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Efficiency and Productivity of Indonesian Islamic Banking

Pipit Afiatun
Master of Science in Management, School of Business and Management
Institut Teknologi Bandung

Sudarso Kaderi Wiryono
School of Business and Management
Institut Teknologi Bandung

Abstract

The direction of the Indonesian banking industry development policy based on the vision of achieving a healthy banking system, strong and efficient to create a stable financial system in order to drive national economic growth. Using analysis of efficiency and changes in Total Factor Productivity of the banking industry during the 2004 to 2009 period, this research aims to observe at the performance of Islamic banking as the new actors of Indonesian banking industry. To analyze the efficiency, this research utilize the method of non-parametric Data Envelopment Analysis (DEA). To measure changes in Total Factor Productivity of Islamic banking industry Malmquist Productivity Index is utilized. From the calculation of relative efficiency by means of input-oriented DEA and also the assumption of Variable Returns to Scale, the study indicated that the efficiency of Islamic banks in the 2004-2009 period are lower on the average compared to conventional banks; except during the period of July 2004 to December 2005. There are three Islamic banks analyzed for this particular research, namely Bank Muamalat, Bank Syariah Mandiri and Bank Syariah Mega, consecutively ranked 3rd, 10th, and 13th within the index of productivity. Yet, the results of t-test concluded that the efficiency and productivity of Islamic banks and conventional banks, statistically, are not significantly different. These results indicated that Islamic banking in general possess the ability to compete with conventional banking in Indonesia.

Keywords: Indonesian Islamic Banking, DEA, Efficiency, Malmquist Index, Total Factor Productivity.

1. Introduction

In the midst of the dynamic competitions of banking industry, Islamic banks comes as a business that offer investment opportunities, finance and commerce in accordance with Islamic principles. The presence of Islamic banks in Indonesia's banking system was developed since 1992, in line with the enactment of Act No.7 of 1992 and followed with the establishment of PT. Bank Muamalat Indonesia (BMI). Since then the Islamic banking system came to be known widely by the public, and Islamic financial institutions is growing rapidly.

Based on the report of the Indonesian Banking Statistics, up to February 2010 recorded that there were seven Islamic Banks (BUS), 25 Sharia Unit (UUS), and 142 Sharia Rural Banks.Based on the blue print of the Indonesian Sharia banking development is currently focused on strengthening phase of the industrial structure, which includes efforts to increase efficiency and competitiveness of Islamic banking, the author intends to examine the efficiency and productivity of Islamic banking in relation to the ability of Islamic banks to compete in the banking industry in Indonesia. This paper is the first effort to study efficiency and productivity indices for Islamic banking in Indonesia. We analyze the efficiency and productivity of Indonesian islamic banks using the panel data over the period of 2004-2009 by utilizing the nonparametric techniques.

The paper is organized as follows. Starting with a brief overview of the Indonesian islamic banking sector and recent historical developments in a section 2. Section 3 introduces the methodology, focusing on the Data Envelopment Analysis and Malmquist productivity index used in the empirical analysis. The empirical analysis is described in Section 4. Consists of the data set used, and the reports on efficiency and productivity resulted from application of the methodology. And conclusions are summarized in Section 5.

2. Development of Indonesian Islamic Banking

At the end of 2009, total Islamic banking assets reached Rp. 66 trillion, increasing 33.37% from the previous year. Annual Report 2009 Bank Indonesia said that the percentage increase in assets of Islamic banks assets against any national banking assets go up, from 2.1% in 2008 to 2.6% in 2009.

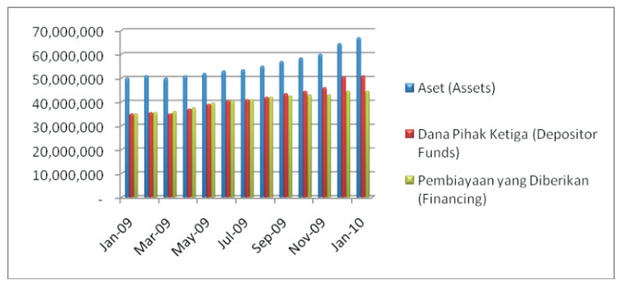

Figure 1. Assets, deposits, PYD Islamic Banks and Islamic Business Unit

The main function of the banking sector in infrastructure, macroeconomic policy was directed to create an effective and efficient means of payment rates in order to improve the economic welfare of society (Hollo and Nagy, 2004). In this case the Islamic bank is able to demonstrate its function through a good performance. In 2009, the aggregate deposits increased by 41.8% from Rp. 36.8 trillion to Rp. 52 Trillion, while the Islamic financing volume increased from Rp. 38 trillion at the end of 2008 to Rp. 46 Trillion in 2009. And with FDR amounting to 126.89% of Islamic banking had shown its ability to channel funds to the real sector. With such performance, Islamic banking shows its role as an intermediary institution that bridges the needs of working capital and investment in real sector with the owners of the fund.

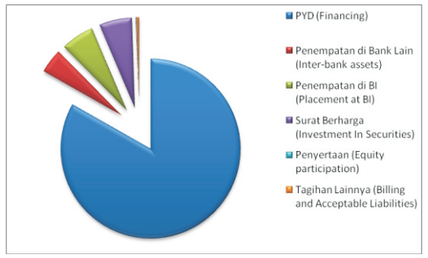

Figure 2. Disbursement Islamic Banks and Islamic Business Unit

Based on the background then this study has the following objectives:
1. Knowing how efficient Islamic banking in Indonesia in the period 2004-2009.
2. Knowing the productivity of Islamic banking in Indonesia in the period 2004-2009.

3. Methodology

In this section we describe the methodology used in this paper to study efficiency and productivity growth of Indonesian islamic banks. We utilize the non-parametric approach Data Envelopment analysis and Malmquist productivity index.

Data Envelopment Analysis (DEA)

Models of data envelopment analysis (DEA) was first developed by Charnes, Cooper and Rhodes (1978), to evaluate the relative efficiency of decision making units (DMU) within an organization by giving weight to the input and output in the model. DEA model and its derivatives is called the standard model, which in this model independently of each DMU to choose weights to maximize the efficiency-weighted individually (Yudistira, 2003).

This model is based on the assumption of input-oriented constant returns to scale, known as the CCR model. In the CCR model each DMU will be compared with all existing DMU in the sample with the assumption that the internal and external conditions are the same DMU. Critics of this model is the assumption of constant returns to scale is only appropriate for the conditions in which the entire DMU operating at optimal scale (Banker et al. 1984, in Chen et al., 2003). In fact, although the DMU is operating with the same input and produce the same output but its internal and external conditions may be different resulting in a DMU not to operate at optimal scale, such as the condition of imperfect competition, financial constraints and other factors.

Yudhisthira (2003) describes a mathematical model of DEA was first developed by Charnes, Cooper, and Rhodes (1978) based on Farrell's research (1957) as follows:
For a number N DMU, such as banks, and other types of output and input and output types of movement m n kinds of inputs, then the level of efficiency of each bank can be calculated with the following

$$e_s = \sum_{i=1}^{m} u_i y_{is} / \sum_{j=1}^{n} v_j x_{js}, \qquad (1)$$

for $i = 1,\ldots, m$ and $j = 1,\ldots, n$,
with y_{is} is the magnitude of the *i-th* output produced by the bank *s*,
x_{js} is the magnitude of the *j-th* input used by banks *s*, u_i is the weight for output *i*, and v_j is the weight of the *j-th* input. Then the efficiency ratio (e_s) were determined maximum value for selecting the optimal weights based on:

$$\sum_{i=1}^{m} u_i y_{ir} / \sum_{j=1}^{n} v_j x_{jr} \leq 1 \qquad (2)$$

for r = 1,. . . , N and ui and vj $\geq$0,
where the first inequality of (2) shows that the greatest efficiency ratio is 1 and the second inequality of (2) is to show that the weight is positive.
Based on the model of Charnes, Cooper, and Rhodes (1978) the above linear program can be transformed into ordinary linear model following program:

$$\text{maximise } e_s = \sum_{i=1}^{m} u_i y_{is}$$
$$\text{subject to } \sum_{i=1}^{m} u_i y_{is} - \sum_{j=1}^{m} v_j x_{ir} \leq 0, r = 1, \ldots N$$
$$\sum_{j=1}^{m} v_j x_{js} = 1 \text{ and } u_i \text{ and } v_j \geq 0. \qquad (3)$$

Or can also be transformed into the dual model the following models:

$$\text{minimize } \xi_s$$
$$\text{subject to } \sum_{r=1}^{N} \varphi_r y_{ir} \geq y_{is}, i = 1, \ldots, m$$
$$\xi_s x_{js} - \sum_{r=1}^{N} \varphi_r x_{ir} \geq 0, j = 1, \ldots, n; \varphi_r \geq 0$$
$$\text{and } 0 \leq \xi_s \leq 1. \qquad (4)$$

with ξs is value of technical efficiency from the bank s, where a value of 1 indicates a point on the frontier (Yudistira,2003).

Malmquist Productivity Index

Malmquist Productivity Index, as shown by Fare et al. (1989) at Rezitis (2006) associated with the use of distance function which describes the multi-input and multi-output production without the necessary involvement in the explicit determination of the price data and behavioral assumptions such as profit maximization or cost minimization. Distance functions are classified in the output and input distance function. An output (input) distance function is defined as the reciprocal of the expansion (contraction) proportional to the maximum (minimum) of the vector output (input) for the vector input (output) which has been set (Fare et al., 1994). Rezitis (2006) describes a mathematical model of Malmquist Productivity Index as follows:

Rezitis (2006) defines multiple-input and multiple-output production technology at time t (St) as :

$$S^t = \{(x^t, y^t): x^t \text{can produce } y^t\}, \quad t = 1, \dots, T \tag{5}$$

Where x^t is the (N x 1) vector of inputs and y^t is the (M x 1) vector output. Then the output distance function at time *t* is defined as:

$$D_o^t(x^t, y^t) = \inf\{\theta: (y^t/\theta) \epsilon S^t\}, t = 1, \dots, T \tag{6}$$

Distance function in (6) is defined as the interrelationships of the maximum proportional expansion of output vector y^t, and the input vector x^t, at period *t*. If the output vectors are in the frontier limits the value of the distance function is 1 and the production is technically efficient,on the other hand, if less than 1 then the production is technically inefficient (Fare et al., 1989) showed that the Malmquist Total Factor Productivity Index as the geometric mean of two malmquist index is defined as:

$$M_o(x^{t+1}, y^{t+1}, x^t, y^t) = [M_o^t(x^{t+1}, y^{t+1} x^t, y^t) \times M_o^{t+1}(x^{t+1}, y^{t+1} x^t, y^t)]^{\frac{1}{2}} = \left[\frac{D_o^t(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)} \times \frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_o^{t+1}(x^t, y^t)}\right]^{\frac{1}{2}} \tag{7}$$

Where x^t is the (N x 1) vector of inputs and y^t is the (M x 1) vector output. Then the output distance function at time *t* is defined as:
Where

$$M_o^t(x^{t+1}, y^{t+1} x^t, y^t) \text{ and } M_o^{t+1}(x^{t+1}, y^{t+1} x^t, y^t)$$

is malmquist index that measures the change in productivity between periods t 1 and t and is defined using the same technology at time t and t 1. In addition Rezitis (2006) explain according to Fare et al. (1989) that malmquist productivity index in equation (7) can be decomposed into two components, namely components of efficiency change (FCH), which measures how close the operating units with a production frontier in period t 1 as compared with the period t, known as the catching-up effect. And components of technical change (TCH), which describes the change in productivity as a change in the production frontier. Then equation (2.11) is written as follows:

$$M_o(x^{t+1}, y^{t+1}, x^t, y^t) = \frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)} \times \left[\frac{D_o^t(x^{t+1}, y^{t+1})}{D_o^{t+1}(x^{t+1}, y^{t+1})} \times \frac{D_o^t(x^t, y^t)}{D_o^{t+1}(x^t, y^t)}\right]^{\frac{1}{2}} \tag{8}$$

Where

$$FCH = \frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)} \tag{9}$$

And

$$TCH = \left[\frac{D_o^t(x^{t+1}, y^{t+1})}{D_o^{t+1}(x^{t+1}, y^{t+1})} \times \frac{D_o^t(x^t, y^t)}{D_o^{t+1}(x^t, y^t)}\right]^{\frac{1}{2}} \tag{10}$$

For each formula above, the value is greater than one indicate an increase in performance and value that is less than one indicates a loss in performance during the study period (Quang and DeBorger, 2009)

4. Empirical Analysis

To investigate the efficiency of Islamic banking, the specification of inputs and outputs based on several assumptions as follows: The capital structure of Islamic banks is recognized by equity-based because it is dominated by shareholder's equity and investment deposits based on the principle of profit and loss sharing (Muljawan, Dar, and Hall, 2002 in Yudistira, 2003). In other words, return on capital will be determined based on the returns earned from economic activity in the utilization of funds or capital. Therefore need an appropriate input output specification, which is based on the intermediation approach. The reason for the selection of the intermediary approach as the basic characteristics of Islamic banks which are often referred to as business by joint stock (Dar and Presley 2000). The basic principle in the Islamic financial system is the participation of business, with the use of funds based on profit and loss sharing, thus implying pentingnnya intermediation activities in the activities of Islamic banks (Yudistira, 2003).

Based on Berger and Humphrey (1991) inputs used in the intermediation approach is the cost of labor, capital and interest payments on deposits, while its output is measured through a credit (loan) and financial investments. Under this approach, the authors model the banks in Indonesia, both conventional and sharia as multiproduk producing company that produces two outputs are total loans (y_1) and other earning assets (y_2), using two inputs of the first input of total deposits (x_1) obtained with total expenditures for overhead expenses and a second input (x_2). Total loans include loans to parties and other banks, and other assets eaning consists of placements with Bank Indonesia, other banks, placements with other banks, securities and government bonds.

The object of this research is the bank that runs its operations based on sharia principles, there are Bank Muamalat Indonesia, Bank Syariah Mandiri, Bank, Bank Mega Syariah and banks that run the operations based on conventional principles in Indonesia and among the 10 largest banks with total assets in the period during the study period of 2004 to 2009, which consists of Bank BCA, Bank BII, Bank BNI, Bank BRI, Bank BTN, Bank CIMB Niaga, Bank Danamon, Bank Mandiri, Bank Panin, and Bank Permata. Data used in this study a panel data of 13 banks in Indonesia during the period December 2004 to June 2009. For data processing method, the authors use the software DEAP 2.1 (Coelli, 1996).

Descriptive Analysis of Input and Output

The descriptive analysis of input and output used this research to model the efficiency and productivity of the banking system. DEA can integrate multiple inputs and outputs, conclusions statistically for input and output can be seen in table 1. Table 1 below is the average input and output variables that are used to measure the efficiency for each year (2004-2009) Changes in percentage of the average value per year can be seen also in table 1 where the variable average total deposits increased by 13.6% and total loans increased in 2005, 2007 and 2008. From the table can also be seen that the deposits in 2006 increased by 12% instead of bank credit growth declined 5%. Other earning assets decreased in 2005 but then increased 10% in 2006 and 2007, but in 2008 the increase in earning assets began to decrease and become negative up to -5%. Then increased again to 9% in 2009. Average overhead costs consist of labor costs and other expenses also operasioanl decline to negative in 2005 but increased by 10% in 2006, and increased again by 18% in 2007 and 2008 and then decline to negative in year 2009.

Table 1 is a combination of input data output 3 Islamic banks and 10 conventional banks. From the table it can be seen that the banking intermediary function has not been fully implemented by banks in Indonesia, it is seen from the number of third party funds that have not been optimally channeled back to the community or in business as a credit or working capital, but more sediment on earning assets such as Bank Indonesia Certificates. Especially in the period 2004-2006, total earning assets exceeds the total value of loans which means that more bank revenue derived from the difference of interest (net interest margin), where in 2006 the BI provides the SBI rate above 10%, while banks also write your only interest rate 5%

Variab les		2004	2005	2006	2007	2008	2009
Output							
y1 total loans	mean	27,630,986	32,699,462	36,923,377	45,867,881	61,534,410	67,877,698
	min	274,287	331,464	1,255,912	2,187,759	1,795,743	3,762,491
	max	88,576,777	100,165,893	109,379,723	126,826,445	161,061,059	184,600,939
	stdev	27,080,252	29,065,362	31,438,257	37,540,942	49,504,288	58,680,907
	% change		18%	13%	24%	34%	10%
y2 other earning assets	mean	33,901,433	33,837,156	37,187,018	41,182,362	39,284,704	43,009,746
	min	121,886	42,018	113,023	220,470	552,399	736,948
	max	134,918,458	144,796,927	138,828,064	160,703,176	158,035,789	148,960,530
	stdev	42,241,122	41,166,737	43,246,424	47,955,083	45,762,690	50,077,044
	% change		0%	10%	11%	-5%	9%
Input							
x1 total deposits	mean	50,280,026	54,584,587	60,995,918	72,111,475	86,020,947	94,239,482
	min	279,736	297,939	1,026,327			

Table 1. Input and Output Description

per year to customers. But in 2007, conditions had improved at which banks can increase the amount of credits channeled to the public exceeds the amount of investment in earning assets.

Technical Efficiency Result

Through the non-parametric DEA method using the intermediation approach to specification of input output, obtained the values of the relative efficiency of 13 banks that are observed. DEA can be obtained from the output of a bank at a certain period that has been efficient and yet efficient. Banks that have efficient as a benchmark as the most efficient banks relative to other banks that have not been efficient to optimize the use of inputs and outputs. Efficiency score is measured through the approach of Variable Return to Scale (BCC model).

Calculation of technical efficiency reflects the degree to which banks can minimize the inputs used to produce some output that has been determined. With input-oriented, a value of 1 or 100% indicates the bank has been operating on the production frontier. While the value of less than 1 or below 100%, reflecting the bank operates under a production frontier. Values between 1 and scores of technical efficiency shows the bank inefficiency. The result of calculation of technical efficiency (TE) obtained from the DEA model can be seen in table 2. While Figure 3 shows the movement of relative efficiency scores of Islamic banks and conventional banks in the years 2004-2009, so that the visible trend established by the efficiency score during the study period. The average value of technical efficiency score for Islamic banks is 86.01% while for conventional banks is 87.09%.

	Dec-04	Jun-05	Dec-05	Jun-06	Dec-06	Jun-07	Dec-07	Jun-08	des 2008	Jun-09
BANK SYARIAH										
Bank Muamalat	1	1	1	1	1	0.889	1	0.081	1	1
Bank Syariah Mandiri	1	1	1	1	1	1	1	1	0.872	1
Bank Mega Syariah	1	1	1	0.259	0.951	0.509	0.198	0.892	0.773	0.795
mean	1	1	1	0.753	0.983667	0.799333	0.732667	0.657667	0.881667	0.931667
stdev	0	0	0	0.427817	0.02829	0.257489	0.463035	0.502319	0.113808	0.118357
overall mean										0.860167
BANK KONVENSIONAL										
Bank Central Asia	0.547	0.941	0.597	1	0.928	0.623	0.688	1	1	1
Bank Internasional Indonesia	1	0.719	0.533	0.446	0.576	0.508	0.696	1	0.682	1
Bank Nasional Indonesia	1	0.642	1	1	1	0.778	1	0.773	0.703	1
Bank Rakyat Indonesia	1	1	1	1	1	1	1	1	1	1
Bank Tabungan Negara	0.851	0.81	0.699	0.734	0.687	0.669	0.698	0.642	0.845	1
Bank CIMB Niaga	1	1	1	1	1	1	1	1	1	1
Bank Danamon	1	0.541	1	1	0.712	0.726	1	0.896	1	0.8
Bank Mandiri	1	0.293	0.718	1	1	1	1	1	1	1
Bank Panin	1	0.577	0.377	1	1	0.927	1	0.771	0.927	0.984
Bank Permata	1	0.889	0.838	0.821	1	1	1	1	0.986	1
mean	0.9398	0.7412	0.7762	0.9001	0.8903	0.8231	0.9082	0.9082	0.9143	0.9784
stdev	0.145743	0.23063	0.227091	0.185566	0.165171	0.185744	0.147833			

Table 2. Technical Efficiency Score

The result of calculation efficiency score with the intermediation approach to model the input-oriented BCC found that the three Islamic banks, namely Bank Muamalat, Bank Syariah Mandiri and Bank has operated efficient in the period July 2004 to December 2005. Bank Muamalat not operate efficiently in the period from January to June 2007 and January-June 2008. Meanwhile, Bank Syariah Mandiri not efficient in the period from July to December 2008. This shows that banks are able to efficiently use inputs to produce a level of output. The Bank is an Islamic banks are less efficient compared with other Islamic banks, this may be caused by a newly established bank in August 2004 so that the allocation of more funds channeled to the fixed asset. For comparison, Islamic banks have the results of efficiency scores are not much different from conventional banks. Although still under conventional bank efficiency scores, but this result is acceptable because the Islamic banks are new players in the new banking business and its operations in less than ten years. While conventional banks have been operating longer.

Sharia banking tends to fluctuate. In the period December 2004 to December 2005 the three Islamic banks showed good performance with the technical efficiency of 100% and then decreased in the period June 2006 to show the inefficiency of the average value that ranges between 20% - 25%. But these figures still fall into the acceptable value of inefficiency. Islamic banks in Malaysia have a range of inefficiencies between 21% to 25% (Mokhtar, 2006) as well as conventional banks in Italy (Resti, 1997). In the period December 2008 and June 2009 the efficiency of Islamic banks showed increasing trend. This can be information that the banking regulations to give positive influence for the Islamic banking industry

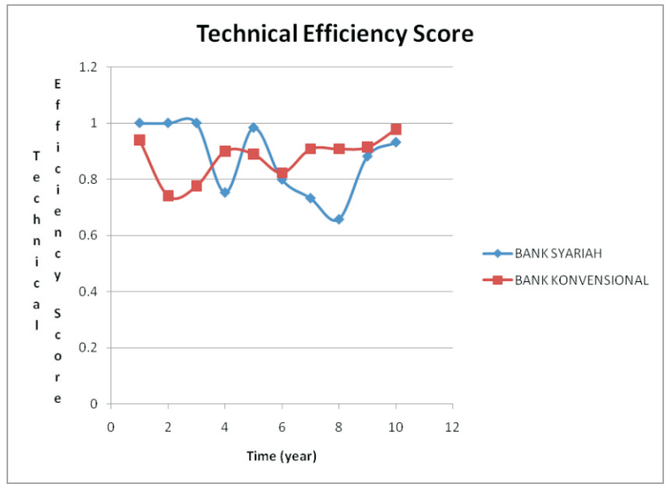

Figure 3. Technical Efficiency

With the above results it can be concluded ratings of Islamic banks with the best efficiency score based on the intermediation approach is Bank Syariah Mandiri with an average score of 0.9872, followed by Bank Muamalat Bank 0.897 and 0.7377. Conventional banking showed fluctuating trend in which efficiency has decreased in 2005 to inefficiency reach the range 22% to 25.88%. But an increase in efficiency in subsequent periods so that inefficiency decreases to about 9% to 17%.

Based on the table 2 is known that, in aggregate, in the period January-December 2005 that analyzed the efficiency of 13 banks decreased by 19%, and increased in the period from June to December 2006. The efficiency rate is decreased by 7-10% for the next two semesters from January to December 2007. The efficiency level continues to increase to four the next semester.
Aggregate efficiency of the analyzed banks rose again by 81.7% in the period from July to December 2006, then continued to fall during 3 consecutive periods before and then continued to rise in the period from July to December 2008.

Productivity Change

For Islamic banks sample consisting of 3 banks. Malmquist index and its decomposition that consists of technical change, technical efficiency change, pure efficiency change and scale efficiency change can be seen in table 3. If malmquist index value of each component is less than 1, it showed a decrease in performance. While a value greater than 1 indicates improved performance or means also that the aggregate efficiency of banks that were analyzed during this period better than the previous period. Malmquist Index Analysis of changes in the first period as a reference set point. Therefore, efficiency changes are calculated from the second period. In table 3 will be seen the value of total factor productivity of a combination of 13 banks which consist of 3 Islamic banks and 10 conventional banks.

From the table shows that TFP fluctuates over the period 2005-2009. Based on the results in the table above is known that, in aggregate, in the period January-June 2005 productivity analyzed banks increased by 194.3%, almost 2 times more than the period from July to December 2004. However, these TFP levels continue to decline for the next two semesters. Aggregate TFP analyzed banks rose again by 81.7% in the period from July to December 2006, then continued to fall during 3 consecutive periods before and then continued to rise in the period from July to December 2008. Average banking TFP is 1.128% per annum.

In broad outline of TFP Islamic banks showed that the company has increased its performance from time to time. In some periods of decline that is driven by technological change. This means that the factors that belong to the technological change such as banking regulation, the influence of macro and industry competition gives more influence on productivity. Of the three Islamic banks, Bank Syariah mandiri has an average high productivity, but it is caused by a spike in technological change in June 2005 and December 2006, while for other periods of decline that also occur due to technological change.

From table 4 it is known that two of the three Islamic banks which have analyzed malmquist index greater than one. That is done in the operational efficiency of both banks were quite good. However, in ranking, the efficiency of Islamic banks in general still not able to compete with conventional banks. The three Islamic banks are analyzed, namely Bank Muamalat, Bank Syariah Mandiri and Bank Syariah Mega, respectively ranked 3rd, 10th, and 13th

Table 3. Malmquist Index Summary of Annual Means.

Period	TE	TC	PE	SE	TFP
Jun-05	0.387	7.614	0.807	0.479	2.943
Des-05	2.057	0.213	1.045	1.969	0.438
Jun-06	1.037	0.764	1.025	1.011	0.792
Des-06	0.859	2.115	1.103	0.779	1.817
Jun-07	0.694	1.271	0.884	0.785	0.882
Des-07	1.337	0.651	1.022	1.308	0.87
Jun-08	0.7	1.166	0.927	0.755	0.817
Des-08	1.591	1.327	1.194	1.332	2.11
Jun-09	0.741	1.633	1.073	0.69	1.21
mean	0.934	1.208	1.003	0.932	1.128

Bank Muamalat, as the first Islamic bank operating in Indonesia, has the greatest malmquist index compared to two other Islamic banks. However, the efficiency index is driven more by technological change, which is the effect of shifting the banking industry productivity curve due to changes in external conditions from time to time. While the factor of internal efficiency improvements tend to be small. Greatest efficiency by bank Muamalat occur in the second half of 2008. At that time the cost efficiencies made by the Bank Muamalat up to 187 times more than the previous period. Similarly, Bank Syariah Mandiri, although obtained Malmquist index greater than one, but it is more driven by a shift in industrial productivity curve.

Unlike the Bank Muamalat, in the calculation of TFP among periods, tend not to have spikes or significant reduction of the cost efficiency of Bank Syariah Mandiri. Bank Mega Syariah has the worst efficiency rating compared to all other banks, both conventional and Islamic. Sharp deterioration in the efficiency of the Bank Mega Syariah occurred in the first half of 2006, the first half of 2007, and the first half of 2009. In those periods decrease the internal efficiency of the bank - which is indicated by TE - reaching between 84-94%.

T test for two independent samples is a procedure to compare the average of two independent samples (samples taken from two different populations) if they have an average difference is significantly different or not. With 5% level of significance this study finds that the mean value of the efficiency productivity index of Islamic banks and conventional banks are not significantly different.

Table 4. *Malmquist Index Summary of Firm Means*

Rank	Firm	TE	TC	PE	SE	TFP
1	CIMB NIAGA	1	1.403	1	1	1.403
2	PANIN	0.957	1.343	0.998	0.959	1.286
3	MUAMALAT	1	1.187	1	1	1.187
4	BNI	0.922	1.285	1	0.922	1.185
5	BRI	0.958	1.213	1	0.958	1.161
6	MANDIRI	0.886	1.309	1	0.886	1.159
7	PERMATA	1	1.131	1	1	1.131
8	BCA	0.929	1.202	1.069	0.869	1.116
9	BTN	0.996	1.105	1.018	0.978	1.101
10	SYARIAH MANDIRI	1	1.071	1	1	1.071
11	DANAMON	0.951	1.125	0.976	0.975	1.07
12	BII	0.94	1.062	1	0.94	0.998
13	MEGA SYARIAH	0.666	1.326	0.975	0.683	0.883
mean		0.934	1.208	1.003	0.932	1.128

5. Conclusion

From the calculation of the relative efficiency with DEA at 13 banks in Indonesia, three of whom are Islamic banks for the period 2004 to 2009, it was found that the efficiency of Islamic banks in the intermediation approach in this period is on average lower than conventional banks for each period except period July 2004 to December 2005. The third relative efficiency of Islamic banks in this period reached a value of 100%. This difference is confirmed that Islamic banks have been relatively efficient in allocating input-input based on the intermediation function, namely the overhead expenses (personnel expenses and other operating costs) and total deposits (deposits) to produce output-the output of total loans (credits) and earning assets. Intermediation function works if the third party funds held by a bank can generate a total of credit and financing rates.

In this financial ratio is known as Loan Deposit Ratio (LDR). The calculation result of Islamic and conventional banking efficiency using Data Envelopment Analysis approach for the year 2004-2009 shows that Islamic banks have an average value of technical efficiency (TE) was lower than with conventional banks. In general the value of the average efficiency score for Islamic banks amounted to 86.01% while 87.09% for conventional banks shows that Islamic banks can compete with conventional banks. But from the resulting t-test concluded that the efficiency of Islamic banks and conventional banks is not statistically significantly different.

From the calculation of Malmquist Productivity Index found that for the period 2004-2009 conducted in the operational efficiency of Islamic banks and conventional banks is good enough. However, in ranking, the efficiency of Islamic banks in general are able to compete with conventional banks. The three Islamic banks are analyzed, namely Bank Muamalat, Bank Syariah Mandiri and Bank Syariah Mega, respectively ranked 3rd, 10th, and 13th in the productivity index. However, based on the results of t-test value of the productivity index of Islamic banks and conventional banks is not statistically significantly different. These results indicated that Islamic banking in general possess the ability to compete with conventional banking in Indonesia

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