Efficiency performance of Malaysian Islamic banks

Ab-Rahim, Rossazana and Kadri, Norlina and Ismail, Farhana

Universiti Malaysia Sarawak, Universiti Malaysia Sarawak, Universiti Malaysia Sarawak

16 April 2013

Efficiency Performance of Malaysian Islamic Banks

Rossazana Ab-Rahim, Norlina Kadri & Farhana Ismail
Faculty of Economics & Business, Universiti Malaysia Sarawak
Email: rossazana@gmail.com

ABSTRACT This study examines the efficiency performance of the full-fledged Islamic banks in Malaysia for the period of 2006 to 2011. The Malaysian Islamic banking industry has grown tremendously in terms of assets, deposits and total financing over the study period. Data Envelopment Analysis is employed in this study to measure the cost efficiency as well as the technical efficiency and its decompositions. The results show that, on average the main contributor of cost efficiency for Islamic domestic and foreign banks in Malaysia is allocative efficiency. In addition, the results find that Islamic foreign banks are more efficient than domestic banks with respect to pure technical efficiency and allocative efficiency.

INTRODUCTION

Islamic banking has been one of the fastest-growing sectors across the global banking industry. The global Islamic banking assets and assets under management have reached US$750 billion and is expected to hit US$1 trillion in 2010 (Mckinsey, 2007); however, International Monetary Fund (IMF) postulates that with the total assets of Islamic banking is at USD$250 billion, it will reach US$1 trillion by 2016 (Bloomberg, 2009). There are over 300 Islamic financial institutions worldwide across 75 countries and the world's 100 largest Islamic banks target an annual asset growth rate of 26.7 percent (%) while the global Islamic finance industry is experiencing average growth of 15-20% annually (McKinsey, 2007). Ernst and Young (2011) in a report entitled 'World Islamic Banking Competitiveness Report 2011-2012' outline that the global Islamic banking assets to reach US$1.1 trillion in year 2012, an increment of 33% from US$826 billion in year 2010. They add that Malaysia will contribute about 13% (US$38 billion) of the Islamic banking asset growth worldwide. This phenomenon has been contributed by Malaysia's long track record of over 30 years to build a successful domestic Islamic banking. As at December 2011, Malaysia's total Islamic banking assets has reached RM335 billion with an average growth rate of 16.07% over the period of 2002-2011 (Bank Negara Malaysia, 2012).

The establishment of the first Islamic bank, the Dubai Islamic Bank in 1975 was initiated by a group of Muslim businessmen; under a special law that allowed it to engage in business while accepting deposits. Since then, most of the formations of Islamic banks worldwide were private initiated. However, the establishment of Islamic banking in Malaysia is different than Islamic banking in the Gulf and the rest of the world (Samad, Gardner and Cook, 2005); it was because the first Islamic bank in Malaysia, Bank Islam Malaysia Berhad (BIMB) was government initiated. The establishment of BIMB in July 1983 under the Islamic Banking Act 1983 has marked the new era in Malaysian Islamic banking. A

decade after, the government introduced the 'Interest-Free Banking Scheme'; the scheme has made Malaysia to be among the first nation in the world to allow a full-fledged Islamic banking institution (Islamic bank) to operate side-by-side with the conventional banks. The conventional banks are allowed to offer Islamic banking products or services to customers or it is called as Islamic window.

The scheme was introduced to promote Islamic banking to be more efficient and effective mode in increasing the number of institutions offering Islamic banking services at lowest cost at the short time (Bank Negara Malaysia, 1994). The growing interest to offer Islamic products is due to the banks' desire to offer Islamic services to the large Muslim population and the banks also motivated to tap the increasing interest of international investors who are attracted to Shariah-compliant products (Sole, 2007). The first local-based banking group that launched Islamic subsidiary was RHB Group, which opened RHB Islamic Bank Berhad. The second was Commerce group when it launched the Commerce Tijari Bank Berhad (Bernama, 2005), and the third banking group was Hong Leong Group, which established the Hong Leong Islamic Bank. In March 1993, twenty one Islamic financial products were offered by three banks; however in July 1993, the scheme was extended to all conventional banks. In October 1999, the second full-fledged Islamic bank, Bank Muammalat Malaysia Berhad (BMMB) was established.

With the facilities and incentives extended by Bank Negara Malaysia to the full-fledged Islamic banks, Islamic window and conventional banks; it has create curiosity whether the Islamic banks have performed well. In recent years, studies on Malaysia Islamic banking have started to grow (Omar et al., 2005; Sufian, 2006; Mohd Zamil, 2007; Ahmad Mokhtar, et al., 2007; Kamaruddin, Safa and Mohammad, 2008; Mohamad, Noor and Ahmad, 2011). Several studies were undertaken to the association between conventional banks and efficiency but empirical works on Malaysian Islamic banking is still in its infancy. Several attempts were undertaken to compare the performance of domestic and foreign banks in Malaysian banking system (Detragiache and Gupta, 2004; Matthews and Ismail, 2005; Sufian and Abdul Majid, 2008; Mohd Tahir, Abu Bakar and Haron, 2010; and Ong, Lim and Teh, 2011) however, there appears to be a limited of studies to assess the efficiency performance of Malaysian Islamic banks with respect to domestic and foreign Islamic banks. Thus, this study contributes to the existing studies on Malaysian Islamic banking by measuring efficiency performance of Islamic banks (full-fledged and Islamic window) with respect to technical and allocative efficiencies. The next section presents the discussion on the existing literature on Malaysian Islamic banking industry.

LITERATURE REVIEW

Generally, a stream of existing studies on Malaysia Islamic banks had focused on comparing the performance of Islamic and conventional banks in Malaysia banking industry. Studies such as Ho, Osman and Abdul Rahim (2011) compare the performance of Islamic and conventional banks by utilizing financial ratios information, namely return on equity (ROE) and return on assets (ROA). The authors find that, over the period of 1996 to 2009; the performance of ROA and ROE are dominated by foreign banks while further investigation reveals that the relationship between size and performance of Islamic and conventional banks is insignificant.

Haron and Wan Azmi (2008) investigate the impact of selected economic variables such as rates of profit of Islamic banks; rates of interest on deposits of conventional banks; base lending rate; Kuala Lumpur composite index; consumer price index; money supply and gross domestic products on deposits level at the Islamic and conventional banks. The findings rule out the impact of most of the variables on the deposits level in Islamic banks; the authors suggest that religious belief plays the important role in the banking decision among Muslim customers.

Samad and Hassan (1999) evaluates the interbank performance of the first Malaysian Islamic bank, BIMB in terms of profitability, liquidity, risk and solvency; and community involvement for the period 1984-1997 by employing financial ratios method. The authors reveal that BIMB is relatively more liquid and less risk as compares to a group of 8 conventional banks. Earlier study by Abdul Majid, Md Nor and Said (2005) compare the relative cost efficiency of Islamic and conventional banks in Malaysia during the period of 1993 to 2000. The results show that Islamic banks are marginally more efficient than conventional banks. This contention is further supported in Kamaruddin, Safa and Mohammad (2008), the study suggests that Islamic banking operators are relatively more efficient at controlling costs than the foreign counterpart. On contrary findings, Mohd Zamil (2007) finds that the managerial efficiency of conventional commercial bank is higher than Islamic commercial bank during the study period of 2000 to 2004.

Another stream of studies on Malaysia Islamic banking focuses on measuring the efficiency performance of Islamic banks and extends their studies to compare the performance of domestic and foreign Islamic banks. Nevertheless, the literature on this line appears to be limited. Ahmad Mokhtar, Abdullah and Alhabshi (2007) examine the technical and cost efficiency of 20 Islamic window banks, two full-fledged Islamic banks and 20 conventional banks over a period of 1997-2003. The DEA results suggest that the full-fledged Islamic banks are more efficient than banks that offer Islamic window; nevertheless, the Islamic banks are still considered as underperformed relatively to conventional banks. The author adds that foreign Islamic banks are more efficient than domestic Islamic banks.

Aik and Tan (2012) investigate the cost and profit efficiency of the full-fledged Islamic banks and Islamic window operations of domestic and foreign banks in Malaysia. Employing DEA, the study covers the period of 2002-2008. Their study confirms Ahmad Mokhtar, Abdullah and Alhabshi (2007) and Batchelor and Wadud (2004) findings that full-fledged Islamic banks are more efficient than Islamic window banks; nevertheless, their results suggest that domestic Islamic banks (full-fledged and Islamic window) are more efficient than foreign Islamic banks. The results are in line with Sufian (2007), the author highlights that over the period of 2001-2004; the domestic Islamic banks are more efficient than the foreign Islamic bank albeit marginally.

Employing a generalized Malmquist productivity index, Abdul Majid (2010) focuses on the productivity of foreign-owned Islamic banks and Islamic banking subsidiaries for the period 2000 to 2008. The results find that foreign full-fledged Islamic banks show negative productivity change due to negative scale change effects and negative technical change. The author suggests that domestic Islamic banks have potential to improve their productivity as they experience considerable rate of technical change and efficiency growth.

The results of previous studies on measuring and comparing the performance of full-fledged banks and Islamic window banks as well as the performance of Islamic domestic and

foreign banks are far from reaching the consensus. At the one hand, few studies support that Islamic domestic banks are more efficient that their foreign counterparts. On the other hand, several studies suggest the efficiency performance is found higher among foreign Islamic banks as compares to domestic banks. Therefore, this study tends to fill the gap in the literature by covering recent study period of 2006-2011 and the sample contains all full-fledged Islamic banks, relatively to previous studies. The next section discusses in detail the methods used to measure relative efficiency of banks and compares the results of Islamic domestic banks and foreign banks.

Data and Methodology

Input and Output Variables

For the empirical analysis, this study incorporates all full-fledged Islamic banks. The full-fledged Islamic domestic banks are Bank Islam, Bank Muamalat, Affin Islamic Bank, Alliance Islamic Bank, AM Islamic Bank, CIMB Islamic Bank, Hong Leong Islamic Bank, Maybank Islamic Bank, Public Islamic Bank, RHB Islamic Bank while the foreign Islamic banks consist of Al-Rajhi Banking and Corporation, Asian Finance Bank, Kuwait Finance House, HSBC Al-Amanah Bank, OCBC Al-Amin Bank and Standard Chartered Saadiq Bank. The study period from 2006 to 2011 is chosen as most of the Islamic banks (except Bank Islam and Bank Muamalat) are given full-fledged Islamic bank status from year 2005 onwards. The input and output variables are obtained from the Bankscope database package produced by Bureau van Dijk electronic publishing (BVDep), supplemented with the published balance sheet and income statement as reported in annual reports of the domestic banks. All data is in millions of Ringgit Malaysia (RM).

As the purpose of this study is to evaluate the efficiency of banks overall, this study employs the intermediation approach like many studies on banking efficiency. The intermediation approach is the most consistent with the concept of Islamic banking as it focuses on a bank's role in intermediating savers and investors of fund. Moreover, this approach is in line with Islamic banking function that relies on profit-sharing contracts, which involve an equity participation principle with depositors. Hence, banks can be seen as intermediating savers and investors by transforming deposits into earning assets, rather than as producers of services and loans (Abdul Majid *et al.*, 2009).

This study follows the input and output by Isik and Hassan (2002); Hassan (2006), and Shamsher *et al.* (2008). The input variables chosen in this study are personnel expenses, fixed assets, deposits and short term funding (deposits) whereas the output variables are represented by total loans, total securities and off-balance sheet items. Input prices employed are calculated as price of labor (total expenditure on employees such as salaries, employee benefits and reserves for retirement pay, divided by total assets); price of capital (the ratio of non-interest expenses to the book value of premises and fixed assets) and price of deposits (total interest expenses divided by total deposits and short-term funding).

Methodology

This study measures the cost efficiency of the Malaysian banking sector and its decompositions - technical efficiency and allocative efficiency. Apart from that, the sources of technical efficiency, namely pure technical efficiency and scale efficiency are also determined. Two models, namely the DEA constant returns to scale and variable returns to scale models are employed. First, this study assumes that there are *n* DMUs to be evaluated with varying amounts of *K* different inputs to produce *M* different outputs. Both DEA models seek to determine which of the *n* DMUs will establish an envelopment surface. This model assumes a constant return to scale mode of operation. It measures efficiency in terms of overall technical efficiency. The DEA efficiency score is obtained by taking the maximum ratio of weighted outputs to weighted inputs. This measurement allows multiple outputs and inputs to be reduced to single 'virtual' input (x_i) and single 'virtual' output (y_i) by optimal weights.

$$\max_{u,\upsilon}\left(u'y_i/v'x_i\right) \qquad (1)$$
$$\text{s.t.} \quad u'y_j/v'x_j \le 1, \qquad j=1,2,..,N$$
$$u, \upsilon \ge 0,$$

The vectors x_i and y_i indicate the $K \times N$ input matrix and $K \times M$ output matrix for *i*th DMUs respectively. The $K \times N$ input matrix, *X*, and the $K \times M$ output matrix, *Y*, represent the data for all *N* DMUs. The efficiency for the *i*th DMU is maximized by finding values for *u* and *v*, to avoid the problem of an infinite number of solutions, a constant constraint ($\rho' x_i = 1$) is imposed on the equation (1).

$$\max_{\mu,\upsilon}\left(\mu'y_i\right), \qquad (2)$$
$$\text{s.t.} \quad \rho'x_i = 1,$$
$$\mu'y_j - \rho'x_j \le 0, \qquad j=1, 2, \ldots, n$$
$$\mu, \rho \ge 0,$$

The notations μ and ρ indicate the transformation of *u* and *v*. The envelopment form of the linear programming problem is shown below:

$$\min_{\theta,\lambda} \theta, \qquad (3)$$
$$\text{s.t.} \quad y_i + Y\lambda \ge 0,$$
$$\theta x_i - X\lambda \ge 0,$$
$$\lambda \ge 0,$$

where θ is a scalar and $\lambda$is an $N \times 1$ vector of constants. The value of θ is the efficiency score for the *i*th DMU; it should be solved *N* times, one for each DMU.

To account for the variable returns to scale assumption, the convexity constraint, $N1'\lambda = 1$, is applied to Equation (2).

$$\min_{\theta,\lambda} \theta, \qquad (4)$$
$$\text{s.t.} \quad -y_i + Y\lambda \ge 0,$$
$$\theta x_i - X\lambda \ge 0,$$
$$N1'\lambda = 1,$$
$$\lambda \ge 0,$$

where the elements in the vector θ are less than or equal to 1, and *N1* is an *N x 1* vector of ones.

To account for allocative efficiency, the vector of input prices w_i is inserted in Equation (4), shown as follows:

$$\min_{\lambda,xi^*} w_i' x_i^*, \quad (5)$$

$$\text{s.t.} \quad -y_i + Y\lambda \geq 0,$$
$$x_i^* - X\lambda \geq 0,$$
$$N1'\lambda = 1,$$
$$\lambda \geq 0,$$

where x_i'' is the cost minimizing vector of input quantities for the ith DMU, given the input prices $w_i$and the output levels y_i. The total cost efficiency or overall efficiency of the ith DMU is calculated as:

$$CE = \frac{w_i' x_i^*}{w_i' x_i} \quad (6)$$

Results and Discussion

Generally, two approaches are normally taken in determining what constitutes bank input and output. With respect to the intermediation approach, bank assets measure outputs and liabilities measure inputs while inputs in the production approach are physical entities such as labor and capital. This study employs intermediation approach in the selection of three inputs and three outputs. Input variables consist of personnel expenses (PE) as a proxy for labor, fixed assets (FA) to represent capital, and total deposits and short term funding (hereafter denoted as DEP). Total loans and advances (LN), securities portfolio (SEC) and off-balance sheet items (OBS) are the chosen output variables. The OBS variable is selected to reflect the increasing contribution of non-traditional activities towards bank's total income. Table 1 provides descriptive statistics of the variables employed; the variables are based on the nominal value and reported in millions of Ringgit Malaysia (RM). The total number of observations is 84, for the period of 2006 to 2011.

Table 1 Descriptive statistics of variables (RM million)

Variable	*Mean*	*Std. deviation*	*Minimum*	*Maximum*
PE	54.98	74.30	0.60	423.95
FA	24.08	40.27	0.20	199.06
DEP	10, 985	9, 906	41.86	54, 356
LN	7, 045	7, 779	2.40	458, 44
SEC	1, 981	2, 361	23.34	12, 684
OBS	3, 978	5, 632	10.00	39, 872
TA	12, 507	11, 498	153.00	65, 927

Note: PE = personnel expenses; FA = fixed assets; DEP = total deposits; LN = total loans; SEC = securities portfolio; and OBS = off-balance sheet items.

This study covers the period 2006-2011, the starting period was the year that all Islamic banks, domestic and foreign banks started their full-fledged Islamic banks except for five banks. The five banks are Alliance Islamic Bank, HSBC Al-Amanah Bank, Maybank Islamic Bank, OCBC Al-Amin Bank and Standard Chartered Saadiq Bank which began their Islamic banking activities in 2008. Table 1 shows the wide differences among variables employed. For instance, total assets which represent the size of banks show that the total assets of the smallest banks is RM 153 million; on contrary, the total assets of the largest size of banks is RM 65 billion. The difference between both banks is recorded at RM65 billion. Next, Table 2 shows the market shares of Islamic banks with respect to ownership.

Table 2 Market structure of Islamic banking industry (RM million)

Bank	*PE*	*FA*	*DEP*	*LN*	*SEC*	*OBS*	*TA*
Domestic (n=10)	66.16	25.87	14, 736	9, 397	2, 762	5, 155	15, 223
Foreign (n=6)	34.86	20.88	4, 234	2, 812	576	1, 859	7, 617

Table 2 shows that domestic banks dominate the Islamic banking with respect to all input and output variables chosen. For instance, the average of total assets of domestic Islamic banks is recorded at RM 15 million as compared with RM 7 million for foreign Islamic banks. However, there is not much difference between the property and equipment category for both types of bank. The fixed asset for domestic Islamic bank is RM 25 million while for foreign banks is RM 20 million. The market share of the foreign Islamic banks is around 23% only for the total financing of Islamic banking. Next, the DEA results are reported in Table 3. There are three models of DEA employed in this study, namely constant returns to scale model, variable returns to scale model and cost minimization model and there are five types of efficiency generated which are technical efficiency and its decompositions, pure technical efficiency and scale efficiency; allocative efficiency and cost efficiency.

Table 3 shows that, with respect to pure technical efficiency, the average of scores between 2006 and 2011 is 81%, it shows that Islamic banks could have produced the same amount of outputs with approximately 19% less inputs than the amount of resources they actually used. The average of technical efficiency scores throughout the study period is 73%, it is found that the major source of technical inefficiency is contributed by pure technical efficiency (81%) which is less efficient than scale efficiency scores (90%). Next, Table 4 reports the average efficiency scores of individual banks from 2006 to 2011. The results could offer an insight to the relative efficiency performance of foreign and domestic Islamic banks.

Table 3: Summary of efficiency scores (2006-2011)

Bank/ Efficiency Score	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*Mean*
TE:							
ALL	0.63	0.62	0.75	0.74	0.79	0.75	0.73
Domestic	0.64	0.64	0.82	0.80	0.81	0.77	0.76
Foreign	0.57	0.64	0.64	0.64	0.77	0.71	0.67
PTE:							
ALL	0.80	0.75	0.85	0.81	0.83	0.79	0.81
Domestic	0.73	0.71	0.86	0.83	0.83	0.80	0.80
Foreign	0.86	0.84	0.76	0.76	0.85	0.78	0.83
SE:							
ALL	0.82	0.85	0.89	0.91	0.95	0.95	0.90
Domestic	0.90	0.91	0.97	0.96	0.97	0.96	0.95
Foreign	0.71	0.77	0.84	0.84	0.91	0.93	0.82
CE:							
ALL	0.56	0.54	0.63	0.63	0.66	0.63	0.62
Domestic	0.58	0.54	0.68	0.66	0.64	0.62	0.63
Foreign	0.53	0.54	0.59	0.59	0.69	0.64	0.60
AE:							
ALL	0.88	0.85	0.83	0.86	0.84	0.85	0.85
Domestic	0.90	0.83	0.82	0.83	0.80	0.81	0.83
Foreign	0.91	0.84	0.93	0.93	0.90	0.91	0.89

Note: TE = technical efficiency; PTE = pure technical efficiency; SE = scale efficiency;CE = cost efficiency; and AE = allocative efficiency.

Table 4: Average efficiency scores of individual banks (2006-2011)

Bank/ Efficiency Score	*TE*	*PTE*	*SE*	*CE*	*AE*
Domestic:					
Affin	0.54	0.70	0.80	0.38	0.72
Alliance	0.89	0.90	0.99	0.83	0.93
AMBank	0.85	0.86	0.99	0.81	0.95
CIMB	0.78	0.80	0.97	0.58	0.76
Hong Leong	0.67	0.68	0.99	0.53	0.79
Maybank	0.65	0.78	0.85	0.52	0.80
Public	0.85	0.85	0.99	0.63	0.75
RHB	0.96	1.00	0.96	0.85	0.89
Bank Islam	0.72	0.75	0.97	0.67	0.92
Muamalat	0.76	0.77	0.99	0.65	0.86
Foreign:					
Al-Rajhi	0.75	0.77	0.98	0.74	0.99
Asian Finance	0.34	0.89	0.39	0.29	0.87
Al-Amanah	0.76	0.78	0.97	0.72	0.96
Kuwait	0.75	0.80	0.94	0.67	0.90
Al-Amin	0.92	0.93	0.99	0.70	0.76
Saadiq	0.59	0.81	0.75	0.50	0.83

Conclusion

This study investigates the efficiency performance of sixteen Islamic banks, foreign and domestic banks for the period of 2006 to 2011 by using Data Envelopment Analysis. This study measures the cost efficiency of the Malaysian banking sector and its decompositions - technical efficiency and allocative efficiency. In achieving this goal some significant results with regard to the Malaysian banking sector are found. The results show that, on average the main contributor of cost efficiency for Islamic domestic and foreign banks in Malaysia is allocative efficiency. In addition, the results find that Islamic foreign banks are more efficient than domestic banks with respect to pure technical efficiency and allocative efficiency.

References

Abdul Majid, M. (2010). Productivity growth of Malaysian banks: Foreign-owned Islamic banks and Islamic bank subsidiaries. Perkem V, 1, 225-235.

Abdul Majid, M., Md. Nor, N. G., and Said, F. F. (2005). Efficiency of Islamic banks in Malaysia. In Munawar Iqbal and Ausaf Ahmed (Eds.). Islamic Finance and Economic Development, Kuala Lumpur:

Abdul Majid, M., Saal, D. S. and Battisti, G. (2009). The impact of Islamic banking on the cost efficiency and productivity change of Malaysian commercial banks. Applied Economics, ISSN 1466-4283.

Ahmad Mokhtar, H.S., Abdullah, N. and Alhabshi, S.M. (2007). Technical and cost efficiency of Islamic banking in Malaysia. Review of Islamic Economics, 11(1), 5-40.

Aik, N.C. and Tan, K.E. 2012. Cost and profit efficiency of the full-fledged Islamic banks and Islamic window in Malaysia. Segi Review, 5(1), 41-46.

Alias, A.S., Kamarulzaman, N.R. and Bhupalan, R. (1993). Islamic banking in Malaysia: An overview. Kuala Lumpur: Institut Bank-Bank Malaysia.

Bank Negara Malaysia. (1994). Money and Banking in Malaysia. Kuala Lumpur: Bank Negara Malaysia.

Bank Negara Malaysia. Annual Report 2012. Kuala Lumpur: Bank Negara Malaysia.

Bernama. (2005). RHB group launches full-fledged Islamic bank subsidiary. http://www.bernama.com.my/bernama/v3/printable.php?id¼121640
(accessed 1 March 2013).

Blominvest, 2009. Islamic banking in the MENA region. Beirut, Lebanon.

Detragiache, E. & Gupta, P. (2004). Foreign banks in emerging market crises: Evidence from Malaysia. IMF Working Paper WP/04/129. International Monetary Fund.

Ernst and Young, 2011. World Islamic banking competitiveness report 2011-2012. Dubai, United Arab Emirates.

Haron, S. and Wan Azmi, W.N. 2008. Determinants of Islamic and conventional deposits in the Malaysian banking sytem. Managerial Finance, 34(9), 618-643.

Hassan, M. K. (2006). The x-efficiency in Islamic banks. Islamic Economic Studies, 13, 49-77.

Isik, I. and Hassan, K. (2002). Technical, scale and allocative efficiencies of Turkish banking industry. Journal of Banking and Finance, 26, 719–766.

Kamaruddin, B.H., Safa, M.S. and Mohamad, R. (2008). Assessing production efficiency of Islamic banks and conventional bank Islamic window in Malaysia. MPRA Paper 10670.

Matthews, K & Ismail, M. (2006). Efficiency and productivity growth of domestic and foreign commercial banks in Malaysia. Working Paper No. E2006. Cardiff Business School.
Mckinsey, 2007. The World Islamic Banking Competitiveness Report 2007-08.
Mohd Zamil, N.A. (2007). Efficiency of Islamic and conventional commercial banks in Malaysia (2000- 2004): A data envelopment analysis (DEA) study. Unpublished Master Thesis, International Islamic University Malaysia.
Mohamad, N., Noor, M.A. and Ahmad, N.H. (2011). The determinants of world Islamic banks' efficiency and the impact of 1998 and 2008 financial crisis. Bangladesh Development Studies, XXXIV(1), 1-22.
Mohd Tahir, I., Abu-Bakar, N.M. & Haron, S. (2010). Cost and profit efficiency of the Malaysian commercial banks: A comparison between domestic and foreign banks. International Journal of Economics and Finance, 2(1), 186-197.
Omar, M.A., Abdul Rahman, A.R., Mohd. Yusof, R., Abdul Majid, M.S. and Mohd. Rasid, M.E.S. (2005). Efficiency of commercial banks in Malaysia. Asian Academy of Management Journal of Accounting and Finance, 2(2), 19–42.
Ong, T.S., Lim, Y.T. & The, B.H. (2011). A Comparison on Efficiency of Domestic and Foreign Banks in Malaysia: A DEA Approach. Business Management Dynamics, 1(4), 33-49.
Samad, A., Gardner, N.D. and Cook, B.J. (2005). Islamic banking and finance in theory and practice: The experience of Malaysian and Bahrain. The American Journal of Islamic Social Sciences, 22(2), 69-86.
Samad, A. and Hassan, M.K. (1999). The performance of Malaysian banks during 1984-1977: an exploratory study. International Journal of Islamic Financial Services, 1(3).
Shamsher, M., Hassan, T. and Bader, M.K.I. (2008). Efficiency of conventional versus Islamic banks: International evidence using the Stochastic Frontier Approach (SFA). Journal of Islamic Economics, Banking and Finance, 4(2), 107-130.
Sole, J. (2007). Introducing Islamic banks into conventional banking systems. IMF Working Paper No. 07/175.
Sufian, F. and Ibrahim, S. (2005). An analysis of the relevance of off-balance sheet items in explaining productivity change in post-merger bank performance: Evidence from Malaysia. Management Research News, 28(4), 74-92.