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Application of the Transportation Algorithm for Selecting Bank Merger Partners

BALACHANDHER KRISHNAN GURU

Department of Banking and Finance, School of Business, Monash University Malaysia, Malaysia, Tel: 60355146381

Email: **balachandher@monash.edu**

KATHIRESON S

Department of Banking and Finance, School of Business, Monash University Malaysia, Malaysia

MURUGESU T

Lecturer, Department of Econometrics and Statistics, School of Business, Monash University Malaysia, Malaysia

RAMASAMY S

Lecturer, Department of Econometrics and Statistics, School of Business, Monash University Malaysia, Malaysia

Abstract

After the experience of the 1997 Asian Financial Crisis, the Malaysian government initiated the consolidation of the commercial banking sector with the aim of creating a core group of strong and well capitalized banking institutions. The first phase of the consolidation was completed by the end of 2001. As a result, the number of domestic banks in the commercial banking sector was reduced from a total of twenty to ten anchor banks which were in compliance with minimum capitalization, asset size, and other prudential requirements. More than a decade since the domestic banking sector has been further reduced to merely eight domestically owned conventional commercial banks and these banks have initiated discussions and negotiations to kick start the second wave of consolidation in the commercial banking sector. However, as a result of market sentiments and failure to arrive at a mutual agreement on pricing and other relevant issues, the second wave of the consolidation of Malaysian commercial banks has been postponed to the future. Regardless of when the consolidation of the banking sector occurs, a key success factor for such M and A exercises would be an optimal selection of merger partners. However, selecting bank merger partners is indeed a highly complex and difficult task with numerous quantitative and qualitative issues to be considered. Given these circumstances, the aim of this paper is to develop a quantitative method using Operations Research (OR) techniques to identify potential merger partners that would optimize the key performance parameters in the EAGLES framework. To this extent, the transportation algorithm is used to produce a viable initial selection of merger partners which can then be subjected to more rigorous qualitative considerations before making the final decision.

Keywords: **Malaysia; Consolidation of the banking sector; Transportation algorithm; Selecting bank merger partners**

INTRODUCTION

In working towards Malaysia's vision of becoming a developed nation by 2020, the Central Bank has developed a comprehensive Financial Sector Master Plan 2010-2020. According to this plan, the financial sector is expected to play a catalytic role in driving economic growth. In order to achieve this objective, the domestic banking sector has to become more dynamic, diversified, inclusive and integrated to better serve the growing domestic, regional and global needs. In this regards a further consolidation of the banks in the financial sector appears to be a necessary condition for achieving these goals.

Now, more than a decade after the first wave of commercial bank consolidation which culminated in the emergence of ten anchor banks at the end of 2001, Malaysia is now getting ready for the second round or wave of consolidation with

the initiation of merger talks and negotiations among domestic banks. This consolidation initiative though market driven was in line with the goals of the Second Financial Sector Master plan. However, as a result of market sentiments and failure of the market participants to arrive at a mutual agreement on pricing and other relevant issues, the second wave of consolidation of the Malaysian commercial banks has been postponed to the future.

Regardless, of when the consolidation of the banking sector will take place, an important success factor for such M and A exercises would be an optimal selection of merger partners. However, selecting bank merger partners is indeed a highly complex and difficult task with numerous quantitative and qualitative issues to be considered. The first step in this process would be the identification of an initial set of potential merger partners. This initial feasible solution can then be subjected to more rigorous quantitative analysis and qualitative considerations before making the final decision. To this extent, the objective of this paper is to develop a quantitative method based on operations research (OR) techniques to determine an initial set of potential merger partners. This could then be used as a starting point for further discussions and considerations.

To this extent, It is worth noting that at the point of writing this paper, there are a total of eight conventional commercial banks operating in Malaysia namely: Maybank, CIMB, Public Bank (PBB), RHB Bank, Hong Leong Bank (HLB), Affin Bank (AFB), AM Bank and Alliance Bank (AIIB) [1-8]. Although these eight banks operate as conventional banks they have windows offering Islamic banking products and services. In addition, to these there are two domestic Islamic banks namely Bank Islam and Bank Muamalat. It is imperative at this point to clarify that this study is only concerned with mergers among the eight conventional banks. This is especially so, since it would not make sense for a merger between Islamic and Conventional banks due to the basic philosophical and ideological differences.

Once again it should be reiterated that that the main aim of this paper is for developing a quantitative method for identifying an initial set of potential merger partners for the second round of commercial bank consolidation in Malaysia. This is achieved by adopting and extending the work of Guru et al. [9]. They had employed an operations research (OR) optimization technique namely the transportation algorithm for this purpose. This is essentially a quantitative approach that is expected to provide a starting point for further due considerations and merger negotiations. In line with the success factors for a marriage, it cannot be denied that both quantitative and qualitative considerations are indeed important for the success of any merger.

In line with the foregoing discussion, the paper commences with a discussion of the framework for selecting bank merger partners. Under this heading the key performance parameters and the associated indicators are discussed. This is

then followed by a description of the bank partner selection methodology which employs the transportation algorithm in line with Guru et al. [9]. Since any mergers and acquisitions are bound to have an impact on market structure and antitrust implications, the paper then examines the impact of the proposed mergers on the bank market concentration based on the Herfindahl index. To this extent, it is worth noting Abdul Majid and FadzlanSuffian [10] who had reported that the Malaysian banking industry is already considered to be a moderately concentrated market based on market concentration ratios and the Herfindahl Index. Finally the paper is concluded with recommendations for proposed initial merger considerations during the second wave of bank mergers in Malaysia.

FRAMEWORK FOR SELECTING BANK MERGER PARTNERS

At the outset, it is assumed that banks would only consider merging with other banks if there are gains are to be achieved. To this extent, the general motivation for any intra industry mergers including bank mergers would either be to strengthen their industry positioning or to gain some kind of synergies. Thus, regardless of the motivation for the merger, the outcome would be more resilient and sound banking entities. In the past, banking firms were often rated, based on the six key bank performance parameters implied in the popular CAMEL rating framework which includes capital adequacy, asset quality, management, earnings and liquidity. More recent researchers had focused on the EAGLES performance framework. The key success factors for banking institutions in this framework are earnings ability, asset quality, growth, liquidity and strategic Management. In line with Guru et al. [9], this study also selects the potential merger partners based on the key performance parameters implied in the EAGLES framework. However, contrary to the earlier study reported in Guru et al. [9], this study employs more than one indicator for some of the key performance measures with the intention of further enhancing the robustness of the merger partner selection process.

The first performance parameter of interest is earnings ability which is assessed by two measures namely return on assets (ROA) and return on shareholders' funds or equity (ROE).

In the context, of the following performance parameter, asset quality, in line with Nimalathasan [11] only a single indicator is used namely the ratio of gross impairment to total loans. The higher the value of this ratio the lower would be the asset quality. Next, the banking firms need to position themselves appropriately for successful branding and long run sustainability. This is best represented by growth in loans and advances and growth in core deposits. A high deposit growth not accompanied by a corresponding growth in loans may signify a bank that is positioning itself favourably to attract depositors by paying high deposit rates and as a consequence the bank may face potential problems in terms of low interest margins. Similarly, high loan growth unaccompanied with

a corresponding growth in deposits would be indicative of a bank that is positioning itself favourably to attract borrowers with attractively low lending rates without affecting the deposit rates and this might also lead to a low interest margin problem which may ultimately have an adverse impact on profitability. Though these two growth measures are important indicators of how the bank intends to position itself in the market place, high deposit or loans growth should be treated with caution.

Another important performance parameter for a bank is liquidity which is simply the measure of the ability of a bank to meet cash demands for loans, deposit withdrawals and operating expenses. Thus, there is a need for these banks to maintain adequate liquid funds at all times at some desired level between deposits garnered and loans extended to ensure sustainable continued existence. Though, there are numerous ways of assessing the liquidity of a bank, Kabir and Suman [12] asserted that the loans to deposit ratio is one of the significant accounting ratios that adequately assesses the liquidity position of commercial banks. The lower this ratio, the higher the bank's liquidity since less of the short term deposits are tied up in long term loans. However, the inverse association between liquidity and profitability must be borne in mind. Thus, bankers need to determine an appropriate balance between liquidity and profitability. For this reason, very low or very high values for this ratio may not be considered favourably.

An important performance parameter emerging from the 1997 Asian Financial Crisis is capital adequacy. Better capitalized banks were less adversely affected by the systemic bank crisis. In this study, this key performance parameter is measured by the ratio of total capital to risk weighted assets. The higher the value of this ratio, the lower the risk associated with the bank and BASEL III requires banks to maintain a value in the range of 8% to 10.5%.

Finally, the quality of the banks management team is evaluated by the Strategic Response Quotient (SRQ). The SRQ is simply calculated as the ratio of net interest income (NII) to net overhead expenses (OE) as indicated in the following expression.

$$\mathrm{SRQ} = \frac{\mathrm{NET\ INTEREST\ INCOME}}{\mathrm{NET\ \ NON-INTEREST\ INCOME}} = \frac{\mathrm{II-IE}}{\mathrm{NII-OE}}$$

Where II = Interest Income, IE= Interest expense, NII= Non- Interest Income and OE= overhead expenditure.

The numerator provides a measure of the extent to which interest income is able to cover interest expense. A positive value would signify that the banks interest income is in excess of its interest expense. The numerator in this case is an

indicator of the strategic efficiency of the bank in pricing its loan and deposits. The larger the numerator the better, since it indicates that the bank is more strategic in pricing its loans relative to the price it pays for its deposits.

On the other hand, the denominator is simply defined as noninterest income less non-interest expense. In a banking context, this can actually be written as non-interest income less the banks overhead expenses. However, a common problem with the denominator is that quite often, the non-interest income is not large enough to cover the overhead expenses and thus, resulting in a negative value. Hence, to ensure a positive value, the denominator is often written as overhead expenses less non-interest income. In this case, the smaller the denominator the more efficient the bank is in narrowing the gap between its non-interest income and its overhead expenses. In the context of the preceding discussion, given that it is better for a bank to have a large numerator and a small denominator, the larger the value of the strategic response (SRQ) quotient, the better the indication of the bank's management strategy.

In addition, to the six key performance parameters of the EAGLES framework Wang et al. [13] highlighted the importance of an efficiency measure represented by the cost to income ratio which provides an assessment of the cost incurred in generating each dollar of income. This efficiency measure was also calculated for the sample banks. The higher the value of this ratio the less efficient is the bank in generating income.

Having determined the key performance parameters and the associated indicators, it must also be noted that the value of these indicators would vary from one year to the next. The next issue that has to be addressed, is which years indicator values are to be used as inputs in the transportation algorithm with regards to each performance parameter? To this extent, it must be noted that an arbitrary choice of year may result in biases and in order to avoid such biases, the average or mean value of the indicators over the five year period prior to 2014, the year when the second wave of bank mergers was supposed to have taken place, was used with respect to each of the key performance parameters. Table 1 provides the summary statistics of the indicators of key performance parameters for the sample banks over the five year period.

BANK PARTNER SELECTION METHODOLOGY

After the first round of consolidation of the commercial banking sector in 2001, the domestic or Malaysian owned commercial banks shrank from a total of twenty to ten anchor banks which were in compliance with regards to capitalization, asset size and other prudential requirements. Subsequent to the consolidation exercise, further acquisitions followed and at the time of writing there are a total of eight conventional commercial banks operating in Malaysia namely: Maybank, CIMB, Public Bank, RHB bank, Hong Leong Bank (HLB), Affin

bank, AM bank and Alliance bank [1-8]. Although these eight operate as conventional banks they have windows offering Islamic banking products and services. In addition, to these there are two Malaysian owned Islamic banks namely Bank Islam and Bank Muamalat. It is imperative at this point to clarify that this study will only be concerned with mergers among the eight conventional banks. This is especially so, since it would not make sense for a merger between Islamic and conventional banks due to the basic philosophical and ideological differences.

Table 1: Summary Statistics of Key Performance Indicators for the period 2009-2013

		Earnings		**Asset Quality**	**Growth**		**Liquidity**	**Equity**	**Strategic Management**			**Efficiency**
Bank \ Ratio		ROA	ROE	GI2TL	Loan	Deposit	L2D	TC2RWA	II2IE	NII2OHE	SRQ	C2I
MBB	Max	1.60	16.0	4.20	0.34	0.33	89.90	17.30	2.96	0.85	9.02	52.20
	Min	0.54	3.10	1.48	0.11	0.10	86.80	14.15	2.26	0.61	3.27	46.50
	Mean	1.22	12.78	2.69	0.17	0.16	88.34	15.91	2.71	0.73	5.33	48.96
	SD	0.51	5.44	1.10	0.10	0.09	1.42	1.32	0.27	0.09	2.18	2.15
CIMB	Max	1.60	16.40	6.10	0.21	0.12	88.40	16.80	2.70	0.65	3.12	57.60
	Min	1.58	14.90	3.20	0.09	0.07	83.20	12.90	2.36	0.58	2.47	53.0
	Mean	1.66	15.80	4.64	0.14	0.10	85.16	15.02	2.50	0.61	2.76	55.48
	SD	0.07	0.60	1.15	0.05	0.02	2.13	1.41	0.13	0.03	0.27	1.74
RHB	Max	1.48	15.70	6.70	0.21	0.23	88.80	15.92	2.56	0.68	5.04	51.30
	Min	1.26	11.50	2.80	0.09	0.00	80.60	14.12	2.07	0.57	3.77	40.50
	Mean	1.37	14.06	4.14	0.15	0.13	84.80	14.81	2.30	0.62	4.10	45.10
	SD	0.10	1.67	1.59	0.04	0.09	3.67	0.78	0.22	0.05	0.53	4.29
PBB	Max	1.95	27.10	1.40	0.20	0.13	87.80	15.6	2.53	0.71	9.08	32.60
	Min	1.53	22.40	0.70	0.11	0.04	79.20	14.2	2.11	0.58	5.37	29.80
	Mean	1.77	25.30	0.96	0.14	0.10	85.84	14.68	2.30	0.07	7.86	31.00
	SD	0.15	2.00	0.30	0.04	0.04	3.72	0.55	0.18	0.05	1.50	1.03
AMB	Max	1.80	14.0	4.10	0.13	0.13	97.90	15.80	2.54	0.69	5.87	47.80
	Min	1.35	11.50	2.0	0.08	0.04	88.80	14.40	2.16	0.46	3.40	39.90
	Mean	1.59	12.92	3.12	0.09	0.08	94.68	15.12	2.37	0.62	4.64	42.92
	SD	0.19	1.22	0.90	0.02	0.03	3.65	0.54	0.14	0.10	0.88	2.99
HLB	Max	1.64	18.0	2.28	1.18	0.65	78.60	15.80	2.66	0.65	4.98	46.10
	Min	1.56	15.0	1.40	0.03	0.004	52.70	14.10	1.74	0.43	2.78	41.70
	Mean	1.60	16.54	1.90	0.29	0.18	66.68	15.08	2.12	0.55	3.77	44.20
	SD	0.03	1.08	0.37	0.5	0.27	11.80	0.65	0.34	0.08	0.80	1.62
AIIB	Max	1.70	14.0	4.50	0.15	0.20	90.60	16.18	2.74	0.56	3.49	53.00
	Min	0.95	8.60	2.10	0.05	-0.10	76.60	14.65	2.38	0.41	2.49	47.60
	Mean	1.42	11.94	3.28	0.11	0.11	80.50	15.23	2.52	0.46	2.84	49.78
	SD	0.31	2.33	0.98	0.04	0.11	5.73	0.60	0.18	0.07	0.40	2.56
AFB	Max	1.50	10.47	3.71	0.18	0.18	80.40	14.30	2.51	0.72	6.84	47.70
	Min	1.24	8.13	1.98	0.08	0.06	77.30	12.55	1.79	0.48	3.09	46.0

	Mean	1.37	9.65	2.89	0.13	0.11	79.14	13.51	2.10	0.59	4.65	46.80
	SD	0.10	0.96	0.78	0.04	0.06	1.22	0.63	0.30	0.10	1.82	0.62

*MBB: Maybank, CIMB: CIMB Bank, RHB: RHB Bank, PBB: Public Bank Berhad, AMB: Arab Malaysian Bank, HLB: Hong Leong Bank, AIIB: Alliance Bank, AFB: Affin Bank, C2I: Cost to Income ratio, GI2TL: Gross Impairment to total loans, L2D: Loan to Deposit ratio, TC2RWA: Total Capital to Risk Weighted Assets, II2IE: Interest Income to Interest Expense, NII2OHE: Non-Interest Income to Overhead Expense, SRQ: Strategic Response Quotient

Since the second round of bank consolidation was also market driven, however as a result of market sentiments and failure to arrive at a mutual consensus on pricing and other relevant issues, the second round of consolidation of the Malaysian commercial banks has been postponed to the future.

Though, no clear indications have been made by the market participants as to when the next wave of consolidation of the domestic banking sector will take place, it is a very likely phenomenon since it is one of the goals of Malaysia's Second Financial Sector [14] Master Plan spanning the period from 2010 to 2020.

Now, regardless of when the consolidation of the banking sector will occur, a key success factor for such M and A exercises would be an optimal selection of merger partners. However, selecting bank merger partners is indeed a highly complex and difficult task with numerous quantitative and qualitative issues to be considered. To this extent it is worth noting that despite the voluminous research on mergers and acquisitions, literature on an objective quantitative method for selecting merger partners whether in the banking context or in general is indeed scarce. To this extent, it is worth noting that Guru et al. is one of the scarce papers in this area.

Given this lack of academic literature on merger partner selection techniques, this paper intends to extend the work done by Guru et al. [9] in order to identify the potential merger partners in the second wave of commercial banking sector consolidation in Malaysia. The rationale for this is simply based on the high compliance rate of their merger partner selection with the actual outcomes of the first consolidation wave which came to its completion in 2001.

In turning to Operations Research (OR) for assistance in selecting bank merger partners, there are actually only two possible techniques that could be applied namely the transportation algorithm or the assignment algorithm. These two Operations Research (OR) techniques are clearly explained in Render, Stair and

Taha [15,16]. Thus, the discussion of these methods in this paper will be confined to remain within the context of the current study.

The main difference between the two techniques is in the column constraints. For each performance parameter the column constraint is restricted to unity for the assignment model, thus allowing only a single partner selection. However, the column constraint is not restricted in the transportation algorithm, thus facilitating the selection of more than one possible merger partner for each performance parameter.

Guru et al. [9] had actually employed both these methods in their paper. The actually employed the transportation algorithm first, to select three potential merger partners for each performance parameter. They then summarized the results of the transportation algorithm selection in a two way classification table with the number of columns and rows being made equal to the total number of banks involved in the consolidation thus resulting in a square matrix with the value of cell-ij representing the total number of performance parameters optimized by the merger of bank-i with bank-j. The assignment model was then applied to determine the merger partner selection that would maximize the number of performance parameters being optimized.

However, in this study, only the transportation algorithm is used with row and column constraints being restricted to unity. This was done to ensure a merger partner selection that would reduce the number of banks by half that is from eight to four. The rationale for this is that if we allowed more than two banks to form a single entity then the number of banks in the market would be far too few thus creating monopolistic or oligopolistic markets which may be in violation of Malaysian anti-trust or anti-competitive acts or laws.

In this paper, the transportation algorithm is employed by restricting the number of rows to unity identify an initial or preliminary set of potential merger partners that would optimize the key performance parameters in the EAGLES framework. To this extent, it must be noted that the transportation algorithm is merely used to produce a viable initial selection of merger partners which can then be subjected to more rigorous quantitative and qualitative considerations before making the final decision.

The initial selection of potential merger partners achieved as a result of employing the transportation algorithm can thus be used a starting point for further merger negotiations. This selection is done by repeatedly using the transportation algorithm to identify the optimum merger partner for each one of the indicators considered under each of the seven key performance parameters in the extended EAGLES framework.

At this stage, the initial transportation table for each of the key performance

parameters will comprise of the eight conventional commercial banks as the sources and the same eight banks as the destinations as well. The capacity at each source will be set as one and the demand for each destination will also be set as one to achieve an initial set of bank merger partners that would result in reducing the number of domestic or Malaysian owned banks by half.

Thus, the initial transportation table will consist of i-sources and j-destinations with i=1 to 8 and j=1 to 8. Since the mergers would only make sense if the merged entities were better than the merging components with regards to the key performance parameters, the value for each cell-ij is made equal to the weighted average of the performance parameter for bank-i and bank-j. The weights were appropriately selected with regards to the respective performance parameter. For example, in the case of ROA, the ratio for the merged entity was weighted based on the total assets of the merging banks and in the case of ROE, the ratio for the merged entity was weighted based on the total equity capital of the two merging units.

Further, for some performance parameters such as profitability a larger value is considered better and the bank merger partner selection will be done by maximizing the performance parameter objective function for the entire banking industry as a whole. On the contrary, if a smaller value is considered better, the merger selection is done by minimizing the performance parameter for the industry as a whole.

Based on the preceding discussion the bank merger partner selection is determined based on the transportation algorithm, with objective function and constraints, which can mathematically be expressed as follows.

Objective function

Minimization or Maximization of $Z = \sum_{i=1}^{8}\sum_{j=1}^{8} C_{ij}\ X_{ij}$

Subject to the following row and column constraints

Row constraint-i: $\sum_{j=1}^{8} X_{ij} \leq 1$

Column constraint-j: $\sum_{i=1}^{8} X_{ij} \leq 1$

Non-Negativity Constraints: $X_{ij} \geq 0$

RESULTS

The optimum merger partner selection based on the transportation algorithm is that which optimizes the key performance parameter for the banking sector as a whole. This process is repeated for each of the performance parameters and the optimal partner selection for all the domestic conventional banks with regards to each of the key performance parameters is presented in Table 2 below.

Then based on this table, the number of key performance parameters optimized for each possible merger combination is calculated and presented in Table 3. Based on the results presented in Table 3, the optimal set of potential bank merger partners can be determined that would maximize the number of key performance parameters being optimized for the banking sector as a whole, as a result of the consolidation exercise when it actually takes place at some point in time in the future.

Table 2: Optimal Bank Merger Partners for each Key Performance Parameter

Bank-i	EARNINGS		EFF	ASSET QUALITY	GROWTH		LIQ	CAPITAL ADEQUACY	STRATEGIC MANAGEMENT		
	ROA	ROE	C2I	GI2TL	LOAN GROWTH	DEPOSIT GROWTH	L2D	TC2RWA	II2IE	NII2OHE	SRQ
MBB	MBB	MBB	CIMB	RHB	AFB	AMB	MBB	AFB	AFB	AIIB	AFB
CIMB	AFB	AFB	RHB	CIMB	PBB	PBB	AMB	RHB	HLB	HLB	CIMB
RHB	AMB	AMB	MBB	MBB	RHB	AFB	RHB	CIMB	PBB	RHB	RHB
PBB	AIIB	AIIB	AIIB	AIIB	CIMB	CIMB	PBB	PBB	RHB	AFB	AIIB
AMB	RHB	RHB	AFB	AMB	AMB	MBB	CIMB	AMB	AMB	AMB	AMB
HLB	HLB	HLB	HLB	AFB	AIIB	AIIB	AIIB	HLB	CIMB	CIMB	MBB
AllB	PBB	PBB	PBB	PBB	HLB	HLB	HLB	AIIB	AIIB	MBB	PBB
AFB	CIMB	CIMB	AMB	HLB	MBB	RHB	AFB	MBB	MBB	PBB	HLB

*MBB: May bank, CIMB: CIMB Bank, RHB: RHB Bank, PBB: Public Bank Berhad, AMB: Arab Malaysian Bank, HLB: Hong Leong Bank, AIIB: Alliance Bank, AFB: Affin Bank,C2I: Cost to Income ratio, GI2TL: Gross Impairment to total loans, L2D: Loan to Deposit ratio, TC2RWA: Total Capital to Risk Weighted Assets, II2IE: Interest Income to Interest Expense, NII2OHE: Non-Interest Income to Overhead Expense, SRQ: Strategic Response Quotient

To this extent, based on the results reported in Table 3, the merger between

Public Bank Berhad [3] and Alliance Bank [6] is the most optimal combination with a maximum of five key performance parameters being optimized. The next optimal pair appears to be May Bank Berhad [1] and Affin Bank [7] with four key performance parameters being optimized. This is then followed by the third ranked pair namely Alliance Bank and Hong Leong Bank [5,6] with three performance parameters being optimized.

Table 3: Number of Key Performance Parameters Optimized for Each Combination

Bank-j / Bank-i	**MBB**	**CIMB**	**RHB**	**PBB**	**AMB**	**HLB**	**AIIB**	**AFB**
MBB	3	1	1	0	1	0	1	**4**
CIMB	0	2	2	2	1	2	0	2
RHB	2	1	**4**	1	2	0	0	1
PBB	0	2	1	2	0	0	**5**	1
AMB	1	1	2	0	**6**	0	0	1
HLB	1	2	0	0	0	**4**	3	1
AllB	1	0	0	**5**	0	3	2	0
AFB	3	2	1	1	1	2	0	1

If however, a combination of more than two domestic banking units can be considered then next optimal combination would be CIMB bank with RHB bank and Hong Leong Bank (HLB) [2,4,5] since two key performance parameters are optimized for each pair.

For the sake of emphasis, it is reiterated again that the results of this study presented above merely indicates an initial feasible solution for optimizing the merger partner selection in the consolidation exercise whenever it occurs. Thus, it must be borne in mind that this technique merely provides assistance in determining an initial feasible merger partner selection which could be used as a starting point for further negotiations and other quantitative and qualitative considerations before making the final decision.

Anti-competitive issues of bank mergers

The financial soundness and competitive structure of the banking industry are essential ingredients for the successful fulfilment of any nations' economic potentials. To this extent, it is also worth noting that financial markets with multiple competing sources are able to produce higher quality and more innovative products and services at lower prices. To this extent, there are concerns regarding potential anticompetitive impacts of the prospective bank

consolidation exercise. At this juncture it is worth noting that consumerism in Malaysia is still in its infancy and to date there are only three regulatory guidelines governing anti-trust issues in the financial sector namely the Financial Services Act (FSA) 2013, the Islamic Financial Services Act (IFSA) 2013 and the Competition Act 2010.

However, it is also worth noting Mogel [17] who pointed out the inappropriateness of anti-trust laws to banks since banking is treated like a public utility and hence should be immune to anti-trust prosecutions. But there are counter arguments to this line of thought since banks do not serve everyone and the banking firms do have the power to exercise price discrimination. The only consolation is that banking operations are heavily regulated and hence may provide some relief to bank consumers. To this extent, in so far as Malaysia is concerned, the FSA and the IFSA are the result of government initiatives to modernize and harmonize the laws governing the financial services sector with the objective of promoting financial stability and protecting the rights and interest of consumers. Under the FSA and the IFSA consumer protection is further enhanced via the establishment of the financial ombudsman scheme to ensure effective and fair handling of customer complaints and disputes in relation to the financial products and services offered by the firms in the financial sector.

In addition to the FSA and the IFSA, there is also the Malaysian Competition Act which came into force on 1st January 2012 with the objective of protecting and promoting the process of competition and hence protecting consumer interests. This legislation was adapted from the competition law in the European Community with the exception of the merger regulations which was deliberately left out to encourage merger and acquisition activities which are essential for creating entities which are large enough to enter and compete in the global market.

Since the prospective consolidation exercise would certainly reduce the number of players in the market and hence may impact on bank market structures which in turn may have serious implications for consumers. The market concentration is calculated based on the Herfindahl index for the domestic conventional banking sector if the proposed mergers actually materialize and the results are presented in Table 4 below.

Table 4: Herfindahl Index of the domestic Conventional Banking Sector

Banks	**HHI Before Merger**	**HHI After Merger**	**Increase**
PBB and AIIB	1887	1976	90
MBB and AFB	1887	2099	212
AIIB and HLB	1887	1923	37
CIMB, RHB and	1887	2796	909

HLB			

Thus, it is clear that if the proposed mergers were to materialize then the domestic conventional banking market would indeed become more concentrated and as a result become less competitive. This may adversely affect consumerism in the domestic banking market. To this extent, it is worth noting that in the United States, any merger initiatives that were to result in an increase in the Herfindahl index by more than 200 points will invoke the antitrust laws. If similar policies were to apply in the Malaysian context, then the proposed mergers between Maybank and Affin Bank and that between CIMB, RHB and Hong Leong Bank [1,2,5,7] will not be legally feasible given that these mergers would result in the Herfindahl Index increasing by more than 200 points.

CONCLUSION

The major contribution of this paper is the development of an objective method for producing an initial feasible merger partner selection. This initial selection could be used as a starting point in merger negotiations which can then be subjected to more rigorous quantitative and qualitative considerations before making the final merger decisions.

In the context of the Malaysian domestic conventional banking market, another round of consolidation would certainly increase market concentration as indicated by the Herfindahl Index. As a result the only feasible merger possibilities that will not result in serious antitrust issues are that between public Bank and Alliance Bank, and that between Alliance Bank and Hong Leong Bank. In making this conclusion we have adhered to the United States policy on competition and anti-trust laws which specifies that any mergers and acquisitions should not increase the market concentration as measured by the Herfindahl Index by more than 200 points.

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