COMPARING THE EFFICIENCY OF ISLAMIC BANKS IN MALAYSIA AND INDONESIA

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A b s t r a c t

This study measures and compares the efficiency of Islamic banks in Malaysia and Indonesia using Data Envelopment Analysis (DEA), which is a non-parametric and deterministic methodology for determining the relative efficiency. The intermediation approach will be applied.

This study identifies the sources and the level of inefficiency of the inputs and outputs. The results show that the Islamic banking in Indonesia is more efficient than the one in Malaysia in all three measurements; the technical, the scale, and the overall efficiency. Technically, financing is one of the sources of inefficiency in Malaysia, while human resource is one of the sources of inefficiency in Indonesia.

Islamic windows should be encouraged to convert to subsidiaries or Islamic full branches to improve the scale and the overall efficiencies in Malaysia. Furthermore, the accelerated expansion both organically and inorganically is needed to improve the scale and the overall efficiencies of the Islamic banking in Indonesia.

JEL Classification: C14, G21, G28

Keywords: Islamic banking, performance, efficiency, Data Envelopment Analysis (DEA).

I. INTRODUCTION

The Islamic banks exist since early 1960s. The first Islamic bank established in 1963 as a pilot project in the form of rural savings bank in a small town of Egypt, Mit Ghamr. After that, Islamic banking movement came back to life in mid 1970s. The establishment of Islamic Development Bank in 1975 triggered the development of Islamic banks in many countries, such as Dubai Islamic Bank in Dubai (1975), Faisal Islamic Bank in Egypt and Sudan (1977), and Kuwait Finance House in Kuwait (1977). By the end of 2005, more than 300 institutions in over 65 jurisdictions are managing assets worth around 700 - 1000 billion US dollars in a Shariah compatible manner. A large part of the banking and Takaful concentration is in Bahrain Malaysia, and Sudan. A significant part of mutual funds concentrate in the Saudi Arabian and Malaysian markets in addition to the more advanced international capital markets.

In Malaysia, Islamic financial institutions exist since the establishment of the Pilgrimage fund board in 1969. Malaysia started the establishment of Islamic bank, Bank Islam Malaysia Berhad or BIMB in 1983. To accelerate the nationwide dissemination of Islamic banking, Bank Negara Malaysia or BNM (the central bank of Malaysia) implemented Islamic banking scheme or Islamic windows structure, which allow the conventional banks to offer Islamic banking products and services using their existing infrastructure including staff and branches. Today, Islamic financial system in Malaysia has emerged as important component that contributes to the growth and development of Malaysian economy by diversifying the players encompasses the domestic as well as the foreign banking players.

The Islamic banking system in Malaysia is represented by 29 Islamic banking institutions comprising of 2 Islamic banks, 2 Islamic subsidiaries and 25 Islamic banking scheme banks. Moreover, Islamic banking in Malaysia has reached more than 10% of the banking market share. It is envisioned in the Financial Sector Master Plan (FSMP) that the Islamic banking industry in Malaysia would achieved 20% of the banking market share in 2010.

In Indonesia, Islamic financial institutions started to emerge in early 1980s with the establishment of *Baitut Tamwil-Salman* in Bandung dan *Koperasi Ridho Gusti* in Jakarta. The first Islamic Bank in Indonesia, Bank Muamalat Indonesia, established in 1992. The development of Islamic bank has been accelerated since Bank Indonesia (the central bank of Indonesia) allowed conventional banks to open Islamic branch. This Islamic branch can offer Islamic banking products and services separated from its conventional parent with its own infrastructure, including staff and branches.

The Islamic banking system in Indonesia is currently represented by 3 Islamic banks and 19 Islamic branches, and 105 Islamic People's Credit Bank, with 620 offices and 439 office

channeling spread through out the country. They offer comprehensive and wide range of Islamic financial products and services and cater 1.54% of the banking market share. It is expected that the Islamic banking industry in Indonesia would reached 5% of the banking market share in 2008.

However, the Islamic banking in Malaysia and Indonesia has experiencing a slower growth in the last two years. There are many factors that could be attributed to this slower growth. One of these factors is the competitiveness since in the dual banking system they have to compete head to head with the conventional banks. To win the competition, Islamic banks should know the strengths and the weaknesses relative to their competitor. Therefore, analysis of the efficiency of Islamic banks in comparison with conventional banks is very important to give a big picture of the strengths and weaknesses of Islamic banks and their competitors.

Despite of the importance, there are very limited study focusing on the efficiency of Islamic banks compare to the efficiency of conventional banks within a country or between countries, especially in Malaysia and Indonesia. These measures could be used as a guide for Islamic banks to improve their weaknesses to be able to compete in the global market and to achieve the intended goals to improve the market share. Moreover, the goal to strengthen Islamic banking structure could be achieved.

The objective of this study is to compare the efficiency of Islamic banks in Malaysia and Indonesia using intermediation approach. This study will identify the sources and level of inefficiency for each of the inputs and outputs. The measurement will give a relative efficiency of individual bank compare to its peer group in every aspect considered.

II. THEORY

The concept of efficiency rooted from the microeconomic concept, namely, consumer theory and producer theory. Consumer theory tries to maximize utility or satisfaction from individual point of views, while producer theory tries to maximize profit or minimize costs from producer point of views.

In the producer theory, there is a production frontier line that describes the relationship between inputs and outputs of production process. This production frontier line represents the maximum output from the use of each input. It also represents the technology used by a business unit or industry. A business unit that operates on the production frontiers is technically efficient. Figure II.1 shows the production frontier line.

Figure II.1
Production Frontier Line
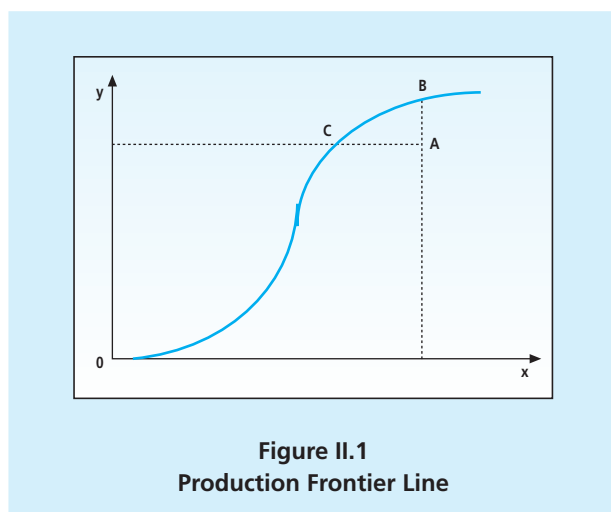
Considered from economic theory, there are two different types of efficiency, namely technical efficiency and economic efficiency. Economic efficiency has macro economic point of view, while technical efficiency has micro economic point of view. The measurement of technical efficiency limited to technical and operational relationship in a conversion process of input to output. Whereas, in economic efficiency price can not be considered as given, since price can be influenced by macro policy (Sarjana, 1999). According to Farell (1957), efficiency comprises of two components, namely:

a. Technical efficiency describes the ability of a business unit to maximize output given certain amount of input.

b. Allocative efficiency describes the ability of a business unit to utilize inputs in optimal proportion based on their price.

When the two types of efficiency combined, it will produce economic efficiency. A company is considered to be economically efficient if it can minimize the production costs to produce certain output within common technology level and market price level.

Kumbhaker and Lovell (2000) argue that technical efficiency is only one of many components economic efficiency as a whole. Nevertheless, in order to achieve economic efficiency a company should produce maximum output with certain amount of input (technical efficiency) and produce output with the right combination within certain price level (allocative efficiency).

II.1. The Measurement of Efficiency

In the past few years, the performance measurement of the financial institution has increasingly focused on the frontier efficiency or X-efficiency (rather than the scale efficiency), which measures the deviation in performance of a financial institution from the best practices or costs-efficient frontier that depicts the lowest production costs for a given level of output. The X-efficiency stems from technical efficiency, which gauges the degree of friction and waste in the production processes, and from the allocation efficiency, which measures the levels of various inputs.

Frontier efficiency is superior for most regulatory and other purposes to the standard financial ratios from accounting statements, such as return on asset (ROA) or cost/revenue ratio that are commonly employed by regulators, managers of financial institutions, or industrial consultants to assess the financial performance. This superiority lies on the usage of the programming or the statistical techniques in order to obtain better estimates of the underlying performance of the managers. This technique can removes the effects of the input prices differences and other exogenous market factors affecting the standard performance ratios (Bauer, *et al.*, 1998).

The frontier efficiency has been used extensively in regulatory analysis to measure the effects of the merger and the acquisition, capital regulations, deregulation of deposit rates, the removal of geographic branching restrictions and the holding company acquisitions, etc., on financial institution performance.

The tools to measure efficiency could be parametric and non-parametric. The parametric approach uses stochastic econometric and tries to eliminate the impact of disturbance to inefficiency, and commonly classified into 3 types, (i) the Stochastic Frontier Approach (SFA), (ii) the Thick frontier approach (TFA), and (iii) the Distribution-free approach (DFA).

These approaches differ in their assumptions about the shape of the efficient frontier, the treatment of random error, and the assumption of the inefficiencies and the random error distribution. The parametric methods have disadvantages relative to the non-parametric methods of having to impose more structure on the shape of the frontier by specifying its functional form. However, an advantage of the parametric methods is that they allow for random error, so these methods are less likely to misidentify measurement error, transitory differences in cost, or specification error for inefficiency (Bauer, *et al.*, 1998).

Meanwhile, non-parametric linear programming approach to measuring efficiency uses non-stochastic approach and tends to combine disturbance into inefficiency. This is built based on discovery and observation from the population and evaluates efficiency relative to other

units observed. One of the non-parametric approaches, known as data envelopment analysis (DEA), is a mathematical programming technique that measures the efficiency of a Decision Making Unit (DMU) relative to other similar DMUs with the simple restrictions that all DMUs lie on or below the efficiency frontier (Seiford and Thrall, 1990). The performance of a DMU is very relative to other DMUs, especially those that cause inefficiency. This approach can also determine how a DMU can improve its performance to become efficient.

DEA was first introduced by Charnes, Cooper, and Rhodes in 1978. Since then its utilization and development have grown rapidly including many banking-related applications. The main advantage of DEA is that, unlike regression analysis, it does not require an a priori assumption about the analytical form of the production function so imposes very little structure on the shape of the efficient frontier. Instead, it constructs the best practice production function solely on the basis of observed data, and therefore the possibility of misspecification of the production technology is zero. On the other hand, the main disadvantage of DEA is that the frontier is sensitive to extreme observations and measurement error (the basic assumption is that random errors do not exist and that all deviations from the frontier indicate inefficiency). Moreover, there exists a potential problem of "self identifier" and" "near-self-identifier".

II.2. The Financial Institution Efficiency

The financial institution efficiency like banks can be approached from their activities, which explain the relationship between the input and the output of the bank. These activities are typically classified into 3 types; the production or operational approach, the intermediation approach and the asset approach or the modern approach.

The first 2 approaches apply the classical microeconomic theory of the firm. The production approach describes the banking activities as the production of services to depositors and borrowers using all available factors such as labor and physical capital. The intermediation approach describes the banking activities as intermediary institution to transform the money borrowed from depositors (surplus spending units) into the money lent to borrowers (deficit spending units).

The third approach is an improvement of the first two ones. It applies the modified classical theory of the firm by incorporating some specificity of the banks activities including the risk management, the information processing and some other form of agency problems. These specificities are crucial in explaining the role of the financial intermediaries (Freixas and Rochet, 1998). See the summary in Table II.1.

From those studies it can be concluded that asset approach is an advanced approach that views bank not only has a classical function of intermediary, but also has other various new functions. Therefore, asset approach is not suitable to be applied to Islamic banking which focuses on extending financing to the real sector. Production approach can be applied for Islamic banking, since this approach views Islamic bank as a general business unit. However, it becomes too general, so that the very essence of Islamic banking is not represented. Meanwhile, intermediation approach can be applied for Islamic banking since this approach views Islamic banking as an intermediary institution. However, the input and output variables should be selected carefully to really reflect the true essence of Islamic banking. Input and output variables selected by Sufian (2006) are the closest to the characteristics of Islamic banking. Some modifications might be needed to make it more representative.

Table II.1 Summary of Approaches Applied		
Author	**Input**	**Output**
Intermediation Approach		
Yudhistira'03	Staff Costs; Fixed Assets; Total Deposits	Total Loans; Other Income; Liquid Assets
Ascarya & Yumanita'06	Staff Costs; Fixed Assets; Total Deposits	Total Loans; Other Income; Liquid Assets
Sufian'06	Labor Costs[2]; Fixed Assets; Total Deposits	Total Loans; Income
Jemrić & Vujčić'02	No. of Employees; Fixed Assets & Software; Total Deposits	Total Loans; Short term Securities
Production Approach		
Ascarya & Yumanita'06	Interest Costs; Staff Costs; Operational Costs	Interest Income; Other Operational Income
Jemrić & Vujčić'02	Interest & Related Costs; Commissions for Services & Related Costs; Labor Related Adm. Costs; Capital Related Adm. Costs	Interest & Related Revenues; Non interest Revenues
Asset Approach		
Ascarya & Yumanita'06	Staff Costs to Total Assets; Interests Costs to Total Assets; Other Costs to Total Assets	Financing to Connected Party; Financing to Other Party; Financial Papers
Hadad *et.al*'03.	Staff Costs to Total Assets; Interests Costs to Total Assets; Other Costs to Total Assets	Financing to Connected Party; Financing to Other Party; Financial Papers

Banking efficiency has been a very important issue in a transition economy. All countries in transition have been encounter at least with one banking crisis, and many with more than one crisis (Jemrić and Vujčić, 2002). Banking efficiency is also an important issue in a developing

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2 As data on the number of employees are not readily made available, this study uses personnel expenses as a proxy measure.

open economy, since most of them have also been faced a banking crisis in the past. Malaysia and Indonesia are no exception.

There are a lot of studies on banking efficiency and most of them use parametric methods instead of non-parametric particularly Data Envelopment Analysis (DEA). Moreover those studies mostly are applied to the conventional banks while its application on the Islamic bank case is still limited.

Yudistira measured the efficiency of 18 Islamic banks from various countries during 1997-2000 using intermediation approach, since intermediation is a fundamental principle of Islamic banking, (Yudistira, 2003). Ascarya and Yumanita measured the efficiency of Islamic banks in Indonesia during 2002-2004 using intermediation and production approaches, since Islamic banking not only can be viewed as intermediary institution, but can also be viewed as a production entity, (Ascarya and Yumanita, 2006). Meanwhile, Sufian measured the efficiency of Islamic window banks in Malaysia during 2001-2004 using intermediation approach with the same reason as that of Yudistira, (Sufian, 2006). Another application of DEA was in Croatia during 1995-2000 using the intermediation and the production approach (Jemrić and Vujčić, 2002). Meanwhile, Hadad *et al.* measured efficiency of banks in Indonesia during 1995-2003 using asset approach to see the impact of merger and acquisition, (Hadad *et al.*, 2003).

III. METHODOLOGY

This study will apply Data Envelopment Analysis (DEA). DEA is a non parametric and stochastic method to measure the relative efficiency of production frontier based on the multiple inputs and multiple outputs of decision making unit data. The non-parametric nature of DEA makes it require no assumption of the production function and the DEA approach will generate the production function based on observed data, hence the misspecification can be minimized. DEA can be applied to analyze different kind of inputs and outputs without initially assigning weight. Moreover, the efficiency produced is a relative efficiency based on observed data. The preference of the decision maker can also be accommodated in the model.

III.1. Data Envelopment Analysis

Data envelopment analysis or DEA is a methodology for analyzing the relative efficiency and managerial performance of productive or decision making units (DMUs). The DEA allows us to compare the relative efficiency of banks by firstly determine the efficient banks as

benchmarks and then measure the inefficiencies in input combinations (slack variables) of other banks relative to the benchmark (Jemrić and Vujčić, 2002).

The DEA is an alternative approach to regression analysis. While the regression analysis relies on central tendencies, the DEA is based on external observations. Furthermore the regression approach applies a single estimated regression equation to each observation vector, while the DEA use and analyze each vector (DMU) separately to produce individual efficiency measures relative to the entire set under evaluation (Jemrić and Vujčić, 2002).

From the set of available data, the DEA identifies the reference points (relatively efficient DMUs) then define the efficient frontier as the best practice production technology and finally evaluate the inefficiencies of other interior points, (Jemrić and Vujčić, 2002). All the inefficient DMUs will lies below the efficient frontier.

Besides producing efficiency value for each DMU, DEA also determines DMUs that are used as reference for other inefficient DMUs.

$$\textit{Efficiency of DMU}_0 = \frac{\sum\limits_{k\ 1}^{p} \mu_k y_{k0}}{\sum\limits_{i\ 1}^{m} v_i x_{i0}}$$

DMU = decision making unit
m : different inputs
p : different outputs

n : number of DMU evaluated
x_{ij} : number of input i consumed by DMU_j
y_{kj} : number of output k produced by DMU_j

Two most frequently used DEA models are the CCR model (Charnes, Cooper, and Rhodes, 1978) and the BCC model (Banker, Charnes, and Cooper, 1984), both differ in their treatment on the return to scale. The CCR assumes each DMU operates with constant return to scale, while the BCC assumes each DMU can operate with variable return to scale.

Generally, the efficiency score of CCR model for each DMU will not exceed the BCC model. This is because the BCC model analysis each DMU "locally" (i.e. compared to the subset of DMUs that operate in the same region of return to scale) rather than "globally (Jemrić and Vujčić, 2002). Furthermore, a DMU like bank has similar characteristics one to another and each bank usually varies in size and production level. This emphasize that size will matter in the relative efficiency measurement. The CCR model represents (the multiplication of) pure technical and scale efficiencies, while BCC model represents technical efficiency only.

We define the relative scale efficiency a the ratio of CCR model and BCC model,

$$S_k = q_{k,CCR}/q_{k,BCC}$$

If the value of S = 1 means that the DMU operates in the best relative scale efficiency or in its optimal size. If the value of S is less than 1 means that there still exists scale inefficiency (equal to 1-S) of the DMU. Consequently, when a DMU is efficient under BCC model but inefficient under CCR model it means the DMU has scale inefficiency.

$$\textbf{OE = TE x SE,} \text{ hence } \textbf{SE = OE/TE}$$

OE: overall efficiency of CCR Model; TE: technical efficiency of BCC Model

III.2. The Formulation of Performance Indicators

The Islamic bank is essentially a business entity and is functioning as financial intermediary and service provider that operate in compliance with Shariah. In addition, Islamic bank, which is a part of the Islamic economic system to bring *rahmatan lil alamin* - 'mercy to all that exist', is inline to the general humanitarian concept to achieve the social welfare improvement and justice and to minimize the gap between the rich and the poor.

The General Council for Islamic Banks and Financial Institutions CIBAFI (2006) issued performance indicators for Islamic Financial Institutions covering: 1) asset quality and composition; 2) capital structure; 3) profitability; 4) efficiency; 5) liquidity; and 6) growth. Samad and Hassan (2000) measure the performance of Islamic bank focusing on four financial ratios: 1) profitability; 2) liquidity; 3) risk and solvency; and 4) commitment to economy and Muslim community.

Hameed *et al.* (2003) propose Islamicity disclosure index and Islamicity performance index. The former covers 3 aspects: 1) Shariah compliance; 2) Corporate governance; and 3) Social/ environmental. The latter covers 1) profit sharing ratio; 2) zakah performance ratio; 3) equitable distribution ratio; 4) directors-employees welfare ratio; 5) Islamic investment ratio; 6) Islamic income ratio; and 7) AAOIFI index.

Another identification of the performance indicator is related to the social reporting aspect. Maali *et.al.* (2006) identify 3 social disclosures as the benchmark; 1) social report on the compliance with the Islamic principles in particular when dealing with different parties; 2) social report on how the operations of the business have affected the well being of the Islamic community; and 3) social report on institution's role to help the Muslims to perform their religious duties.

From indepth interviews and focus group discussions we realize that the Islamic bank performance measurement should fulfill its responsibility to the shareholders (such as financial soundness and sustainability), to the customer (such as customer satisfaction), to the employee (such as fair treatment, facility and encouragement to perform religious duties), and to the

society (such as role in improvement of social welfare and employment). Therefore, we suggest that comprehensive performance measurement should cover business, social, ibadah/da'wah, and shariah compliance aspects. Parameters of each aspect should reflect the true essence and characteristics of Islamic banking.

1. Business aspect measures the performance of an institution as a business entity, which could include financial, management, operation, etc. Business aspect, including efficiency and profitability, is important since sound and profitable business is needed for an institution to be able to serve and bring benefit to the society.

2. Social aspect measures the contribution of an institution made to the society, which could include zakah, infaq and shadaqah (ZIS), qardhul hasan, commitment to Muslims, commitment to micro, small and medium enterprises (MSMEs), commitment to under developed areas, corporate social responsibility (CSR), charitable activities, community involvement, etc.

3. Ibadah/ da'wah aspect measures the effort of an institution to help Muslims to perform their religious duties and improve their God consciousness (iman), which could include iman improvement for employees, ibadah facilities, socialization, etc.

4. Shariah compliance aspect measures the adherence of an institution's activities to Islamic laws, which could include profit-and-loss sharing (PLS) ratio, financing to deposit ratio (FDR), unlawful transactions, etc.

The description above should show clearly that the efficiency which is generally used to measure the performance in market-driven concept is only one part of the holistic performance concept explained above. The efficiency measure should be viewed with caution as it may ignore the social justice (*dzulm*).

IV. RESULT AND ANALYSIS

IV.1. Data Description

The sources of the data are from financial statements of the Islamic banks in Malaysia and Indonesia during the period of 2002-2005. There are 2 types of Islamic banks in Malaysia; the full fledged Islamic bank and the conventional bank that offer Islamic banking products called Islamic window (domestic and foreign owned), see Table II.2. Similarly, in Indonesia there are also 2 types of Islamic banks; the full fledged Islamic bank and the conventional bank that have separated its Islamic branch or Islamic business unit. Some data on newest and remote Islamic Regional Development Branches are not yet available hence they are excluded from the analysis.

Table II.2 Data of Islamic Banks				
	2002	**2003**	**2004**	**2005**
Malaysia				
Domestic Full Fledged	2	2	2	2
Domestic Window	9	9	9	9
Foreign Window	4	4	4	4
Indonesia				
Domestic Full Fledged	2	2	3	3
Domestic Full Branch (included)	5	7	10	16
Domestic Full Branch (no data)	1	1	5	3

This study modifies the intermediation approach to better reflect Islamic bank activities, as also adopted by Sufian (2006). Accordingly, we assume the Islamic banks produce Total Loans (y_1) and Income (y_2) by employing Total Deposits (x_1), Labor (x_2) and Fixed Assets (x_3). Liquid assets are not included in since the Islamic banks are not dealing with the financial instruments transaction but in the business of providing financing to the real sector.

As data on the number of employees are not available we use the personnel expenses as a proxy. Table II.3 presents the aggregate series of inputs and outputs of Malaysian and Indonesian Islamic banks included in this study.

Table II.3 Inputs and Outputs Data (Real US$.000)					
	2002	**2003**	**2004**	**2005**	**Growth**
Malaysia					
Deposits	13,141,963	14,541,280	16,304,807	18,921,325	44.0
Labor	47,417	57,465	61,694	76,225	60.8
Assets	14,665,918	17,097,693	18,396,941	22,537,563	53.7
Financing	7,470,068	9,755,250	11,817,295	13,582,279	81.8
Income	497,820	623,390	748,052	869,034	74.6
FDR	56.8	67.1	72.5	71.8	
Indonesia					
Deposits	110,371	550,617	940,023	885,359	702.2
Labor	8,580	13,060	19,084	20,174	135.1
Assets	433,713	854,425	1,400,265	1,395,608	221.8
Financing	347,468	598,175	1,041,176	1,093,134	214.6
Income	51,847	85,358	140,256	141,101	172.1
FDR	314.8	108.6	110.8	123.5	
Malaysia: Indonesia					
Deposits	119.1	26.4	17.3	21.4	
Labor	5.5	4.4	3.2	3.8	
Assets	33.8	20.0	13.1	16.1	
Financing	21.5	16.3	11.3	12.4	
Income	9.6	7.3	5.3	6.2	

Some important issue can be drawn from the fact above. *Firstly*, over the four-year period, the total assets of Malaysian Islamic banking operations grew by about 54%, while Indonesian Islamic banking grew even more impressive by 222%, although it still significantly smaller (one sixteenth) than that of Malaysia.

Secondly, during this period, there has been an increasing awareness among Malaysian and especially Indonesian public about the Islamic banking and finance substantiated by the growth of total deposits by 44% and 702% respectively. *Thirdly*, the contribution of the Islamic banking in the economy has been increasing substantially reflected by the growth in total financing extended of 82% in Malaysia and 215% in Indonesia. High financing to deposits ratio reflects the contribution of Islamic banks to the real sector. Malaysia recorded an increasing trend of FDR to reach the highest of 72.5% in 2004 and then slightly declined to 71.8% in 2005. Indonesia has always recorded high FDR of more than 100% and still recorded 123.5% in 2005.

Another conclusion is about the employment in the Islamic banking industry during this period. It is clear from table II.3 that the Islamic banking and finance industry in Malaysia and Indonesia has created significant employment during this period.

As data on the number of employees are not readily made available, we use personnel expenses as a proxy measure. From table II.3 it is apparent that personnel expenses have expanded by approximately 61% in Malaysia and 135% in Indonesia. Finally, the Islamic banking and finance industry has increasingly generated high returns. During the period of study, we have witnessed more than 75% and 172% increase in total income of the Malaysian and the Indonesian Islamic banks respectively. Table II.3 and II.4 in the appendix present the summary of statistics for the inputs and outputs for Islamic banks included in this study for Malaysia and Indonesia, respectively.

IV.2. Pre Tests

Theoretically, DEA does not require the proof that the samples are indeed belong to the same population and similar level of technology, hence comparable. However, since the DEA assumes that random errors do not exist and that all deviations from the frontier indicate inefficiency therefore the DEA is sensitive to any extreme observations and measurement error. To minimize this disadvantage, some parametric and non-parametric pre tests are done to make sure that all samples are drawn from the same population. The pre tests results summary can be read in table II.4.

Table II.4 Summary of Parametric and Non Parametric Tests for the Null Hypothesis that Malaysian and Indonesian Islamic Banks Possess Identical Technologies			
Item	**Test Group**		
	Parametric		**Non Parametric**
Individual Test	ANOVA Test	t test	Mann Whitney
Hypothesis	MeanI MeanM		MedianI MedianM
Test Statistics	F(Prb>F)	t(Prb>t)	z(Prb>z)
Overall Efficiency	0.3305	0.645	(0.004)
Technical Efficiency	0.3540	0.492	(0.004)
Scale Efficiency	0.0003	0.051	(0.017)
	Accept Ho: There is no significant difference		

Based on most of the results presented in Table II.4, we failed to reject the null hypothesis at the 0.05 levels of significance that the Malaysian Islamic banks and Indonesian Islamic banks come from the same population and have identical technologies. This implies there is no significant difference between the Malaysian and Indonesian Islamic banks technologies and it is appropriate to construct a combined frontier.

IV.3. DEA Results

The efficiency of Islamic banks in Malaysia and Indonesia are measured in several ways by applying the DEA method. To ensure a comparable measurement, the Malaysian and the Indonesian Islamic banks are pooled together to form a common frontier. First, all banks are measured for single year from 2002 to 2005. Second, all banks for all years are pooled to measure the overall efficiency. Table II.5 reports the sample statistics of the various efficiency scores of Malaysian and Indonesian Islamic banks for the years 2002 (Panel A), 2003 (Panel B), 2004 (Panel C), 2005 (Panel D), and all banks all years (Panel E).

Table II.5 Summary Statistics of Efficiency Measures				
Efficiency Measures	**Mean**	**Minimum**	**Maximum**	**Std Dev**
Panel A. 2002				
MALAYSIA				
Overall Efficiency	0.723	0.295	1.000	0.243
Technical Efficiency	0.832	0.346	1.000	0.222
Scale Efficiency	0.862	0.581	1.000	0.133

Table II.5 Summary Statistics of Efficiency Measures (continue)				
Efficiency Measures	**Mean**	**Minimum**	**Maximum**	**Std Dev**
INDONESIA				
Overall Efficiency	0.847	0.366	1.000	0.232
Technical Efficiency	0.993	0.949	1.000	0.019
Scale Efficiency	0.853	0.366	1.000	0.229
Panel B. 2003				
MALAYSIA				
Overall Efficiency	0.734	0.245	1.000	0.284
Technical Efficiency	0.809	0.288	1.000	0.247
Scale Efficiency	0.897	0.527	1.000	0.169
INDONESIA				
Overall Efficiency	0.855	0.333	1.000	0.224
Technical Efficiency	0.927	0.476	1.000	0.172
Scale Efficiency	0.907	0.699	1.000	0.117
Panel C. 2004				
MALAYSIA				
Overall Efficiency	0.748	0.323	1.000	0.229
Technical Efficiency	0.810	0.328	1.000	0.208
Scale Efficiency	0.919	0.630	1.000	0.135
INDONESIA				
Overall Efficiency	0.885	0.437	1.000	0.187
Technical Efficiency	0.921	0.659	1.000	0.130
Scale Efficiency	0.951	0.663	1.000	0.103
Panel D. 2005				
MALAYSIA				
Overall Efficiency	0.742	0.068	1.000	0.270
Technical Efficiency	0.807	0.071	1.000	0.250
Scale Efficiency	0.919	0.520	1.000	0.150
INDONESIA				
Overall Efficiency	0.848	0.338	1.000	0.200
Technical Efficiency	0.918	0.461	1.000	0.158
Scale Efficiency	0.919	0.622	1.000	0.128
Panel E. ALL YEAR				
MALAYSIA				
Overall Efficiency	0.684	0.059	1.000	0.255
Technical Efficiency	0.750	0.059	1.000	0.253
Scale Efficiency	0.919	0.530	1.000	0.143
INDONESIA				
Overall Efficiency	0.724	0.171	1.000	0.219
Technical Efficiency	0.830	0.332	1.000	0.197
Scale Efficiency	0.867	0.376	1.000	0.163

The results suggest the overall efficiency of Malaysian Islamic banks improve and reach the highest mean of 74.8% in 2004 (Panel C) and then decline slightly to 74.2% in 2005 (Panel D). The decomposition of overall efficiency into its pure technical and scale efficiency components suggest that the technical inefficiency dominates the scale inefficiency of Malaysian Islamic banks for all years. The technical efficiency has been somewhat declining to 80.7% in 2005 (Panel D), while the scale efficiency has been improving to 91.9% in 2005 (Panel D). This implies that during the period of study, the Malaysian Islamic banks have been operating at slightly higher scale efficiency but technically less efficient (see Figure II.2, left).

Figure II.2
Efficiency of Islamic Banks in Malaysia and Indonesia
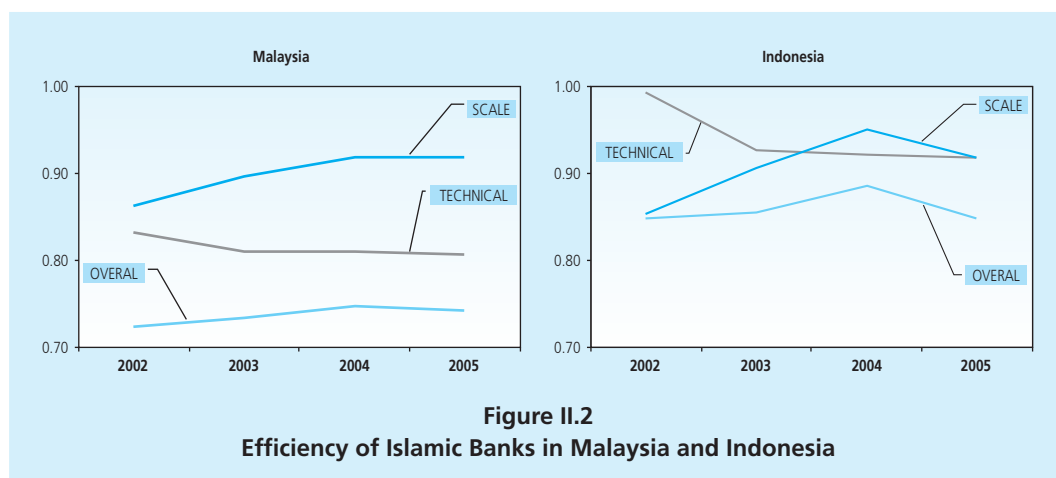
In Indonesia, the overall efficiency of the Islamic banks is stable and reached the highest mean of 88.5% in 2004 as in Malaysia. In 2005, the overall efficiency of Indonesia Islamic bank also down slightly to 84.8%. From 2002 to 2004, the scale efficiency of the Indonesia Islamic bank increased but slightly down in 2005 (see Figure II.2, right).

The scale efficiency can be further investigated by looking at the return to scale trend calculated using the DEA, as presented on Table II.6:

	2002		2003		2004		2005	
	Bank	**% Share**	**Bank**	**% Share**	**Bank**	**% Share**	**Bank**	**% Share**
Overall								
CRS	12	54.5	13	54.2	14	50.0	17	50.0
IRS	5	22.7	5	20.8	5	17.9	4	11.8
DRS	5	22.7	6	25.0	9	32.1	13	38.2
TOTAL	22	100.0	24	100.0	28	100.0	34	100.0

Table II.6
Return to Scale

Table II.6 Return to Scale (continue)								
	2002		2003		2004		2005	
	Bank	**% Share**	**Bank**	**% Share**	**Bank**	**% Share**	**Bank**	**% Share**
Malaysia								
CRS	6	40.0	7	46.7	5	33.3	6	40.0
IRS	5	33.3	4	26.7	5	33.3	2	13.3
DRS	4	26.7	4	26.7	5	33.3	7	46.7
TOTAL	15	100.0	15	100.0	15	100.0	15	100.0
Indonesia								
CRS	6	85.7	6	66.7	9	69.2	11	57.9
IRS	0	0.0	1	11.1	0	0.0	2	10.5
DRS	1	14.3	2	22.2	4	30.8	6	31.6
TOTAL	7	100.0	9	100.0	13	100.0	19	100.0

In Malaysia, in general 6 of 15 Islamic banks operate efficiently during 2002-2005. In Indonesia the number of Islamic bank is growing from 7 banks in 2002 to 19 in 2005. Around half of the new Islamic bank from year to year can operate in efficient scale. In 2005, 11 of 19 Islamic bank in Indonesia run efficiently in scale.

IV.3.1. Individual Bank Investigation

Deeper analysis on individual bank is presented on Table Appendix II.3 in appendix. In Malaysia, most of Islamic banks operate at diseconomies of scale (DRS) or constant return to scale (CRS). It is found that the larger Islamic banks in Malaysia tend to be more efficient than the smaller ones. On the other hand, all the profitable banks are efficient. For the smaller banks, the decomposition of overall efficiency suggest that the foreign window banks are mostly efficient in scale, while the inefficiency is mainly attributed to the technical aspect[3].

In Indonesia, almost all Islamic banks are either operating at scale efficient (CRS) or operating at diseconomies of scale (DRS). Most of the Islamic banks experiencing CRS are older banks, while Islamic banks experiencing DRS mostly are newer banks. This is true since for the year 2005 there are six new Islamic banks added in the analysis, while the existing banks are also still expanding. All profitable Islamic banks in Indonesia also tend to be efficient banks as in Malaysia. However, size does not always correspond with efficiency in Indonesia as we can find an efficient bank both in large or smaller scale.

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3 These findings are contradict to the findings of Sufian (2006), where he found that foreign window banks were almost scale efficient and the inefficiency were mainly attributed to scale.

Besides generating an efficient frontier another salient feature of DEA is its ability to generate a set of references for the inefficient bank to benchmark to. Table II.7 shows those referenced banks in 2005. There are more Indonesian Islamic banks set as the benchmarks. On total, Indonesian Islamic banks have been benchmarked 51 times, while Malaysian Islamic banks have been benchmarked only 16 times. Among all the Islamic banks, Bank Muamalat Indonesia is the most referred bank and the EON Bank from Malaysia is the second most referred bank.

No	Bank	Count	No	Bank	Count
	Table II.7 **Reference Set**				
1	Bank Muamalat Indonesia	13	8	Bank Tabungan Negara	2
2	*EON Bank*	12	9	Bank Jabar	2
3	Bank DKI	12	10	*Public Bank*	1
4	Bank BRI	11	11	*Hong Leong Bank*	1
5	Bank IFI	7	12	Bank Danamon	1
6	*Maybank*	3	13	*Affin Bank*	1
7	Bank Syariah Mandiri	3			

IV.3.2. Sources of Inefficiencies

Another useful feature of DEA is that it can identify the source of inefficiency. In 2005, the 3 largest sources in Malaysian Islamic Bank are financing (52.39%), labor (20.22%) and deposits (11,61%). This means the Malaysian Islamic banks should increase their financing over the deposit (FDR) since the core business of Islamic bank is to extend the financing of the real sector.

Figure II.3
Potential Improvements for Islamic banks in Malaysia and Indonesia
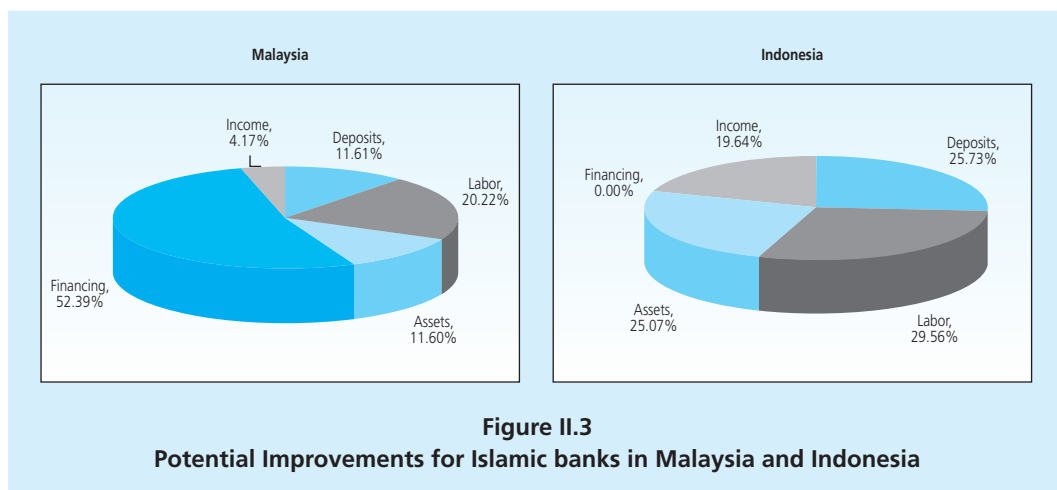
Contrary to the Malaysian case, the most efficient element of Indonesian Islamic banking is financing, while the most inefficient element is labor costs. In 2005, 29.56% of the inefficiencies can be attributed to the personnel expenses as the supply of human resource is always lagging behind the demand. Even in the expansion of the universities and the higher educational institutions offering Islamic Economic and Finance, the number of graduates are still could not catch up with the demand.

In general, the Indonesian Islamic banks are relatively more efficient than Malaysian in terms of the three measures applied on this study. The FDR in Indonesia has always been higher than 100 percent, reflecting a high contribution of Indonesian Islamic banking to the real sector. This conclusion should be further investigated as the FDR increase could also caused by a slower deposit mobilization, especially when the market interest rate increase and the fund is shifting to conventional bank in order to gain a higher return.

V. CONCLUSION AND RECOMMENDATOIN

Several conclusions derived from the comparison of the Indonesian vs. Malaysian Islamic banking system are:

- Islamic banking in Malaysia existed 10 years earlier than that of Indonesia. Currently, its asset size is 16 times larger.

- In Malaysia, the scale efficiency has reached 92%, however the overall efficiency remains around 74% due to low technical efficiency. There are only 40% efficient Islamic banks in Malaysia from 2002 – 2005 where the large Islamic window banks tend to be more efficient than the small ones.

- Profitable banks tend to be efficient banks. 7 of 15 Malaysian Islamic banks operate in diseconomies of scale (DRS) in 2005, especially small and foreign owned banks.

- In a relatively infant stage and small size, Indonesian Islamic banking has recorded high overall efficiency of 85%, mainly due to the improvement in scale efficiency from impressive growth. Technical efficiency has always been high at higher level than Malaysia. However, the percentage of efficient Islamic banks in Indonesia has been declining from 86% (6 out of 7) in 2002 to 58% (11 out of 19) in 2005. Most efficient Islamic bank in Indonesia are old bank.

- Labor has been a problem of Islamic banks in Indonesia and requires top priority improvement. The Islamic banks also need further expansion both organically and inorganically to improve its scale and the overall efficiency.

The policy implications are straightforward especially as recommended below:

- The Islamic banks in Malaysia should redirect their orientation not to follow the path of conventional banks, which mainly focus on the monetary sector by expanding the financing activities to improve their FDR. One alternative policy is to give an incentive for Islamic banks that extend more financing, while to give disincentive for Islamic banks that maintain excess liquidity and opt to place them in the short-term financial instruments.

- The size of the Islamic (window) bank matters in Malaysia. Consequently, the window banks should be encouraged to convert to subsidiaries or full branches apart from their parent conventional banks. This strategy will improve their scale and overall efficiencies.

- Instead of relying on organic expansion, which is naturally slow, this study recommend the rapid acceleration of the Islamic banks in Indonesia, directed by the government. The government is encouraged to expand inorganically by converting one state owned conventional bank into Islamic bank, preferably the one with large networks.

- Human resource has always been a problem in Indonesian Islamic banking. In the short, the education and training should be conducted for every level of management. In the long term, special fields of study in Islamic economic and finance should be opened in graduate and undergraduate levels, as well as inserting Islamic economic and finance curriculum in high school.

- Minimum budget allocated for human resources development is another proposed policy. In addition, the government could give incentives by financing participation in human resources development program and also provide a free training for the Islamic bank officers.

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APPENDIX

Table Appendix II.1 Descriptive Statistics of Malaysian Islamic Banks				
	2002 **($ 000)**	**2003** **($ 000)**	**2004** **($ 000)**	**2005** **($ 000)**
OUTPUT				
Total Financing				
Min	5,473	4,448	2,923	1,546
Mean	498,005	650,350	787,820	905,485
Max	2,171,982	3,044,636	3,712,326	3,978,985
S.D	619,756	848,942	984,796	1,073,597
Income				
Min	1,042	1,539	2,913	985
Mean	33,188	41,559	49,870	57,936
Max	145,517	148,730	155,722	183,899
S.D	44,444	43,333	49,963	60,753
INPUT				
Total Deposits				
Min	16,386	25,442	159,772	107,226
Mean	876,131	969,419	1,086,987	1,261,422
Max	3,201,733	3,272,005	4,064,761	4,579,731
S.D	999,222	1,065,232	1,148,374	1,344,370
Labor Costs				
Min	196	233	117	105
Mean	3,161	3,831	4,113	5,082
Max	19,782	22,929	23,897	32,750
S.D	6,002	6,867	7,150	9,372
Assets				
Min	24,488	39,155	213,591	129,197
Mean	977,728	1,139,846	1,226,463	1,502,504
Max	3,474,857	4,052,667	3,966,089	5,655,260
S.D	1,090,688	1,237,634	1,164,147	1,557,892

	Table Appendix II.2 Descriptive Statistics of Indonesian Islamic Banks			
	2002 ($ 000)	**2003 ($ 000)**	**2004 ($ 000)**	**2005 ($ 000)**
OUTPUT				
Total Financing				
Min	607	3,348	485	772
Mean	49,638	66,464	80,090	57,533
Max	188,410	243,709	483,915	438,709
S.D	71,338	96,747	157,981	134,216
Income				
Min	23	479	35	37
Mean	7,407	9,484	10,789	7,426
Max	26,564	38,878	64,030	60,130
S.D	11,365	15,912	21,179	17,481
INPUT				
Total Deposits				
Min	411	2,597	394	301
Mean	15,767	61,180	72,309	46,598
Max	87,394	237,872	437,862	374,120
S.D	32,208	100,576	146,307	114,040
Labor Costs				
Min	93	84	29	17
Mean	1,226	1,451	1,468	1,062
Max	3,889	5,887	7,405	8,836
S.D	1,607	2,141	2,416	2,108
Assets				
Min	1,511	4,709	1,675	1,434
Mean	61,959	94,936	107,713	73,453
Max	229,304	356,133	635,353	546,614
S.D	91,560	147,355	204,025	162,039

Table Appendix II.3 Summary of Efficiency Measures 2005										
Size	BANK	Assets	2005		2004		2003		2002	
Mal	Domestic Full Fledged		OE	ROA	OE	ROA	OE	ROA	OE	ROA
2	Bank Islam Malaysia	3,928,457	0.66	3.20	0.68	0.58	0.55	0.57	0.64	0.28
3	Bank Muamalat	2,545,530	0.45	0.31	0.49	0.36	0.38	0.05	0.57	0.29
Mal	Domestic Window									
1	Maybank	5,655,260	1.00	1.68	1.00	0.90	1.00	0.77	1.00	1.35
4	Public Bank	1,994,331	1.00	2.62	0.84	2.50	0.91	1.88	0.83	1.69
5	RHB Islamic Bank	1,889,672	0.56	0.54	0.99	2.18	0.69	1.08	0.69	1.01
6	Hong Leong Bank	1,441,707	1.00	1.39	1.00	1.68	1.00	2.04	1.00	1.43
7	Hong Kong Bank	1,302,628	0.82	0.78	0.93	0.50	0.95	0.38	1.00	2.65
8	EON Bank	1,061,960	1.00	2.47	1.00	1.88	1.00	1.50	0.81	1.07
9	Affin Bank	904,394	1.00	0.85	0.85	1.03	1.00	1.22	0.98	0.94
16	Southern Bank	202,439	0.79	0.67	0.73	1.05	0.77	5.04	0.73	3.65
17	Commerce Tijari	129,197	0.07	3.15						
	Arab Malaysian Bank	338,447			0.69	1.25	0.81	0.18	0.57	1.07
Mal	Foreign Window									
10	OCBC	582,394	0.77	0.88	0.72	0.62	0.35	0.44	0.36	0.65
13	Alliance Bank	384,206	0.80	0.90	0.62	0.92	0.25	0.94	0.29	1.11
14	Citibank	266,457	0.43	0.94	0.35	0.55	1.00	1.45	0.94	3.84
15	Standard Chartered Bank	248,932	0.79	0.30	0.32	0.48	0.36	1.36	0.42	2.61
Ind	Domestic Full Fledged									
11	Bank Syariah Mandiri	546,614	1.00	1.18	0.99	1.51	0.72	0.53	1.00	1.55
12	Bank Muamalat Ind	511,232	1.00	2.11	1.00	1.54	0.90	1.59	1.00	2.06
20	Bank Syariah Mega Ind	38,904	0.89	0.81	0.77	2.51				
Ind	Domestic Full Branch									
18	Bank Negara Indonesia	91,912	0.84	2.05	0.91	N/A	1.00	0.01	1.00	N/A
19	Bank BRI	43,936	1.00	0.34	1.00	3.76	0.76	8.41	0.37	15.22
22	Bank Bukopin	26,098	0.99	0.56	1.00	1.73	1.00	0.27	0.89	2.57
23	Bank Danamon	24,457	1.00	11.77	1.00	0.21	0.98	2.47	0.74	10.18
24	Bank Niaga	22,402	0.85	0.57	0.44	N/A				
26	Bank Tabungan Negara	10,844	1.00	0.76						
27	Bank International Ind	9,887	0.94	9.57	0.84	17.20	0.33	3.59		
28	Bank Permata	9,851	0.61	3.44						
32	Bank IFI	2,572	1.00	2.01	1.00	2.50	1.00	3.84		
Ind	Regional Full Branch									
21	Bank Jabar	26,630	1.00	2.82	1.00	1.67	1.00	0.77	0.94	0.21
25	Bank Sumut	15,180	0.52	1.43						
29	BPD Aceh	5,337	0.34	0.26						
30	Bank DKI	4,202	1.00	2.96	0.57	1.84				
31	Bank Riau	2,591	0.84	0.87	1.00	N/A				
33	BPD NTB	1,525	0.62	2.65						
34	Bank Kalsel	1,434	0.67	0.61						

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   a. *Publikasi buku:*
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   b. *Artikel dalam jurnal:*
   Rangazas, Peter. *"Schooling and Economic Growth: A King-Rebelo Experiment with Human Capital",* Journal of Monetary Economics, *Oktober 2000,46(2), hal. 397-416.*

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