The efficiency of Islamic banks: empirical evidence from the Asian countries' Islamic banking sectors

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ABSTRACT

The paper investigates the efficiency of the Islamic banking sectors in 4 Asian countries namely Bangladesh, Indonesia, Malaysia and Pakistan during the period of 2001-2006. The efficiency estimates of individual banks are evaluated by using the non-parametric Data Envelopment Analysis (DEA) method. The results imply that during the period of study, although the Asian Islamic banking sectors have been operating at a relatively optimal scale of operations, they were relatively managerially inefficiency in controlling their operating costs and utilizing their resources to the fullest.

JEL Classification: G21; G28

Keywords: Islamic Banks, Data Envelopment Analysis (DEA), Asia

1.0 INTRODUCTION

Islamic banks today exist in all parts of the world, and are looked upon as a viable alternative system which has many things to offer. While it was initially developed to fulfill the needs of Muslims, Islamic banking has now gained universal acceptance. Islamic banking is recognized as one of the fastest growing areas in banking and finance. Since the opening of the first Islamic bank in Egypt in 1963, Islamic banking has grown rapidly all over the world. So in comparison, Islamic banking is relatively new phenomenon as the first Islamic bank, Mit Ghamr Local Savings Bank of Egypt, was only established in 1963. Even then, the real growth of Islamic finance did not begin until the 1980s when Middle East countries experienced a large growth in surplus funds. Since then Muslim investment has spread throughout Europe and Asia, and Islamic finance is still expanding. Direct Islamic financing methods, such as with Islamic bonds, are gaining popularity in the West as is Islamic based funds management.

The number of Islamic financial institutions worldwide has risen to over 300 today in more than 75 countries concentrated mainly in the Middle East and Southeast Asia (with Bahrain and Malaysia the biggest hubs), but are also appearing in Europe and the United States. The Islamic banking total assets worldwide are estimated to have exceed $250 billion and are growing at an estimated pace of 15 percent a year. Zaher and Hassan (2001) suggested that Islamic banks are set to control some 40-50 percent of Muslim savings by 2009/10. Saleh and Zeitun (2007) found that interesting development of Islamic banking globally. This sector has not only grown in the Muslim world, but has also gained significant attention in the Western world, with over 250 Islamic banks worldwide controlling approximately US$400 billion in assets and client money. The growth of these banks is proof of their success, and an indication that these banks continue to grow in number and size worldwide.

Islamic banking operations started out as a mere deposit taking and lending facility and has since transformed into all aspects of banking, money and capital market operations, including fully

fledged stock exchanges. The Islamic resurgence in the late 1960's and 1970's, further intensified by the 1975 oil price boom, which introduced a huge amount of capital inflows to Islamic countries has initiated the call for a financial system that allows Muslim to transact in a system that is in line with their religious beliefs. Before the re-emergence of the Islamic financial system, Muslims throughout the world has only conventional financial system to fulfill their financial needs.

Islamic financial products are aimed at investors who want to comply with the Islamic laws (*syaria'*) that govern a Muslim's daily life. *Syaria'* law forbids the giving or receiving of *riba'*[1] (because earning profit from an exchange of money for money is considered immoral); mandate that all financial transactions be based on real economic activity; and prohibit investment in sectors such as tobacco, alcohol, gambling, and armaments. Despite that, Islamic financial institutions are providing an increasingly broad range of financial services, such as fund mobilization, asset allocation, payment and exchange settlement services, and risk transformation and mitigation.

Among other reasons which attributed to the rapid growth of the Islamic banking and finance industry are the growing oil wealth, with demand for suitable investments soaring in the Gulf region and the competitiveness of many of the products, attracting strong demand from Muslim and non-Muslim investors. Despite the growing interest and the rapid growth of the Islamic banking and finance industry, analysis of Islamic banking at a cross-country level is still at its infancy. This could partly be due to the unavailability of data, as most of the Islamic financial institutions particularly in the Asian region are not publicly traded.

The aim of this paper is to fill a demanding gap in the literature by providing the empirical evidence on the performance of Islamic banks in 4 Asian countries during the period 2001 to 2006. The efficiency estimate of each Islamic bank is computed by using the non-parametric Data Envelopment Analysis (DEA) method. The method allows us to distinguish between three different

1 *Riba'* the English translation of which is *usury* is prohibited in Islam and is acknowledged by all Muslims. The prohibition of *riba'* is clearly mentioned in the Quran, the Islam's holy book and the traditions of Prophet Muhammad *(sunnah).* The Quran states: "Believers! Do not consume *riba',* doubling and redoubling…" (3.130); "God has made buying and selling lawful and *riba'* unlawful… (2:274).

types of efficiency measures, namely technical, pure technical, and scale. Unlike the previous analysis of Islamic bank efficiency, we have constructed and analyzed the results derived from dynamic panels, which is critical in a dynamic business environment as a bank may be the most efficient in one year but may not be in the following year (s). A dynamic panel analysis will also highlight any significant changes taking place in the Islamic banking sector during the period of study.

This paper unfolds as follows. Section 2 provides an overview of the related studies in the literature, followed by a section that outlines the method used and choice of input and output variables for the efficiency model. Section 4 reports the empirical findings. Section 5 concludes and offers avenues for future research.

2.0 REVIEW OF THE LITERATURE

While there have been extensive literatures examining the efficiency features of the contemporary banking sector, particularly the U.S. and European banking markets, the work on Islamic banking is still in its infancy. Typically, studies on Islamic bank efficiency have focused on theoretical issues and the empirical work has relied mainly on the analysis of descriptive statistics rather than rigorous statistical estimation (El-Gamal and Inanoglu, 2004). However, this is gradually changing as a number of recent studies have sought to apply various frontier techniques to estimate the efficiency of Islamic banks.

Hassan and Hussein (2003) examined the efficiency of the Sudanese banking system during the period of 1992 and 2000. They employed a variety of parametric (cost and profit efficiencies) and non-parametric DEA techniques to a panel of 17 Sudanese banks. They found that the average cost and profit efficiencies under the parametric were 55% and 50% respectively, while it was 23% under the non-parametric approach. During the period of study, they found that the Sudanese banking

system have exhibited 37% allocative efficiency and 60% technical efficiency, suggesting that the overall cost inefficiency of the Sudanese Islamic banks were mainly due to technical (managerially related) rather than allocative (regulatory).

Yudistira (2004), for example, with a global sample of 18 Islamic banks, found Islamic banks to be more efficient than conventional banks. In contrast, Hassan (2006) in a larger study of 43 Islamic banks found them somewhat less cost efficient than conventional banks. Mokhtar et al., (2006), similarly, in a study of Malaysian Islamic banks found that while Islamic banks had grown faster, their overall efficiency was lower than the conventional banks.

Saleh and Zeitun (2007) analyzed the performance and efficiency of Jordan Islamic Banks for 1998 to 2003 period. The contribution of the paper is the measures show the ability and the efficiency of both Islamic banks to increase their income and reduce expenses. Viverita et al. (2007), of their study of Islamic bank in Asia, Africa and Middle East found the average Middle East bank size was some US $2 billion with Asia Islamic banks averaging US $900 million and African banks just US $151 million. The other finding is the age of each bank was correlated against the various efficiency results. It could be expected that newer banks may have had a chance to implement newer technologies. In this case, technical efficiency results were not correlated with the bank's age.

Hussein (2003) provides an analysis of the cost efficiency features of Islamic banks in Sudan between 1990 and 2000. Using the stochastic cost frontier approach, he estimates cost efficiency for a sample of 17 banks over the period. The interesting contribution of this paper is that specific definitions of Islamic financial products are used as outputs. In addition, the analysis is also novel as Sudan has a banking system based entirely on Islamic banking principles. The results show large variations in the cost efficiency of Sudanese banks with the foreign owned banks being the most efficient. State owned banks are the most cost inefficient.

Samad (1999) was among the first to investigate the efficiency of the Malaysian Islamic banking sector. In his paper, he investigates the relative performance of the full-fledged Malaysian

Islamic bank compared to its conventional bank peers. During the period of 1992 to 1996 he found that the managerial efficiency of the conventional banks was higher than that of the full-fledged Islamic bank. On the other hand, the measures of productive efficiency revealed mixed results. He suggests that the average utilization rate of the Islamic bank is lower than that of the conventional banks. Similarly, he found that profits earned by the full-fledged Islamic bank either through the use of deposit or loanable funds, or used funds are also lower than the conventional banks, reflecting the weaker efficiency position of the full-fledged Islamic bank. In contrast, the productivity test by loan recovery criterion indicate that the efficiency position of the full-fledged Islamic bank seems to be higher and bad debts as a percentage of equity, loans, and deposits also show a clear superiority over the conventional bank peers.

Batchelor and Wadud (2004) showed the mean technical efficiency (TE) of the overall Malaysian Islamic banking operations indicates a significant improvement of technical efficiency from 63% in 1997 to 83.7% in 2002. Except for two years (viz., 1997, 2001), the attribution of scale efficiency (SE) appears to be higher than pure technical efficiency (PTE) as the source of overall TE. The average PTE declined from 84% in 1997 to 75.4% in 1998, perhaps in reflection of the sudden shock of the Asian crisis, but increased almost consistently from 1999 onwards peaking to 91.5% in 2002. Based on the bank specific efficiency scores, Maybank appears to be the most efficient in the industry. Maybank achieves full technical efficiency (sourced from full pure technical and scale efficiencies) for the entire period under study except for the year 2001 where slight scale inefficiency of about 5% has been recorded.

More recently, Sufian (2006) examined the efficiency of the Malaysian Islamic banking sector during the period 2001-2004 by using the non-parametric Data Envelopment Analysis (DEA) method. He found that scale efficiency outweighs pure technical efficiency in the Malaysian Islamic banking sector, implying that Malaysian Islamic banks have been operating at non-optimal of operations. He suggests that the domestic Islamic Banking Scheme banks have exhibited a higher

technical efficiency compared to their foreign Islamic Banking Scheme bank peers. He suggests that during the period of study the foreign Islamic Banking Scheme Banks inefficiency were mainly due to scale rather than pure technical.

3.0 METHODOLOGY

A non-parametric Data Envelopment Analysis (DEA) is employed with variable return to scale assumption to measure input-oriented technical efficiency of Asian Islamic banking sectors. DEA involves constructing a non-parametric production frontier based on the actual input-output observations in the sample relative to which efficiency of each firm in the sample is measured (Coelli, 1996). Let us give a short description of the Data Envelopment Analysis[2]. Assume that there is data on K inputs and M outputs for each N bank. For ith bank these are represented by the vectors x_i and y_i respectively. Let us call the K x N input matrix – X and the M x N output matrix – Y. To measure the efficiency for each bank we calculate a ratio of all inputs, such as $(u'y_i/v'x_i)$ where u is an M x 1 vector of output weights and v is a K x 1 vector of input weights. To select optimal weights we specify the following mathematical programming problem:

$$\min_{u,v} (u'y_i / v'x_i),$$

$$u'y_i / v'x_i \leq 1, \qquad j = 1, 2, \ldots, N,$$
$$u, v \geq 0 \tag{1}$$

The above formulation has a problem of infinite solutions and therefore we impose the constraint $v'x_i = 1$, which leads to:

2 Good reference books on efficiency measures are Thanassoulis (2001), Cooper et al. (2000), and Avkiran (2002).

$$\min_{\mu,\varphi} (\mu' y_i),$$

$$\varphi' x_i = 1$$
$$\mu' y_i - \varphi' x_j \leq 0 \quad j = 1, 2, \ldots, N,$$
$$\mu, \varphi \geq 0 \qquad (2)$$

where we change notation from u and v to μ and φ, respectively, in order to reflect transformations. Using the duality in linear programming, an equivalent envelopment form of this problem can be derived:

$$\min_{\theta, \lambda} \theta,$$
$$y_i + Y\lambda \geq 0$$
$$\theta x_i - X\lambda \geq 0$$
$$\lambda \geq 0 \qquad (3)$$

where θ is a scalar representing the value of the efficiency score for the ith decision-making unit which will range between 0 and 1. λ is a vector of N x 1 constants. The linear programming has to be solved N times, once for each decision-making unit in the sample. In order to calculate efficiency under the assumption of variable returns to scale, the convexity constraint ($N1'\lambda = 1$) will be added to ensure that an inefficient firm is only compared against firms of similar size, and therefore provides the basis for measuring economies of scale within the DEA concept. The convexity constraint determines how closely the production frontier envelops the observed input-output combinations and is not imposed in the constant returns to scale case. The variable returns to scale technique therefore forms a convex hull which envelops the data more tightly than the constant returns to scale, and thus provides efficiency scores that are greater than or equal to those obtained from the constant returns to scale model.

3.1 Data Sample, Inputs-Outputs Definition, and the Choice of Variables

It is commonly acknowledged that the choice of variables in efficiency studies significantly affects the results. The problem is compounded by the fact that variable selection is often constrained by the paucity of data on relevant variables. The cost and output measurements in banking are especially difficult because many of the financial services are jointly produced and prices are typically assigned to a bundle of financial services. Two approaches dominate the banking theory literature: the production and intermediation approaches (Sealey and Lindley, 1977).

Under the production approach, pioneered by Benston (1965), the banks are primarily viewed as providers of services to customers. The input set under this approach includes physical variables (e.g. labour, material) or their associated costs, since only physical inputs are needed to perform transactions, process financial documents, or provide counseling and advisory services to customers. The output under this approach represents the services provided to customers and is best measured by the number and type of transactions, documents processed or specialized services provided over a given time period. This approach has primarily been employed in studying the efficiency of bank branches.

Under the intermediation approach, financial institutions are viewed as intermediating funds between savers and investors. In our case, Islamic banks produce intermediation services through the collection of deposits and other liabilities and in turn these funds are invested in productive sectors of the economy, yielding returns uncontaminated by usury (*riba'*). This approach regard deposits, labour and physical capital as inputs, while loans and investments are treated as output variables.

Following among others, Hassan (2005), and Sufian (2006), a variation of the intermediation approach or asset approach originally developed by Sealey and Lindley (1977) will be adopted in the definition of inputs and outputs used in this study. Furthermore, as at most times bank branches are engaged in the processing of customer documents and bank funding, the production approach might be more suitable for branch efficiency studies (Berger and Humphrey, 1997).

Due to entry and exit factor, the efficiency frontier is constructed by using an unbalanced sample of 10 Islamic banks operating in the Asian countries during the period 2001-2006 (see Appendix 1) yielding 37 bank year observations. We are able to collect data on three outputs and two input variables. Data for the empirical analysis is sourced from individual bank's annual balance sheet and income statements. The Islamic banks are modelled as multi-product firms producing three outputs namely, *Total Loans* (*y1*), which include loans to customers and other banks, *Income* (*y2*), which include income derived from investment of depositors' funds and other income from Islamic banking operations, and Investments (*y3*), which include investment securities held for trading, investment securities available for sale (AFS), and investment securities held to maturity, by engaging two inputs namely, *Total Deposits* (*x1*), which include deposits from customers and other banks and *Assets* (*x2*). All variables are measured in millions of US Dollars (US$) and are deflated against the respective countries inflation rates.

[**Insert Table 1**]

3.0 RESULTS

In this section, we will discuss the technical efficiency change (TE) of the Asian Islamic banking sectors, measured by the DEA method and its decomposition into pure technical efficiency (PTE) and scale efficiency (SE) components. In the event of the existence of scale inefficiency, we will attempt to provide evidence on the nature of the returns to scale of each Islamic bank. The Islamic banks' efficiency is examined for each year under investigation.

As suggested by Bauer et al. (1998), DeYoung and Hasan (1998), and Isik and Hassan (2002), constructing an annual frontier specific to each year is more flexible and thus more appropriate than estimating a single multiyear frontier for the banks in the sample. Following the earlier studies, for the purpose of the study, we prefer to estimate separate annual efficiency frontier for each year. In

other words, there were six separate frontiers constructed for the study. Isik and Hassan (2002) contended that the principal advantage of having panel data is the ability to observe each bank more than once over a period of time. The issue is also critical in a continuously changing business environment because the technology of a bank that is most efficient in one period may not be the most efficient in another. Furthermore, by doing so, we alleviate, at least to an extent, the problems related to the lack of random error in DEA by allowing an efficient bank in one period to be inefficient in another, assuming that the errors owing to luck or data problems are not consistent over time (Isik and Hassan, 2002).

4.1 Efficiency of the Asian Islamic Banking Sectors

The results from Table 2 seem to suggest that the Islamic banks in the Asian countries have exhibited a declining trend during the earlier part of the study, increased in 2004, before declining again in years 2005 and 2006. During the years, the Asian Islamic banks have exhibited a lower mean technical efficiency of 61.4%. It is also clear from Table 2 that pure technical inefficiency outweighs scale inefficiency in determining the total technical inefficiency of the Asian Islamic banks.

During the period of study, we find that banks from Indonesia were the most efficient from the Asian region, exhibiting a mean efficiency score of 92.3%, followed by banks from Pakistan and Bangladesh with a mean efficiency score of 64.3% and 57.4% respectively. On the other hand, we find that the Malaysian Islamic banking sector were the least efficient, recording a mean efficiency score of 50.5%.

The empirical findings seem to suggest that pure technical inefficiency outweighs scale inefficiency in determining the total technical inefficiency in all of the Asian Islamic banking sectors. Thus, the findings imply that although the Asian Islamic banking sectors have been operating at a relatively optimal scale of operations, they were relatively managerially inefficiency in controlling their operating costs and utilizing their resources to the fullest.

[**Insert Table 2**]

4.2 Composition of the Efficiency Frontier

While the results above highlight the sources of technical inefficiency of the Islamic banks, we next turn to discuss the sources of the scale inefficiency of the Islamic banks. As have been mentioned earlier, a bank can operate at CRS or VRS where CRS signifies that an increase in inputs results in a proportionate increase in outputs and VRS means a rise in inputs results in a disproportionate rise in outputs. Further, a bank operating at VRS can be at increasing returns to scale (IRS) or decreasing returns to scale (DRS). Hence, IRS means that an increase in inputs results in a higher increase in outputs, while DRS indicate that an increase in inputs results in lesser output increases.

To identify the nature of returns to scale, first the CRS scores (obtained with the CCR model) is compared with VRS (using BCC model) scores. For a given bank, if the VRS score equals to its CRS score, the bank is said to be operating at constant returns to scale (CRS). On the other hand, if the scores are not equal, a further step is needed to establish whether the bank is operating at IRS or DRS. To do this, the DEA model is used under the non-increasing returns to scale assumptions (NIRS). If the score under VRS equals the NIRS score, then the bank is said to be operating at DRS. Alternatively, if the score under VRS is different from the NIRS score, than the bank is said to be operating at IRS (Coelli et al., 1998).

Table 3 shows the banks that lie on the efficiency frontier. The composition of the efficiency frontier suggests the number of 100% efficient banks varies between 1 to 10 banks. In general, the table indicates that while the small banks tend to operate at CRS or IRS, the large banks tend to operate at CRS or DRS, the findings which are similar to the earlier studies by among others McAllister and McManus (1993) and Noulas et al. (1990). To recap, McAllister and McManus (1993)

have suggested that while the small banks have generally exhibited IRS, the large banks on the other hand tend to exhibit DRS and at best CRS. As it appears, the small Islamic banks have experienced increasing returns to scale (IRS) in their operations during the period of the study. One implication is that for the small Islamic banks, a proportionate increase in inputs would result in more than a proportional increase in outputs. Hence, the small Islamic banks which have been operating at IRS could achieve significant cost savings and efficiency gains by increasing its scale of operations. In other words, substantial gains can be obtained from altering the scale via internal growth or further consolidation in the sector. In fact, in a perfectly competitive and contestable market, the efficient banks should absorb the scale inefficient banks, in order to exploit cost advantages. Thus, the banks that experience IRS should either eliminate their scale inefficiency or be ready to become a prime target for acquiring banks, which can create value from underperforming banks by streamlining their operations and eliminating their redundancies and inefficiencies (Evanoff and Israelvich, 1991). On the other hand, the results seem to suggest that further increase in size would only result in a smaller increase of outputs for every proportionate increase in inputs of the large banks, resulting from the fact that the large banks have been operating at declining returns to scale (DRS) during the period. Hence, decision-makers ought to be more cautious in promoting mergers among the large banks as a means to enjoying efficiency gains.

[**Insert Table 3**]

5.0 CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

In this paper, we examine the performance of the Asian Islamic banks that consist of 4 countries namely Bangladesh, Indonesia, Malaysia and Pakistan during the period 2001-2006. The

efficiency estimates of individual banks are evaluated using the non-parametric Data Envelopment Analysis (DEA) approach.

The empirical findings suggest that during the period of study, pure technical inefficiency outweighs scale inefficiency in the Islamic banking sector implying that the Islamic banks have been managerially inefficient in exploiting their resources to the fullest extent. The empirical findings seem to suggest that the Asian Islamic banks have exhibited highest technical efficiency on 2004 within the period of study 2001 to 2006. During the period of study we find that pure technical inefficiency has greater influence in determining the total technical inefficiency of the Asian Islamic banking sectors. We find that banks from Indonesia were the most efficient from the Asian region, followed by banks from Pakistan and Bangladesh and the Malaysian Islamic banking sector were the least efficient. The finding correlate with Viverita et al. (2007), finding that Malaysia had been expected to be the most efficiency-improved country due to its innovation in Islamic products, but Indonesia obtained the best overall efficiency, the only different is Viverita et al (2007) were using Malmquist Total Factor Productivity in their study.

Due to its limitations, the paper could be extended in a variety of ways. Firstly, the scope of this study could be further extended to investigate changes in cost, allocative, and technical efficiencies over time. Secondly, it is suggested that further analysis into the investigation of the Islamic banking sector efficiency to consider risk exposure factors. Finally, future research into the efficiency of the Islamic banking sector efficiency could also consider the production function along with the intermediation function.

Despite these limitations, the findings of this study are expected to contribute significantly to the existing knowledge on the operating performance of the Islamic banking industry in the Asian countries. Nevertheless, the study have also provide further insight to bank specific management as well as the policymakers with regard to attaining optimal utilization of capacities, improvement in managerial expertise, efficient allocation of scarce resources and most productive scale of operation

of the banks in the industry. This may also facilitate directions for sustainable competitiveness of Islamic banking operations in the future.

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Table 1: **Summary Statistics of the Variables Employed in the DEA Model (in million of USD)**

	Mean	Min	Max	Std. Dev.
Outputs				
2001				
Financing (y1)	1,735,785.94	685.47	5,033,050.00	2,856,823.32
Investments (y2)	730,998.37	308.36	2,012,298.00	1,113,285.13
Income (y3)	172,433.32	113.83	491,855.00	276,914.49
2002				
Financing(y1)	996,741.14	24,254.08	4,209,934.13	1,806,099.82
Investments (y2)	1,986,604.30	9,842.27	9,376,245.28	4,132,479.11
Income (y3)	484,848.66	4,532.19	1,520,878.97	673,734.01
2003				
Financing (y1)	3,419,115.71	41,679.11	13,427,695.21	5,440,812.15
Investments (y2)	4,476,309.07	4,417.52	23,813,792.56	9,519,077.85
Income (y3)	1,398,069.98	3,825.89	6,086,189.15	2,381,838.31
2004				
Financing (y1)	5,701,458.90	5,227.63	19,593,734.28	8,453,241.83
Investments (y2)	5,269,057.64	45,139.10	22,340,807.13	9,653,648.44
Income (y3)	472,558.03	3,219.26	1,682,953.77	719,273.62
2005				
Financing (y1)	6,522,068.66	2,888.25	36,897,649.76	12,791,237.75
Investments (y2)	23,365,232.09	166.08	201,638,954.33	63,101,672.03
Income (y3)	1,405,999.35	1,108.33	10,124,689.20	3,141,070.45
2006				
Financing (y1)	10,951,173.26	15,109.23	51,374,453.02	20,531,566.43
Investments (y2)	34,028,601.76	191.34	260,950,844.15	91,739,582.43
Income (y3)	2,104,884.79	899.45	13,829,219.05	4,812,637.41
Inputs				
2001				
Deposits (x1)	3,155,809.45	2,418.59	9,027,099.00	5,089,346.14
Assets (x2)	3,607,583.28	7,790.21	10,335,296.00	5,831,145.25
2002				
Deposits (x1)	4,154,990.82	34,880.54	15,623,643.33	6,558,291.11
Assets (x2)	7,166,821.44	47,872.60	17,202,577.16	9,046,971.53
2003				
Deposits (x1)	8,101,948.87	43,706.79	27,186,513.93	11,900,802.38
Assets (x2)	11,371,628.76	62,557.48	34,243,357.20	13,766,520.76

2004				
Deposits (x1)	10,872,558.90	50,374.06	27,708,309.61	14,135,589.11
Assets (x2)	12,784,621.19	72,056.48	35,291,235.69	16,905,772.38
2005				
Deposits (x1)	28,772,100.99	5,036.12	232,074,760.72	72,191,284.36
Assets (x2)	33,698,865.42	26,560.35	264,590,936.99	82,150,435.61
2006				
Deposits (x1)	43,500,363.64	5,975.97	304,246,781.34	106,340,051.44
Assets (x2)	50,134,848.59	39,231.07	345,220,001.59	120,417,671.27

Source: Banks Annual Reports

Table 2: **Summary Statistics of Efficiency Scores**

The table presents mean, minimum, maximum, and standard deviation of the Asian Islamic banks technical efficiency (TE), and its mutually exhaustive pure technical efficiency (PTE) and scale efficiency (SE) components derived from the DEA. Panel A, B, C, D, E, and F shows the mean, minimum, maximum and standard deviation of TE, PTE, and SE of the Islamic banks for the years 2001, 2002, 2003, 2004, 2005, and 2006 respectively. Panel G presents the Asian Islamic banks mean, minimum, maximum, and standard deviation of TE, PTE, and SE scores for all years. The TE, PTE, and SE scores are bounded between a minimum of 0 and a maximum of 1.

Banks	Mean	Minimum	Maximum	Std. Dev.
Panel A: All Banks 2001				
Technical Efficiency	0.658	0.255	0.900	0.351
Pure Technical Efficiency	0.722	0.266	1.000	0.398
Scale Efficiency	0.925	0.818	1.000	0.095
Panel B: All Banks 2002				
Technical Efficiency	0.597	0.372	1.000	0.296
Pure Technical Efficiency	0.622	0.372	1.000	0.279
Scale Efficiency	0.952	0.763	1.000	0.106
Panel C: All Banks 2003				
Technical Efficiency	0.239	0.057	1.000	0.374
Pure Technical Efficiency	0.264	0.057	1.000	0.367
Scale Efficiency	0.875	0.475	1.000	0.204
Panel D: All Banks 2004				
Technical Efficiency	0.865	0.602	0.995	0.152
Pure Technical Efficiency	0.894	0.621	1.000	0.157
Scale Efficiency	0.967	0.927	0.995	0.026
Panel E: All Banks 2005				
Technical Efficiency	0.804	0.605	1.000	0.159
Pure Technical Efficiency	0.812	0.605	1.000	0.164
Scale Efficiency	0.991	0.952	1.000	0.015
Panel F: All Banks 2006				
Technical Efficiency	0.496	0.237	1.000	0.268
Pure Technical Efficiency	0.736	0.329	1.000	0.259
Scale Efficiency	0.670	0.405	1.000	0.219
Panel G: All Years				
Technical Efficiency	0.614	0.057	1.000	0.254
Pure Technical Efficiency	0.685	0.057	1.000	0.296
Scale Efficiency	0.889	0.405	1.000	0.048

Note: Detailed results are available from the authors upon request

Table 3: **Composition of Production Frontiers**

Bank	Region	2001	2002	2003	2004	2005	2006	Count Bank
Al-Arafah Islami Bank	ASIA			CRS	DRS	CRS		**2**
Al-Baraka Islamic Bank B.S.C.	ASIA					IRS	DRS	**0**
Bank Islam Malaysia Berhad	ASIA	DRS	CRS	IRS	DRS	DRS		**1**
Bank Muamalat Indonesia	ASIA					CRS	CRS	**2**
Bank Muamalat Malaysia Berhad	ASIA	CRS	CRS	IRS	DRS	DRS	DRS	**2**
Islamic Bank Bangladesh	ASIA					CRS	DRS	**1**
Kuwait Finance House (Malaysia)	ASIA					CRS	DRS	**1**
Meezan Bank	ASIA	IRS	IRS	IRS	IRS	IRS	DRS	**0**
Shah Jalal Islami Bank	ASIA		DRS	CRS	DRS	DRS	DRS	**1**
Standard Chartered Modharaba	ASIA		CRS	CRS		CRS	DRS	**3**
Count Year		**1**	**3**	**3**	**0**	**5**	**5**	

Note: CRS – (Constant Returns to Scale); DRS – (Decreasing Returns to Scale); IRS – (Increasing Returns to Scale).

The banks corresponds to the shaded regions have not been efficient in any year in the sample period (2001-2006) compared to the other banks in the sample.

'Count Year' denotes the number of banks appearing on the efficiency frontier during the year.

'Count Bank' denotes the number of times a bank has appeared on the efficiency frontier during the period of study.

APPENDIX 1

Country / Year	2001	2002	2003	2004	2005	2006
Bangladesh		1	2	2	3	2
Indonesia					1	1
Malaysia	2	2	2	2	3	2
Pakistan	1	2	2	1	3	3
Total	**3**	**5**	**6**	**5**	**10**	**8**