetta (2001) and Houston et al. (2001).

gross loans minus loan loss provisions; and investments refer to bank deposits, money market instruments, government securities, equity investments and other investments. Given the importance of non-interest income, *OOIAA* is included as a proxy for bank profitability. This ratio measures to what extent fees and other incomes represent a greater percentage of bank's earnings.

The two cost ratios in this study are the average cost to income ratio (*CIR*) and the ratio of non-interest expense to average assets (*NIEAA*). *CIR* measures the overall costs of running the bank as percentage of the income generated before provisions while *NIEAA* measures the bank's effectiveness in controlling its operating expenses. The lower the ratio, the more efficient is the bank. Piloff and Santomero (1998) and Berger and Humphrey (1992) stress the importance for acquirer to be more cost efficient than its target. In contrast, Rhoades (1998) claims that having an efficient acquiring bank is insufficient to ensure efficiency gains. However, Berger (1998) suggests that efficiency improvements are more likely when both the acquirer and target are inefficient.

Bank risk, on the other hand, is represented by five financial risk variables that reflect levels of credit and liquidity risks.[20] Capital market risk measures are not used as only a few domestic banks are exchange-listed companies. Instead, our risk variables include: the ratio of net loans to total assets (*NLTA*); gross loans to earning asset (*GLEA*); ratio of loan loss provision to gross loans (*LLRGL*); the liquid asset-to-total deposit ratio (*LACSTF*); and risk-weighted capital adequacy ratio (*CAR*). The difference between gross loans and loan provisions is net loans. Since loan loss reserves reflect the bank's estimate of potential losses, higher loan loss reserves is then interpreted as poor quality of the loan portfolio in the future. Alternatively, if loan provisions are seen as a positive indicator of bank's capacity to generate incomes, high ratio means good loan portfolio quality (Barrios and Blanco [2003]). Bank managers may over-reserve during good times to lower earnings or under-reserve during bad times. The capital ratio (*CAR*) is measured according to the 1988 Basle Accord.[21] The first three

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20. The ratio of nonperforming loans was included in the model during the first stage of our logit analysis. Due to missing data for a significant number of banks in the sample, it was dropped in our final analysis.

21. The Basle Committee on Banking Supervision (BC) consisted of banking officials from 12 industrial countries. In 1988 its work resulted in a common framework of capital adequacy measurement and agreed a minimum risk-based capital standard of 8% for banks operating internationally.

risk variables (*NLTA*, *GLEA* and *LLRGL*, are expected to have negative coefficients while the expected sign for risk-weighted capital ratio is positive. In addition, the variable, *LASSET*, is included to proxy bank size. This variable equals the logarithm of total bank assets in RM millions.[22] As mentioned, size may be an important determinant of acquiring bank if efficiency improvement is a motive. The expected coefficient on this variable is positive.

A non-financial determinant—government connection

One of the contributions of this study is that it provides fresh insights into the determinants of bank mergers by giving special consideration to a non-financial variable named *DPOLITIK*. This dummy variable proxies the close relationship between the bank and the government—a value of one denotes strong connection and zero otherwise.

The definition of "political-connected banks" is based on the ethnicity of ownership and major shareholders relationships with politicians (namely the Finance Minister and Prime Minister) as well as the shareholdings by government agencies such as the Armed Forces Fund, Employees Provident Fund and Khazanah Nasional Berhad.[23] Thus, our definition of government-connected banks is analogous to Johnson and Mitton (2003) who rely on the analysis of Gomez and Jomo (1997). Information on the government-connected banks is also based on the ownership data obtained from the Bankscope database and Kuala Lumpur Stock Exchange Annual Companies Handbook. The majority of the government connected banks are large and publicly listed companies while the non-connected banks are small and family -owned banks. Table 1 provides the list of politically connected banks.

In particular, government policy of transferring more ownership of productive assets to the indigenous population may have affected the consolidation decisions (Rahman and Limmack [2000]). Moreover, there is empirical evidence supporting the notion that well-connected institutions received significant direct and indirect government support

22. RM stands for local currency, Ringgit Malaysia. It is traded at U.S. $ 1.00 = RM 3.50 in late 2007.

23. *EPF* is a scheme that provides retirement benefits to employees who contribute every month to the scheme through salary deductions while *AMF* is catered specially for the members of the Armed Forces. *PNB*, on the other hand, is a Malaysian government's investment arm.

TABLE 1. Politically Connected Commercial Banks in the Study*

Sample	Majority shareholders	Politically connected or State owned	1 = strong and 0 = weak
Alliance (Multi-Purpose Bank)	Syabas Sutra Sdn. Bhd. Multipurpose Mngmnt. Bhd.	Daim*	1
AmBank (Arab Malaysian Bank)	Arab Malaysian Corp. Berhad Employees Provident Fund Board	UMNO*	1
Aseambanker Malaysia		Daim	1
Bank Bumiputra	Ministry of Finance	Government	1
BSN Commercial Bank		UMNO	1
BSN Merchant Bank		UMNO	1
Bumiputra-Commerce	Ministry of Finance Khazanah Nasional Berhad	State-owned	1
EON Bank	Edaran Otomobile Nasional	Mahathir*	1
Maybank	Sekim Amanah Saham Bumi' Permodalan Nasional Berhad Employees Provident Fund Board	State-owned	1
Perwira Affin Bank	Affin Holding Berhad ARM Forces	State-owned	1

Note: *This information was collected from Gomez and Jomo (1997) and Johnson and Mitton (2003). Banks associated to Daim who was the Finance Minister who created acquirer banks scheme and Tan Sri Mahathir, the Malaysian Prime Minister, are categorized as government-favored banks while those linked to Anwar Ibrahim, the jailed ex-Deputy Prime Minister, are otherwise. As for other banks, we refer to several local newspaper articles shareholders' lists from banks' annual reports and the BANKSCOPE database.

after the 1997 crisis. Similarly a study by Johnson and Mitton (2003) discovers that politically connected Malaysian non-financial and financial institutions were the main beneficiaries of the September 1998 capital controls.[24] Given that the policy-makers initiated these mergers, the banking consolidation is also most likely to favor the politically connected banks. Thus, the likelihood of becoming an acquiring bank is likely to be influenced by a close relationship between bank and government.

24. Faccio (2003) discovers that over 10% of listed corporations in Malaysia are politically connected and these firms account for more than 20 percent of the market capitalization.

B. Data

Financial institutions are categorized as either banks or non-bank financial institutions. Commercial banks, finance companies, merchant banks and discount houses are all classified as banks in this country. Non-bank financial institutions include insurance companies, unit trusts companies, pension funds, venture capital firms, etc. The 1999 – 2002 guided mergers involved all the domestic commercial banks, finance companies and merchant banks. This involved 54 institutions in all. Table 2 contains a list of acquiring banks (10 banking groups), their respective subsidiaries (9 institutions) prior to mergers and their merging partners (36 targets). The final list of 10 merged banks with their targets that merged with them are listed in table 3.

All the subsidiaries of the acquiring banks are excluded in our analysis as they existed prior to the decision to merge with other targets. As the 10 acquiring banks and 22 of the 36 target banks have their financial data in the Fitch-IBCA's Bankscope database, the sample consists of yearly observation for 32 domestic banks covering over a six-year period from 1994 until 1999.[25] The exceptions are the Bank Bumiputera and Sime Bank; these targets were either acquired or merged with the acquiring banks after October 1999 (the date of the second announcement).

IV. Empirical results

A. Descriptive Statistics

Accounting ratios

Table 4 presents the mean values and standard deviations of the financial variables over 1994 – 1999. In general, the post-crisis merger plan involves relatively large and medium-sized banking institutions acquiring relatively small-sized banks. The average log of total asset for

25. Two of the 14 targets excluded from the sample are merchant banks while the rest are finance companies. Finance companies were worst hit by the 1997 crisis. Between 1998 and 1999, Bank Negara Malaysia took control over the operations of at least three finance companies (Bank Negara [1999]) and others were absorbed by the parent companies. This partly explains the missing data.

TABLE 2. Acquiring Banks, Subsidiaries and Acquired Institutions, 1999 – 2002.

Banking groups (Acquirer Bank)[a]	Banking institutions in the group Subsidiaries	Acquired institutions
Alliance[c]		Sabah Bank; International Bank Malaysia Berhad; Bolton Finance; Sabah Finance; Bumiputra Merchant Bankers; Amanah Merchant Bankers
AmBank[c]	Arab Malaysian Finance Berhad	MBF Finance Bhd.
Bumiputra-Commerce[b]	Commerce Finance Berhad	Commerce International Merchant Bankers Berhad; Bank Bumiputra
EON Bank	EON Finance Berhad	Oriental Bank; City Finance; Perkasa Finance; Malaysia International Merchant Bankers
Hong Leong Bank	Hong Leong Finance Berhad	Wah Tat Bank; Credit Corporation Malaysia
Malayan Banking Group	Mayban Finance Berhad	PhileoAllied Bank; Pacific Bank; Sime Finance; Kewangan Bersatu; Aseambanker Malaysia

(*Continued*)

TABLE 2. (Continued)

Banking groups (Acquirer Bank)[a]	Banking institutions in the group Subsidiaries	Acquired institutions
Perwira Affin Bank	Affin Finance Berhad Perwira Affin Merchant Bankers Berhad	BSN Commercial Bank; BSN Finance; Asia Commercial Finance; BSN Merchant Bank
Public Bank	Public Finance Berhad	Hock Hua Bank; Advance Finance; Sime Merchant Bankers
RHB Bank	RHB Sakura Merchant Bankers Berhad	Sime Bank; Bank Utama; Delta Finance; Interfinance Berhad
Southern Bank		Ban Hin Lee Bank; Cempaka Finance; Perdana Finance; United Merchant Finance; Perdana Merchant Bank
10 institutions	9 institutions	36 institutions

Note: Source: Bank Negara (1999). [a]The six original acquirers or "acquirer banks" in the government-led merger programme were Maybank, Bumiputra Commerce Bank, Public Bank, Perwira Affin Bank, Multi-Purpose Bank and Southern Bank. [b]Bumiputra-Commerce was created from the merger between Bank of Commerce and Bank Bumiputra, second largest banking institutions prior to 1997 crisis. The latter suffered from non-performing loans and so was rescued by the Bank of Commerce. The mergers between Bank Commerce and Bank Bumiputra as well as RHB Bank and Sime Bank happened in 1999 prior to the government merger announcement in October 1999. [c]AmBank and Alliance Bank were previously known as Arab Malaysia Bank and Multipurpose Bank respectively.

TABLE 3. Final List of Deposit-Taking Institutions Selected

Acquiring banks (10)	Target banks (22)
Alliance	Aseambanker Malaysia: Asia Commercial
AmBank	Finance;
Bumiputra-Commerce	Ban Hin Lee Bank; Bank Bumiputra; Bank
EON Bank	Utama; Bolton Finance; BSN Commercial Bank;
Hong Leong Bank	BSN Merchant Bank; Bumiputra Merchant Bankers;
Maybank	Commerce Inter' Merchant Bankers Bhd;
Perwira Affin Bank	Credit Corporation Malaysia; Hock Hua Bank;
Public Bank	International Bank Malaysia Berhad; Malaysia
RHB Bank	International Merchant Bankers; Oriental Bank;
Southern Bank	Pacific Bank; Phileo Allied Bank; Sabah Bank; Sime Bank; Sime Merchant Bankers; United Merchant Finance; and Wah Tat Bank.

acquirers was 21.225 while it was 14.9998 for targets.[26] In addition, our statistics document that acquiring bank on average were more efficient as they incurred fewer overheads for each local dollar (ringgit) earned and invested than the target. The difference in profitability is pronounced particularly when measured by return on average equity (*ROAE*). During this period, the *ROAE* for acquiring banks was 10.89 percent, compared with 5.68 percent for targets. As for cost efficiency, the non-interest expense to average asset ratio (*NIEAA*) and cost-income ratio (*CIR*) show the acquirers were more efficient despite their higher non-interest expense. *NIEAA* for the acquiring banks and targets were 2.37 percent and 2.70 percent respectively. Between the two ratios, *CIR* provides a better measurement of bank performance since *NIEEA* is sensitive to bank size. Prior to mergers, the acquiring banks enjoyed cost-income ratio of 40.65 percent compared to 51.24 percent for targets. Based on *CIR*, acquirers were more efficient.

Acquiring banks were less adequately capitalized during the 1994 – 1999 period. The average capital adequacy ratio for acquiring banks was 14.01 percent compared to 15.11 percent for targets: perhaps the

26. The acquisition of Bank Bumiputera by Bank of Commerce in 1999 was the only merger where the target is at least 2.5 times larger than acquirer. This acquisition happened prior to the final announcement on the government scheme.

TABLE 4. Means and Pairwise *t*-statistics by Group for Selected Financial Variables

	Acquirer	Target	*t*-statistics
Log of total assets (*LASSET*)	21.225	14.9998	8.57*
Net interest margin (*NIM*)	2.9761	2.9162	0.31
Ratio of other operating income to average assets (*OOIAA*)	0.8025	0.8822	–0.81
Return on average equity (*ROAE*)	10.8859	5.9849	2.41**
Non-interest expenses to average assets ratio (*NIEAA*)	2.3739	2.7056	–1.71
Cost income ratio (*CIR*)	40.6523	51.2426	–3.47*
Ratio of net loan to total assets (*NLTA*)	60.0685	56.9653	1.77
Ratio of loan loss reserves to gross loans (*LLRGL*)	3.5028	5.0383	–2.70*
Ratio of liquid assets to total deposits (*LACSTF*)	20.4370	23.1157	–1.39
Capital adequacy ratio (*CAR*)	14.0086	15.1075	–0.59
Ratio of gross loans to earnings assets (*GLEA*)	67.7319	66.0238	0.83

Note: *Significance at 1% level. **Significance at 5% level. ***Significance at 10% level.

difference is driven by Basle I risk adjustment. Acquiring bank loan loss reserves ratio were also substantially lower –3.51 percent versus 5.04 percent for targets. A high *LLRGL* is interpreted as high bank risk. Proportionally high loan loss reserve (*LLRGL*) can be argued as indicators of low credit risk. Banks that perform better or banks with more conservative management may provision more for loan losses. On top of that, acquiring banks averaged 60.07 percent *NLTA* versus 56.96 percent for targets in that period. This helps explain why acquiring banks in general earned higher average returns than targets.

The Malmquist Index

We measure productivity gains/losses as measures of efficiency following the recently-popularized *DEA*-Malmquist Index. This is a non-parametric index value of how productivity changes over annual time period is changing for the firm: see Thanassoulis (2001) for an example of its application. The model measures if the input values used

TABLE 5. Average Malmquist Total Factor Productivity Index (*TFP*) and Components in Malaysian Banking during Pre-acquisition Period, 1995 – 1999.

Inputs: (i) deposits, (ii) fixed assets and (iii) interest expense. Output: (i) total earning assets (loans plus other earning assets).

	TFP	*EFF*	*TECH*	*PECH*	*SECH*
All (29)	0.982	0.981	1.002	1.001	0.982
Acquirer (10)	0.9943	1.005	0.9896	1.0274	0.9787
Targets (12)	0.97075	0.96408	1.0068	0.9885	0.9752
Others (7)	0.9968	0.9791	1.0154	0.99	0.9894

Note: The 29 banks includes 29 subsidiaries of the acquiring banks. *TFP* refers to the total productivity change, which is the product of *EFF* and *TECH*. *EFF* refers to technical efficiency change relative to constant returns to scale technology. *TECH* refers to technological change. *PECH* denotes pure technical efficiency change relative to variable returns to scale technology. *SECH* refers to scale efficiency change.

to produce a given output is done in such a way to have net gain thus showing efficiency in the use of resources or no gain or net loss. Measured values greater than 1 are indicative of gains in productivity relative to performance in the previous year whereas values significantly less than 1 are indicative of net losses and zero values indicate no change: this measure is an alternative to the traditional financial measures. For each firm, the mean annual value of the total factor productivity change (*TFP*) in the index value and its components (*EFF* and *TEF*) are measured: see table 5.

The *TFP* values indicate that both acquiring banks and targets suffered a slight decline in productivity during the study period. These figures are as expected since the banking system was experiencing a financial crisis following the collapse of the Thai currency in July, 1997. In comparison to the targets' 2.9 percent fall in productivity, the acquiring banks had 0.6 percent average decline in productivity. The decomposition of *TFP* further illustrates that the targets suffered higher declines in productivity due mainly to lower efficiency change (*EFF*), and not technical change over time (*TECH*).

Summarizing, it appears, during the pre-acquisition period, that the acquiring banks were larger, riskier, in terms of capital adequacy and portfolio composition, and earned higher average returns than targets as well as had much less fall in productivity at the time of the crisis. In contrast, the target commercial banks were larger or better managed financially than some but not all acquiring banks.[27] The statistics also demonstrate that factors other than financial variables influenced the consolidation decisions. One such factor is bank's close association with incumbent political groups.

B. Logit Estimation Results

Based on the variables used by other researchers, we consider initially more than 20 financial variables. A careful analysis of each variable as well as factor analysis and collinearity tests aided in narrowing the set to 11 variables. The eleven financial ratios except for liquid asset ratio (*LACSTF*), gross loan to total earning asset ratio (*GLEA*) and net loan to total asset ratio (*NLTA*) are not highly correlated as seen in table 6.

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27. The net interest margin for Hock Hua Bank and Pacific Bank are 4.507% and 2.706% respectively while EON Bank is 2.29% and AmBank is 0.671%. AmBank was badly hit by the 1997 crisis and suffered high non-performing loans of 29.44% in 1998. The average cost-income ratio for AmBank is 74.349% higher than the average for target.

TABLE 6. Correlation Matrix of Model Variables

	dpolitik	*lasset*	*nim*	*roae*	*cir*	*ooiaa*	*nieaa*	*nlta*	*car*	*llrgl*	*glea*	*lacstf*
Dpolitik	1.000											
lasset	0.251	1.000										
nim	–0.137	0.015	1.000									
roae	0.004	0.067	0.319	1.000								
cir	–0.134	–0.164	–0.218	–0.270	1.000							
ooiaa	–0.049	–0.161	–0.097	0.291	–0.497	1.000						
nieaa	–0.057	–0.051	0.259	–0.670	–0.074	–0.061	1.000					
nlta	0.193	0.146	0.437	0.067	–0.038	–0.359	0.066	1.000				
car	–0.031	0.198	–0.254	–0.055	0.447	0.072	–0.105	–0.428	1.000			
llrgl	–0.020	–0.062	–0.119	–0.303	0.294	0.025	0.367	–0.213	0.431	1.000		
glea	0.161	0.119	0.473	0.034	0.008	–0.359	0.132	0.955	–0.367	0.005	1.000	
lacstf	–0.107	–0.189	–0.331	–0.084	0.205	0.052	–0.051	–0.764	0.388	0.225	–0.759	1.000

Note: *dpolitik* is a dummy variable; 1 denotes close relationship with the government and 0 otherwise; *lasset* refers to logarithm of total assets; nim is the net interest margin; *roae* is the return on average equity; *cir* refers to cost to income ratio; *ooiaa* is the ratio of other operating income to average assets; *nieaa* is the ratio of non-interest expenses to average assets ratio; *nlta* is the ratio of net loan to total assets; car is the risk weighted capital adequacy ratio; *llrgl* is the ratio of loan loss reserves to gross loans; *glea* is the ratio of gross loans to total earnings assets; and finally, *lacstf* refers to the ratio of liquid assets to total deposits.

Thus, the variables, *GLEA* and *LACSTF* used to represent risk, are excluded in the third model.[28] Given the problem of heteroscedasticity, the Huber/White/Sandwich estimator of variance is used, instead of the conventional *MLE* variance estimator.

Table 7 summarizes a series of logit regression estimations for models 1, 2 and 3, where the dependent variable is a dummy indicating whether the bank is an acquiring bank.[29] All the three models have reasonable pseudo *R*-square values 0.647, 0.571 and 0.210 respectively.[30] The first model uses 12 independent variables (11 financial and one political). Five variables are significant at the 0.01 acceptance level and the performance variables are statistically insignificant. *LLRGL*, *NLTA* and *GLEA* (representing risk) are statistically significant. While *NLTA* has a positive coefficient, the signs of variables *GLEA* and *LLRGL* are negative. Bank size (*LASSET*) and government connections (*DPOLITIK*) are highly significant and have the predicted signs. These two variables and most of the risk variables are significant at 0.05 level or better. These later results are not inconsistent with market-led mergers.

The results from model 2 are from stepwise logistic regression using *p*-value equals to 0.10 for removal of the variable as shown in column (3).[31] As a result, seven of the 10 variables are removed. Variables representing bank size (*LASSET*), government connections (*DPOLITIK*) and loan loss reserves (*LLRGL*) are statistically significant at the 0.01 level. Cost-to-income ratio (*CIR*) that represents bank efficiency is insignificant. The coefficient of loan loss reserve ratio (*LLR*) indicates that a fall in bank risk increases the probability of a bank becoming

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28. Replacing the variable *NLTA* with either variable *GLEA* or *LACSTF* does not change our results.

29. STATA uses maximum likelihood algorithm to determine the direction and size of the change in the logit coefficients which will increase the log likelihood. For further discussions see http://www.ats.ucla.edu/stat/stata/webbooks/logistic/chapter1/statalog .

30. The pseudo-R^2 is given as: $C/(N + C)$, where, $C = -2\log(\log L_1 - \log L_2)$ and N is the sample size.

31. When the *p*-value for the likelihood ratio test of the significance of the coefficient is greater than 0.10, the variable is removed form the model. Hosmer and Lameshow (2000) recommend stepwise procedure for selection and deletion of variables from a model. While the stepwise linear regression uses *F*-test, the logistic regression assumes the errors follow a binomial distribution and significance is assessed via likelihood ratio chi-squared test. In each step, the chosen variable is one that results in the greatest change in the log-likelihood relative to a model not containing the variable (Hosmer and Lameshow [2000]).

TABLE 7. Estimated Coefficients of the Three Logistic Models for Predicting a Domestic Bank Becoming an Acquirer

Variable	Model 1: Null model Estimates	*P*-value	Model 2: The step-wise model Estimates	*P*-value	Model 3: The inclusion of Malmquist *TFP* Index Estimates	*P*-value
Bank size:						
Log of total assets (*LASSET*)	2.9280	0.000	1.6545	0.000		
Bank performance variables:						
Net interest margin (*NIM*)	0.6294	0.256				
Ratio of other operating income to average assets (*OOIAA*)	–0.0046	0.994				
Return on average equity (*ROAE*)	0.02205	0.639				
Cost income ratio (*CIR*)	–0.0708	0.090	–0.0395	0.071		
Ratio of non-interest expenses to average assets (*NIEAA*)	1.2761	0.069				
Malmquist total factor productivity change index (*TFP*)					3.5465	0.163
Bank risk variables:						
Ratio of net loan to total assets (*NLTA*)	1.1847	0.000				
Ratio of loan loss reserves to gross loans (*LLRGL*)	–0.8652	0.023	–0.5563	0.001	–0.2163	0.043

(*Continued*)

TABLE 7. (Continued)

Variable	Model 1: Null model Estimates	*P*-value	Model 2: The step-wise model Estimates	*P*-value	Model 3: The inclusion of Malmquist *TFP* Index Estimates	*P*-value
Bank risk variables:						
Ratio of liquid assets to total deposits (*LACSTF*)	–0.0514	0.318				
Capital adequacy ratio (*CAR*)	0.0498	0.059				
Ratio of Gross Loans to earnings assets (*GLEA*)	–1.0900	0.000				
A non-financial variable:						
Government connection (*DPOLITIK*)	4.5878	0.000	2.4036	0.000	2.2839	0.000
Constant	–44.2791	0.001	–23.8191	0.000	–3.5884	0.133
Number of observations	148		148		87	
Pseudo *R*-squared	0.6471		0.4830		0.2102	

Note: Each model estimates the likelihood of a sample bank becoming an acquiring bank. The dependent variable is set equal to one if the bank is an acquiring bank in a government guided merger announced in 1999 and completed in 2002. For Model 1 and 2, all characteristics are measured from 1994 to 1999. The variables include a size variable (log of total assets), 5 bank performance variables, 5 bank risk variables and a dummy variable called *DPOLITIK*. *DPOLITIK* denotes 1 for a government-connected bank and 0 otherwise. Model 1 consists of 12 independent variables while Model 2 represents the step-wise logit regression with 10 independent variables and they are *LASSET, NIM, OOIAA, ROAE, CIR, NIEAA, NLTA, CAR, LLRGL* and *DPOLITIK*. The variables *GLEA* and *LASCTF* are excluded in the Model 2. Due to the missing data, Model 3 covers the period 1995 – 1999 and only 22 banks in the sample. Given less number of banks in the sample, only 3 independent variables are included and they are *TFP, DPOLITIK* and *LLRGL*.

acquiring bank (a high loan loss provision indicates low credit risk). Finally, the results suggest that the likelihood of becoming an acquiring bank is strongly related to bank size as well as its relationship to government, as indicated by a significant coefficient with a coefficient of 2.403 significant at 0.01 level, on *DPOLITIK*.

The last column in table 7 shows the results of model 3. In this, we replaced all the accounting ratios that describe profitability and costs with the *TFP* values. There has been a suggestion that financial ratios are not always the best measure of performance, and that productivity measures are increasingly used to judge bank performance. Two other independent variables added to this regression are *LLRGL* and *DPOLITIK*. Once again, the risk variable represented by *LLRGL* and variable for government connection, *DPOLITIK*, are consistently significant at 0.05 level or better. The effect of bank performance measurement, *TFP*, on the probability of a domestic bank becoming an acquiring bank is statistically and economically insignificant. On the other hand, the effect of *LLRGL* and *DPOLITK* is similar in magnitude to that obtained in models 1 and 2.

An interesting finding is that the risk exposure, bank size and the strength of government connections appear to play very significant roles in the likelihood of a bank becoming an acquiring bank. The significance of the coefficients for the bank's risk exposure variables supports the notion that risk variables are important determinants in being an acquiring bank, as in market-led mergers. This augurs well for the often-used justification by policymakers that the motive for mergers as means to consolidate a sick banking system is to reduce bank risk. Our findings offer empirical support that bank regulators use these guided mergers as means to reduce the risk of failure endemic in the banking sector, whenever reform is mandated. The negative coefficients on *LLRGL* in all the three models suggest that the probability of a bank being an acquirer increases as a bank's risk falls or is lower.

On the efficiency gains hypothesis, the overall results provide no clear support for the notion that well-managed banks are more likely to become the acquirers (earn acquirer bank status in this study) than poorly managed institutions. All the performance ratios in the three logit estimations presented in table 6 are insignificant. Thus, the government regulator's decision to use guided mergers does not appear to be systematically related to the banks' performance record. Indeed, in general, our logit models consistently suggest that the two variables,

LASSET and *DPOLITIK*, strongly influenced the likelihood that a bank will become an acquiring bank. However, the policymakers' preference for larger banks as the potential acquirer bank candidates is consistent with what have been reported in other merger studies. Holding other variables constant, the government-connected banks had greater chance of becoming an acquirer than other institutions.

V. Conclusion

This research is based on an event in which all domestic banks were guided by a country's central bank to merge in 2002. The empirical evidence is consistent with the risk-reduction hypothesis in general but, in contrast to most studies, not the efficiency improvement hypothesis. The latter hypothesis for merger as a reform process has been supported in most studies, but not in this study, which finds that only risk-reduction hypothesis is supported. While the likelihood for a bank to become an acquiring bank is strongly influenced by the risk variables, its performance variables, particularly those that reflect bank profitability and productivity, are statistically not factors correlated with guided mergers in our study. The estimations show clear evidence that the pre-acquisition bank risk characteristics are highly valued by the policy-makers. Although the government had emphasized that the consolidation was meant to increase bank efficiency and productivity, the findings do not show efficiency improvement as a key force in the consolidations. These results are anomalous to previous European and U.S. studies that very often show well managed or efficient banks are more likely to be the acquiring banks in market-driven mergers particularly when the key rationale for consolidation is to achieve greater bank efficiency.

Similar to market-driven mergers, the larger banks in this study were more likely to become an acquiring bank. Government's preference for larger banks as the potential acquirers or acquirer bank candidates is consistent with past empirical findings, which report that mean value of total assets for targets is normally lower than of acquirers (refer to Focarelli et al. [2002] and Berger and Humphrey [1992]). Piloff and Santomero (1998) and Boyd and Graham (1998) suggest that mergers involving large banks acquiring small banks do have potential for efficiency gains. Efficiency may also improve due to greater

diversification. This study also finds that government connections were more likely a factor for a bank to become an acquiring bank. The findings are consistent with Johnson and Mitton (2003) who found that the politically connected banks were among the main beneficiaries of capital controls adopted.

This study is limited to the pre-acquisition characteristics of the merging banks. Other issues pertaining to the mergers remain unexplored. For instance, how these characteristics affect the resulting outcomes of the mergers and what impact the mergers continue to have on small business lending remain unanswered questions. Therefore, future research should focus on these macro and microeconomic effects as more post-merger data becomes available. Since we completed our study, there have also been few studies on the extent of productivity change of the 10 acquiring banks. Krishnasamy, Ridzwa and Perumal (2004) utilize the Data Envelopment Analysis (*DEA*) and the Malmquist total factor productivity index to measure individual bank efficiency and productivity changes over one period 2000 – 2001. They report that 8 of the 10 acquiring banks enjoy an increase in total factor productivity attributed mainly to technology change rather than technical efficiency change. Conversely, Mat-Nor and Hisham (2003), using *DEA* analysis on bank annual reports over 2000 – 2001, discover that mergers do not contribute to any significant increase in efficiency of the 10 commercial banks.

APPENDIX 1. Definition of Variables Used in Study

Bank Size:	
LASSET	Logarithm of total assets expressed in millions ringgit (RM)
Bank performance or efficiency variables:	
NIM	Net interest margin. The ratio of net interest revenue (*NIR*) to average earning assets (*AEA*). Earnings asset include total loans (exclude provisions) and investments. *NIR* equals interest revenue minus interest expense. *NIM* = (*NIR*/*AEA*)*100
OOIAA	Ratio of non-interest income to average assets. Non-interest income refers to fees and other operating incomes. Average Total Assets (*TA*) = $(TA_t + TA_{t-1})/2$
ROAE	Return on average equity. *ROAE* = (Net Income After Tax/Average *TA*)*100
NIEAA	Non-interest expenses (*NIE*) to average assets ratio. *NIE* refers to overheads plus provisions.*NIEAA* = (*NIE*/Average *TA*)*100
CIR	Cost income ratio. Total overheads divided by net interest revenue plus other operating income.
TFP	The Malmquist total productivity change index generated from the Data Envelopment Analysis.
Bank risk variables:	
NLTA	Ratio of net loan to total assets Net loans equal gross loans minus loan provisions.
LLRGL	Ratio of loan loss reserves to gross loans. It is a reserve for losses expressed as a percentage of total loans.
LACSTF	Ratio of liquid assets to total deposits. Liquid assets include cash and amounts due from banks, Treasury Bills, other bills, government securities, trading securities and CDS.
CAR	Capital adequacy ratio as measured by the Basle Accord.
GLEA	Ratio of gross loans to earnings assets. Gross loans refer to total loans plus provisions while earnings assets include total loans and investments.
Non-financial variable:	
DPOLITIK	A dummy variable whereby 1 denotes a close relationship with the government and 0 otherwise.

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