Total Factor Productivity Change of the Malaysian Islamic Banking Sector: An Empirical Study

Fadzlan Sufian

Abstract
The paper seeks to examine the antecedents of the Malaysian Islamic banking sector’s productivity changes during the period 2001-2005. The study employs the Malmquist Productivity Index (MPI) method to isolate efforts to catch up to the frontier (efficiency change) from shifts in the frontier (technological change) and the main sources of efficiency changes. The empirical findings suggest that the Malaysian Islamic banking sector have exhibited productivity regress mainly due to the decline in technological change. This study finds that the foreign IBS banks have exhibited lower productivity levels compared to their domestic peers. The results suggest that the domestic Islamic Banking Scheme (IBS) banks have exhibited higher productivity levels compared to their foreign peers attributed to higher technological progress and efficiency levels.

JEL Classification: G21
Keywords: Islamic Banks, Productivity, Malmquist Productivity Index, Malaysia

1. 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. In Malaysia, the first Islamic bank was established in 1983. Ten years have to pass before the government allowed other conventional banks to offer Islamic banking services under their existing infrastructure and branches. The move to create the Islamic banking window operations allowed the country to enjoy Islamic banking services at the lowest cost and within the shortest time frame.
Throughout the years, the Malaysian Islamic banking sector has gained its significance and has been on a progressive upward trend. Since 2000, the Malaysian Islamic banking industry has been growing at an average rate of 18.9% per annum in

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terms of assets. As at end-2005, total assets of the Malaysian Islamic banking sector has increased to RM111.8 billion, accounting for 11.3% of the banking system’s total assets, while the market share of Islamic deposits and financing amounted to 11.7% and 12.1% of total banking sector’s deposits and financing respectively. The rapid progress of the Malaysian Islamic banking sector, accentuated by the significant expansion and developments in Islamic banking and finance has become increasingly more important in meeting the changing requirements of the new economy (Bank Negara Malaysia, 2005). Today, Malaysia has succeeded in implementing a dual banking system and has emerged as among the first nations to have a full-fledged Islamic banking system operating side-by-side with the conventional banking system.

Table 1: Performance of Malaysian Islamic Banking System, 2000 – 2005

<table>
<thead>
<tr>
<th>Indicators</th>
<th>RM million</th>
<th>Average Annual Growth Rate (%) 2001-2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td>2005</td>
</tr>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Fledged Islamic Banks</td>
<td>14,029</td>
<td>43,433</td>
</tr>
<tr>
<td>Islamic Banking Windows</td>
<td>20,094</td>
<td>59,698</td>
</tr>
<tr>
<td>Finance Companies</td>
<td>7,150</td>
<td>1,254</td>
</tr>
<tr>
<td>Merchant Banks</td>
<td>1,507</td>
<td>1,466</td>
</tr>
<tr>
<td>Discount Houses</td>
<td>4,288</td>
<td>5,973</td>
</tr>
<tr>
<td>Total</td>
<td>47,068</td>
<td>111,824</td>
</tr>
<tr>
<td><strong>Deposits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Fledged Islamic Banks</td>
<td>11,304</td>
<td>35,625</td>
</tr>
<tr>
<td>Islamic Banking Windows</td>
<td>16,091</td>
<td>42,775</td>
</tr>
<tr>
<td>Finance Companies</td>
<td>5,393</td>
<td>684</td>
</tr>
<tr>
<td>Merchant Banks</td>
<td>867</td>
<td>797</td>
</tr>
<tr>
<td>Discount Houses</td>
<td>2,268</td>
<td>3,993</td>
</tr>
<tr>
<td>Total</td>
<td>35,923</td>
<td>83,874</td>
</tr>
<tr>
<td><strong>Financing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Fledged Islamic Banks</td>
<td>6,426</td>
<td>20,627</td>
</tr>
<tr>
<td>Islamic Banking Windows</td>
<td>8,606</td>
<td>45,398</td>
</tr>
<tr>
<td>Finance Companies</td>
<td>5,090</td>
<td>1,071</td>
</tr>
<tr>
<td>Merchant Banks</td>
<td>769</td>
<td>268</td>
</tr>
<tr>
<td>Total</td>
<td>20,891</td>
<td>67,364</td>
</tr>
</tbody>
</table>

It has been the Malaysian government aspiration to develop the country as the capital or hub of Islamic banking worldwide. To meet its objectives, the government has taken measures, among others, to further liberalize the Malaysian Islamic banking sector. The strategy is to create more competition, to tap new growth opportunities,
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and to raise the efficiency of the Malaysian Islamic banking industry as a whole. The
Malaysian government’s commitment is evidenced by the issuance of three more new
full-fledged Islamic banks licences to foreign banks from the Middle East namely,
Kuwait Finance House, Al-Rajhi Banking and Investment Corporation, and Al-
Baraka Islamic Bank.

It is reasonable to assume that the ongoing liberalization posed great challenges to
Islamic banks in Malaysia as the environment in which they operated changed
rapidly. Thus, further investigations on the performance of the Malaysian Islamic
banking sector are warranted as the study in this nature could help the regulatory
authorities and bank managers in determining the future course of action to be
pursued to further strengthen the Islamic banking sector in Malaysia, particularly the
domestic incorporated Islamic banks to meet the challenges of foreign banks entry
from 2007 onwards.

Nevertheless, the study also have important public policy implications, particularly
with respect to the principal aim of the Malaysia’s Financial Sector Master Plan
(FSMP), a long-term development plan charting the future direction of the financial
services industry in Malaysia to achieve a more competitive, resilient and efficient
financial system (see Bank Negara Malaysia Financial Sector Master Plan, 2001).

Despite the Malaysian Islamic banking sector’s considerable development, empirical
works on Islamic banks’ productivity particularly in Malaysia is still in its infancy.
Furthermore, studies on Islamic banks have generally focused on theoretical issues
and empirical works have relied on the analysis of descriptive statistics rather than
rigorous statistical estimation (El-Gamal and Inanoglu, 2004). The study therefore
attempts to fill the gap in the literature by providing new empirical evidence on the
relative operating performance of the domestic Islamic Banking Scheme (hereafter
referred to as domestic IBS) banks, the foreign Islamic Banking Scheme (hereafter
referred to as foreign IBS) banks, and the full-fledged Islamic banks by using the
non-parametric frontier based Malmquist Productivity Index (MPI) approach. The
preferred methodology allows us to isolate efforts to catch up to the frontier
(efﬁciency change) from shifts in the frontier (technological change). Also, the
Malmquist index enables us to explore the main sources of efﬁciency change: either
improvements in management practices (pure technical efﬁciency change) or
improvements towards optimal size (scale efﬁciency change).

The paper also attempt to examine whether the foreign IBS banks have exhibited
higher productivity growth compared to their domestic counterparts. Evidences from
the contemporary banking industry in general have mainly suggested that foreign
banks in developing countries outperformed their domestic counterparts in terms of
efficiency, productivity, and profitability (Bhattacharyya et al. 1997; Sathye, 2003;
Ataullah et al. 2004; Hasan and Marton, 2003; Isik and Hassan, 2003). This paper
will therefore shed some light on the impact of ownership structure in determining the variability of bank performance within the context of the Malaysian Islamic banking sector.

The remainder of the paper is organized as follows: The following section presents the literature review. Section 3 describes the data, sources and model specifications, which is employed in the study. Empirical results are presented in section 4, and finally, we conclude in section 5.

2. Review of the Literature

While there has been extensive literature examining the performance of the conventional banking sectors over the recent years, empirical evidence on the Islamic banking sector 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 the approaches outlined above to estimate bank efficiency using various frontier techniques.

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. The analysis is extended to examine the determinants of bank efficiency. Here, he finds that smaller banks are more efficient that their larger counterparts. In addition, banks that have higher proportion of musharakah and mudharabah finance relative to total assets also have efficiency advantages. Overall, the substantial variability in efficiency estimates is put down to various factors, not least the highly volatile economic environment under which Sudanese banks have had to operate over the last decade or so.

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).

El-Gamal and Inanoglu (2004) used the stochastic frontier approach to estimate the cost efficiency of Turkish banks over the period 1990-2000. The study compared the cost efficiencies of 49 conventional banks with four Islamic special finance houses (SFHs). The Islamic firms comprised around 3% of the Turkish banking market. Overall, they found that the Islamic financial institutions to be the most efficient and this was explained by their emphasis on Islamic asset-based financing which led to lower non-performing loans ratios. It is worth mentioning that the SFH achieved high levels of efficiency despite being subjected to branching and other self-imposed constraints such as the inability to hold government bonds.

Hassan (2005) examined the relative cost, profit, X-efficiency, and productivity of the world Islamic Banking industry. Employing a panel of banks during 1993-2001, he used both the parametric (Stochastic Frontier Approach) and non-parametric (Data Envelopment Analysis) techniques as tools to examine the efficiency of the sample banks. He calculated five DEA efficiency measures namely cost, allocative, technical, pure technical, and scale and further correlated the scores with the conventional accounting measures of bank performance. He found that the Islamic banks are more profit efficient, with an average profit efficiency score of 84% under the profit efficiency frontier compared to 74% under the stochastic cost frontier. He also found that the main source of inefficiency is allocative rather than technical. Similarly, his results suggest that the overall inefficiency was output related. The results suggest that on average the Islamic banking industry is relatively less efficient compared to their conventional counterparts in other parts of the world. The results also show that all five efficiency measures are highly correlated with ROA and ROE, suggesting that these efficiency measures can be used concurrently with the conventional accounting ratios in determining Islamic banks performance.

Despite considerable developments in the Malaysian Islamic banking sector, there are still limited studies focusing on the efficiency of Islamic banks, particularly the Malaysian Islamic banking industry. Among the notable microeconomic research performed to examine the efficiency of Malaysian Islamic banking sector are by Samad and Hassan (1999), Samad (1999), and Sufian (2006).

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.

Samad and Hassan (1999) applied financial ratio analysis to investigate the performance of a Malaysian Islamic bank over the period 1984-1997. Their results suggest that in general, the managements’ lack of knowledge was the main reason for slow growth of loans under profit sharing. Despite that, the bank was found to perform better compared to its conventional counterparts in terms of liquidity and risk measurement (lower risks).

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. Methodology

3.1 Malmquist Productivity Index

Three different indices are frequently used to evaluate technological changes: the Fischer (1922), Tornqvist (1936), and Malmquist (1953) indexes. Grifell-Tatje and Lovell (1996) pointed out that the Malmquist index has three main advantages relative to the Fischer and Tornqvist indices. Firstly, it does not require the profit maximization, or the cost minimization, assumption. Secondly, it does not require information on the input and output prices. Finally, if the researcher has panel data, it allows the decomposition of productivity changes into two components (technical efficiency change or catching up, and technical change or changes in the best practice). Its main disadvantage is the necessity to compute the distance functions. However, the Data Envelopment Analysis (DEA) technique can be used to solve this problem.
Following Fare et al. (1994) among others, the output oriented Malmquist productivity change index will be adopted for this study. Output orientation refers to the emphasis on the equi-proportionate increase of outputs, within the context of a given level of input. The output based Malmquist productivity change index may be formulated as:

\[ M_{j}^{t+1}(y^{t+1}, x^{t+1}, y^{t}, x^{t}) = \left[ \frac{D_{j}^{t+1}(y^{t+1}, x^{t+1})}{D_{j}^{t}(y^{t}, x^{t})} \times \frac{D_{j}^{t+1}(y^{t+1}, x^{t+1})}{D_{j}^{t+1}(y^{t}, x^{t})} \right]^{1/2} \]

where \( M \) is the productivity of the most recent production point \((x^{t+1}, y^{t+1})\) relative to the earlier production point \((x^{t}, y^{t})\). \( D \)'s are output distance functions. Thus, a value greater than unity, will indicate positive factor productivity growth between two periods. Following Fare et al. (1994) an equivalent way of writing this index is:

\[ M^{t+1}_{j}(y^{t+1}, x^{t+1}, y^{t}, x^{t}) = \left[ \frac{D_{j}^{t+1}(y^{t+1}, x^{t+1})}{D_{j}^{t}(y^{t}, x^{t})} \times \frac{D_{j}^{t+1}(y^{t+1}, x^{t+1})}{D_{j}^{t+1}(y^{t}, x^{t})} \right]^{1/2} \]

In equation (2), the ratio outside the brackets is equal to the change of technical efficiency between time \( t \) and \( t+1 \). In other words, it represents the change in the relative distance of the observed production from the maximum potential production. The component inside the brackets of equation (2) is the geometric mean of the two productivity indexes and represents the shift in production technologies (technical change) between time \( t \) and \( t+1 \).

That is,

Efficiency Change (EFFCH) = \[ \frac{D_{j}^{t+1}(y^{t+1}, x^{t+1})}{D_{j}^{t}(y^{t}, x^{t})} \]

Technological Change (TECHCH) = \[ \left[ \frac{D_{j}^{t+1}(y^{t+1}, x^{t+1})}{D_{j}^{t+1}(y^{t}, x^{t})} \times \frac{D_{j}^{t+1}(y^{t+1}, x^{t+1})}{D_{j}^{t+1}(y^{t}, x^{t})} \right]^{1/2} \]

Efficiency change (EFFCH) in equation (3) can be further decomposed as the product of two components – pure technical efficiency change and scale efficiency change – as follows (Fare et al. 1994).

\[ \frac{D^{t+1}(y^{t+1}, x^{t+1})}{D^{t}(y^{t}, x^{t})} = \left[ \frac{D^{t+1}(y^{t+1}, x^{t+1})}{D^{t}(y^{t}, x^{t})} \times \frac{D^{t+1}(y^{t+1}, x^{t+1})}{D^{t+1}(y^{t}, x^{t})} \right] \]
The ratio outside the brackets in equation (5) represents the pure technical efficiency change, subject to a distance function \( D_j \) with variable returns to scale, between time \( t \) and \( t+1 \) and is denoted by \( \text{PEFFCH} \) hereafter. In other words,

\[
\text{PureTechnicalEfficiencyChange} (\text{PEFFCH}) = \frac{D_{j}^{t+1}(y^{t+1},x^{t+1})}{D_j^{t}(y^t,x^t)} \]

The component inside the brackets of equation (6) represents the effects of economies of scale on productivity and is expressed as \( \text{SECH} \) can be readily derived by dividing \( \text{EFFCH} \) of equation (3) by \( \text{PEFFCH} \) of equation (6) and would not involve its own computations of additional distance functions. That is, scale efficiency change (SECH)

\[
\text{Scale Efficiency Change (SECH)} = \frac{\text{EFFCH}}{\text{PEFFCH}} \]

After incorporating equation (5) – (7) into equation (2), we obtain the complete decomposition of the MPI:

\[
= (\text{EFFCH}) \times (\text{TECHCH})
= (\text{TECHCH}) \times (\text{PEFFCH}) \times (\text{SECH}) \]

Another merit of defining the MPI using the output distance functions \( D_t \) is that the MPI and its corresponding components (EFFCH, TECHCH, PEFFCH, and SECH) are all calculated in an index form and have a threshold value of one. In other words, if a derived value is equal to one, it indicates that a bank’s performance remains unchanged in that performance measure. A value of greater than one represents an improvement and a value of less than one indicate a decline. The product of the index components of TECHCH, PEFFCH, and SECH then amounts to the final MPI.

To determine the final MPI, a close examination of equations (2) and (5) reveal that we have to compute TECHCH, EFFCH, and PEFFCH and then derive SECH by dividing EFFCH by PEFFCH. Each output distance function corresponds to one particular output oriented DEA linear programme. Among TECHCH, EFFCH, and PEFFCH there are six output distance functions thus, a total of six different DEA models have to be formulated and solved:

\[
D_{j}^{t+1}[y^{t+1},x^{t+1}], D_{j}^{t+1}[y^{t+1},x^{t+1}], D_{j}^{t+1}[y^{t+1},x^{t+1}], D_{j}^{t+1}[y^{t+1},x^{t+1}], D_{j}^{t+1}[y^{t+1},x^{t+1}], D_{j}^{t+1}[y^{t+1},x^{t+1}] \]

3.2 Specification of Inputs, Outputs, and Data

The definition and measurement of inputs and outputs in the banking function remains a contentious issue among researchers. Banks are typically multi-input and multi-output firms. As a result, defining what constitutes ‘input’ and ‘output’ is fraught with difficulties, since many of the financial services are jointly produced and
prices are typically assigned to a bundle of financial services. Additionally, banks may not be homogeneous with respect to the types of outputs actually produced. In the banking theory literature, there are two main approaches competing with each other in this regard: the production and intermediation approaches (Sealey and Lindley, 1977).

Under the production approach, a financial institution is defined as a producer of services for account holders, that is, they perform transactions on deposit accounts and process documents such as loans. Hence, according to this approach, the number of accounts or its related transactions is the best measures for output, while the number of employees and physical capital is considered as inputs. The intermediation approach on the other hand assumes that financial firms act as an intermediary between savers and borrowers and posits total loans and securities as outputs, whereas deposits along with labour and physical capital are defined as inputs.

For the purpose of this study, 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. According to Berger and Humphrey (1997), the production approach might be more suitable for branch efficiency studies, as at most times bank branches basically process customer documents and bank funding, while investment decisions are mostly not under the control of branches.

The aim in the choice of variables for this study is to provide a parsimonious model and to avoid the use of unnecessary variables that may reduce the degree of freedom. All variables are measured in millions of Malaysian Ringgit (RM). For the purpose of the study, we model the domestic IBS banks, the foreign IBS banks, and the full-fledged Islamic banks as multi-product firms, producing two outputs by employing two inputs. Accordingly, Total Deposits (x1), which include deposits from customers and other banks and Labour (x2) are used as input vectors to produce Financing (y1), which include loans to customers and other banks and Investments (y2), which include investment securities held for trading, investment securities available for sale (AFS), and investment securities held to maturity.

In the spirit of maintaining homogeneity, only banks that offer Islamic banking services are included in the analysis. The annual balance sheet and income statement used to construct the variables for the empirical analysis are taken from published balance sheet and income statement information in annual reports of each individual bank. During the period of study, there were two full-fledged Islamic banks, 11 domestic IBS banks, and 4 foreign IBS banks in Malaysia. The summary statistics of the output and input variables used in the MPI models are presented in Table 2.

Table 2: Summary Statistics of the Variables Employed in the MPI Model

<table>
<thead>
<tr>
<th></th>
<th>Y1</th>
<th>Y2</th>
<th>X1</th>
<th>X2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Panel A: **ALL BANKS**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Max</th>
<th>Min</th>
<th>Std. Dev.</th>
</tr>
</thead>
</table>
| ALL   | 3,036,843 | 16,052,758 | 11,480 | 3,552,672
| BANKS | 1,235,759 | 5,829,933  | 19,525 | 1,240,713
|       | 4,415,195 | 18,476,399 | 62,266 | 4,441,929
|       | 16,537   | 132,128  | 11     | 29,309

Panel B: **DOM_BNKS**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Max</th>
<th>Min</th>
<th>Std. Dev.</th>
</tr>
</thead>
</table>
| ALL   | 3,733,119 | 16,052,758 | 63,589 | 3,749,319
| BANKS | 1,420,183  | 5,829,933  | 127,479| 1,344,763
|       | 5,376,906  | 18,476,399 | 605,877| 4,609,896
|       | 21,007    | 132,128   | 11     | 32,077

Panel C: **FOR_BNKS**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Max</th>
<th>Min</th>
<th>Std. Dev.</th>
</tr>
</thead>
</table>
| ALL   | 680,217 | 2,853,518 | 11,480 | 856,629
| BANKS | 611,555 | 1,096,142  | 19,525 | 396,047
|       | 1,160,173 | 3,782,546  | 62,266 | 1,028,345
|       | 1,409    | 3,362    | 422    | 854

Notes: Y1: Financing Activities (includes loans to customers and other banks), Y2: Investments (includes dealing and investment securities), X1: Total Deposits (includes deposits from customers and other banks), X2: Labour (inclusive of total expenditures on employees such as salaries, employee benefits and reserve for retirement pay).

Source: Banks Annual Reports and authors own calculations

4. **Results**

In this section, we will discuss the productivity change of the Malaysian Islamic banking sector, measured by the Malmquist Productivity Index (MPI) and assign the changes in Total Factor Productivity Change (TFPCH) to Technological Change (TECHCH) and Efficiency Change (EFFCH). We will also attempt to attribute changes in EFFCH to changes in Pure Technical Efficiency (PEFFCH) and/or Scale Efficiency (SECH). The summary of annual means of TFPCH, TECHCH, EFFCH, and its decomposition into PEFFCH and SECH for years 2001-2005 is presented in Table 3. Because the year 2001 is the reference year, the Malmquist TFPCH index and its components takes an initial score of 1.000 for 2001. Hence, any score greater (lower) than 1.000 in subsequent years indicates an improvement (worsening) in the relevant measure. It is also worth mentioning that favorable efficiency change (EFFCH) is interpreted as evidence of “catching up” to the frontier, while favorable technological change (TECHCH) is interpreted as innovation (Cummins et al. 1999).
Table 3: Decomposition of Total Factor Productivity Change (TFPCH)

<table>
<thead>
<tr>
<th>Banks</th>
<th>TFPCH</th>
<th>TECHCH</th>
<th>EFFCH</th>
<th>PEFFCH</th>
<th>SECH</th>
<th>Geo Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL_BNKS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001-2000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>2002-2001</td>
<td>0.948</td>
<td>1.202</td>
<td>0.789</td>
<td>0.929</td>
<td>0.849</td>
<td></td>
</tr>
<tr>
<td>2003-2002</td>
<td>0.909</td>
<td>0.707</td>
<td>1.286</td>
<td>1.074</td>
<td>1.197</td>
<td></td>
</tr>
<tr>
<td>2004-2003</td>
<td>0.933</td>
<td>0.965</td>
<td>0.967</td>
<td>0.968</td>
<td>0.999</td>
<td></td>
</tr>
<tr>
<td>2005-2004</td>
<td>0.991</td>
<td>1.007</td>
<td>0.984</td>
<td>1.012</td>
<td>0.973</td>
<td></td>
</tr>
<tr>
<td>Geometric Mean</td>
<td>0.956</td>
<td>0.962</td>
<td>0.993</td>
<td>0.995</td>
<td>0.998</td>
<td></td>
</tr>
</tbody>
</table>

Panel B: DOM_BNKS

| 2001-2000  | 1.000 | 1.000  | 1.000 | 1.000  | 1.000|         |
| 2002-2001  | 0.982 | 1.261  | 0.779 | 0.911  | 0.855|         |
| 2003-2002  | 0.894 | 0.674  | 1.327 | 1.095  | 1.211|         |
| 2004-2003  | 0.940 | 0.972  | 0.967 | 0.967  | 1.000|         |
| 2005-2004  | 1.101 | 1.111  | 0.991 | 1.022  | 0.970|         |
| Geometric Mean | 0.981 | 0.983  | 0.998 | 0.997  | 1.001|         |

Panel C: FOR_BNKS

| 2001-2000  | 1.000 | 1.000  | 1.000 | 1.000  | 1.000|         |
| 2002-2001  | 0.861 | 1.054  | 0.817 | 0.982  | 0.832|         |
| 2003-2002  | 0.949 | 0.805  | 1.178 | 1.019  | 1.157|         |
| 2004-2003  | 0.914 | 0.946  | 0.966 | 0.970  | 0.996|         |
| 2005-2004  | 0.762 | 0.787  | 0.968 | 0.987  | 0.981|         |
| Geometric Mean | 0.893 | 0.912  | 0.979 | 0.991  | 0.988|         |

Note: The mean scores of the Total Factor Productivity Change (TFPCH) index and its components, Technical Change (TECHCH) and Efficiency Change (EFFCH) that is further decomposed into Pure Technical Efficiency Change (PEFFCH) and Scale Efficiency Change (SECH), for all banks (ALL_BNKS) and different forms in the sample: Domestic IBS Banks (DOM_BNKS) and Foreign IBS Banks (FOR_BNKS).

As depicted in Panel 1 of Table 3, the Malmquist results suggest that during the period of 2001-2005, the Malaysian Islamic banking sector has exhibited productivity regress during all years. With respect to year 2001, the average productivity regress was 5.2% in year 2002, declining further by 9.1% in year 2003, before improving slightly to record 6.7% and 0.9% productivity regress in years 2004 and 2005.
respectively. It is apparent from Panel 1 of Table 3 that the regress in Malaysian Islamic banking sector’s productivity during the years 2002 and 2005 was mainly due to the decline in EFFCH, while the regress of 29.3% and 3.5% in TECHCH in 2002 and 2004 respectively has mainly resulted in the Malaysian Islamic banking sector’s productivity regress during the years.

The decomposition of the EFFCH index into its PEFFCH and SECH components suggest that the dominant source of the decline in Malaysian Islamic banking sector’s efficiency during the year 2004 was managerial rather than scale related, implying that the Malaysian Islamic banking sector has been relatively inefficient in controlling their costs during the year, rather than operating at the wrong scale of operations. On the other hand, the empirical findings seem to suggest that the Malaysian Islamic banking sector has been operating at an incorrect scale of operations during the years 2002 and 2005. The empirical findings concurs with the earlier study by Sufian (2006) who has found that the Malaysian Islamic banking sector’s inefficiency was largely due to scale rather than pure technical. During the year 2002, the Malaysian Islamic banking sector SECH declined by 15.1%, while PEFFCH declined by a lesser degree of 7.1%. Likewise, in year 2005 the Malaysian Islamic banking sector has exhibited 2.7% decline in SECH, while PEFFCH on the other hand increased by 32.9%.

Panel 2 of Table 3 presents the results for the domestic IBS banks (DOM_BNKS). As observed, the DOM_BNKS have exhibited productivity regress during the earlier years, declining by 1.8% in year 2002 relative to 2001, 10.6% in year 2003 relative to year 2002, 6.0% in year 2004 relative to year 2003, before exhibiting an increase of 10.1% in 2005. The decomposition of the TFPCH index into its TECHCH and EFFCH components suggest that the decline in the DOM_BNKS TFPCH in years 2002 and 2004 was largely the result of the decline in EFFCH of 22.1% and 3.3% during the years, while the decline in the DOM_BNKS TFPCH in year 2003 was mainly due to the decline in TECHCH of 32.6%. In contrast, the increase in the DOM_BNKS TFPCH in year 2005 was attributed to the increase in TECHCH, which increased by 11.1%. The results suggest that like the TFPCH index, the DOM_BNKS TECHCH index also followed a U-shaped behaviour during the period of study. The decomposition of the EFFCH index into its PEFFCH and SECH components suggest that the dominant source of the decline in the DOM_BNKS efficiency in years 2002 and 2005 was SECH related. Likewise, the results suggest that SECH has largely resulted in the increase in the DOM_BNKS EFFCH during the year 2003. On the other hand, the results seem to suggest that the decline in the DOM_BNKS EFFCH in year 2004 was mainly due to the 3.3% decline in PEFFCH.

The results for the foreign IBS banks (FOR_BNKS) are presented in Panel 3 of Table 3. As observed, during the period of study the FOR_BNKS have exhibited
productivity regress during all years under study. With respect to year 2001, the average productivity regres was 13.9% in year 2002, improved to record 5.1% productivity regres in year 2003 relative to year 2002, before declining to record 8.6% and 23.8% productivity regres in years 2004 and 2005 respectively. The decomposition of the TFPCH index into its TECHCH and EFFCH components suggest that while the decline in the FOR_BNKS TFPCH in year 2002 was solely due to the decline in EFFCH of 18.3%, the decline in TECHCH has largely resulted in the FOR_BNKS TFPCH regres in years 2003, 2004, and 2005.

It is also clear from Panel 3 of Table 3 that the FOR_BNKS have exhibited 19.5%, 5.4%, and 21.3% TECHCH decline during the years 2003, 2004, and 2005 respectively, while EFFCH seem to have increased by 17.8% in year 2003 and declining at a lesser degree of 3.4% and 3.2% in years 2004 and 2005 respectively. The decomposition of the EFFCH index into its PEFFCH and SECH components suggest that the dominant source of the decline in the FOR_BNKS EFFCH in years 2002 and 2005 was SECH related rather than PEFFCH related. Similarly, the results suggest that SECH has largely resulted in the increase in the FOR_BNKS EFFCH during the year 2003, while PEFFCH has contributed largely to the increase in the FOR_BNKS EFFCH during the year 2004.

5. Conclusions

The paper seeks to examine the antecedents of the Malaysian Islamic banking sector’s productivity changes during the period 2001-2005, by applying a non-parametric Malmquiest Productivity Index (MPI) method. The preferred methodology allows us to isolate efforts to catch up to the frontier (efficiency change) from shifts in the frontier (technological change). Also, the Malmquist index enables us to explore the main sources of efficiency changes: either improvements in management practices (pure technical efficiency change) or improvements towards optimal size (scale efficiency change).

The empirical findings suggest that during the period of study, the Malaysian Islamic banking sector has exhibited productivity regres of 4.4% due to the decline in technological change of 3.8% rather than the decline in efficiency change of 0.7%. The decomposition of the efficiency change index into its pure technical and scale efficiency components suggest that the decline in the Malaysian Islamic banking sector’s efficiency during the period of study was mainly due to the 0.5% decline in pure technical efficiency while the Malaysian Islamic banking sector’s scale efficiency declined by a lesser degree of 0.3%.

During the period under study, the results suggest that the foreign IBS banks have exhibited lower productivity levels compared to their domestic peers. The empirical
findings suggest that the foreign IBS banks have exhibited 1.7% regress in their productivity mainly due to the 8.8% decline in technological change. Similarly the results suggest that the foreign IBS banks have exhibited efficiency decline of 2.1% due to the decline in scale efficiency of 1.2%. The results imply that during the period of study, while the foreign IBS banks were relatively managerially efficient in controlling their operating costs, they have been operating at an incorrect scale of operations. Thus, the findings seem to suggest that the foreign IBS banks should benefit from higher scale of operations.

Likewise, the findings suggest that the domestic IBS banks have exhibited productivity regress of 1.9% mainly due to the decline in technological change of 1.7% compared with the decline in efficiency change of 0.2%. Unlike their foreign bank peers, the decline in the domestic IBS banks’ efficiency was mainly due to the 0.3% decline in pure technical efficiency while scale efficiency seems to have exhibited a slight increase. The empirical findings imply that while the domestic IBS banks have been operating at the more optimal scale of operations, they have been relatively inefficient in controlling their operating costs.

Future investigations on the performance of the Malaysian Islamic banking sector could examine changes in cost, allocative and technical efficiencies over time by employing the non-parametric Data Envelopment Analysis (DEA) approach. In addition, the paper modelled Malaysian Islamic banks according to the intermediation function. Given that Islamic banks are multi-output firms, considering the production function along with the intermediation function at the same time, could be another extension of the paper. Finally, the non-parametric frontier analysis used in this paper could be combined with the stochastic frontier analysis method of estimating the frontier. This should testify to the robustness of the results against alternative estimation methods.

Despite these limitations, the findings of this study are expected to contribute significantly to the existing knowledge on the operating performance of the Malaysian Islamic banking industry. Nevertheless, the study have also provided 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 Malaysian Islamic banking industry. This may also facilitate directions for sustainable competitiveness of future Islamic banking operations in Malaysia.

References:
Total Factor Productivity Change of the Malaysian Islamic Banking Sector: An …


