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# Efficiency, Productivity and Stability of Islamic Banks in Indonesia

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**Keywords:** Efficiency, Stability, Productivity, DEA, Islamic bank

**Abstract:** The Shariah banking industry is one of the main indicators of economic development of Islamic finance in Indonesia. In the banking world including Shariah banking, the issue of efficiency and productivity measurement are the two important things that should be noted. However, the determination of limitation factor to be a benchmark of whether a company has been worked efficiently and productively becomes problems itself. This study tried to analyze the CCR models as a basic model in DEA to see the efficiency level of Shariah commercial banks in Indonesia during the period of 2011-2017. Then, this research also examined the condition of efficiency stability of each bank which are presented in quadrant of 4 group formed. The results showed that the average value of CRS (Constant Return to Scale) efficiency of a whole Shariah commercial banks in Indonesia is relatively low at 68%, while the mean standard deviation is 0.12. The results of the Malmquist Productivity Index of Islamic Commercial Banks in Indonesia showed a decline in productivity growth (TFPCH), the reason for the decline was also caused by the level of technological innovation of banking (TECHCH) and stagnation of changes in the level of efficiency (EFFCH). Therefore Islamic banks need to carry out effective strategies in the current era of technological disruption.

## 1 INTRODUCTION

The Islamic banking industry, being an object of study that's always interesting to be studied. Especially if it is compared with the conditions of the conventional banking industry that has already existed before. For example, the results of research conducted by Nurfalah et al (2018) which states that Islamic banking is relatively more stable compared to conventional banking in the face of shock both internally and externally. This is an interesting finding that needs to be proven through various research in the future.

The development of Shariah banking industry in Indonesia showed relatively good tendency, although impressed slowly. Based on Shariah banking statistics data on April 2018, the number of Islamic banking has reached 13 Shariah Commercial Banks, 21 Shariah Business Units and 168 Shariah Rural Banks with the total office networking of 2,460 offices throughout Indonesia (Financial Services Authority, 2018).

Meanwhile, according to Global Islamic Finance Report 2017, Shariah financial industry in Indonesia is ranked seventh world after Malaysia, Iran, Saudi Arabia, UAE, Kuwait and Pakistan. The index score of Indonesia's Shariah financial industry in 2017 is 24.21 on a scale of 100 and ranks 7th in the world (GIFR, 2017).

Regardless of the data, the 2016 target proclaimed by Bank Indonesia in achieving a 5% market share has not been satisfactory. The growth that occurs in Islamic banks is not much better when compared with the increase market Shariah bank itself. The target market shares of Shariah banks in 2016 that is not achieved becomes a separate phenomenon to evaluate the level of efficiency performance of Shariah banking in Indonesia as a whole. Various kinds of obstacles such as competition factor, the conversion of Shariah business unit into Shariah commercial bank, so that many investment value must be issued, consequently

inefficiency become obstacle in their competition with conventional banking.

The main goals for banking sector reform include Shariah commercial banks is to encourage the banking sector within the regulatory and legal framework, monitoring and supervision, financing risk management, liquidity management, auditing and other important aspects. If the reform of the banking sector is going well, then this will improve the efficiency of the banking sector that affects every aspect of bank operations. Efficient banks will be able to reduce costs and impose relatively low margins on customers. In the long run, the achievement of efficiency will be able to increase market share consistently in Shariah banking industry.

This study has 2 main objectives. First to measure the level of efficiency and productivity of Islamic banks in Indonesia, in this case is the full fledged Shariah Bank. Secondly, to see the level of stability of the efficiency of Shariah banks that become the object of research. This research will analyze the efficiency by trying to create 2 dimensions based on efficiency matrix to assess the ability of Shariah banks to remain competitive.

## 2 BACKGROUND

For a business entity, efficiency is very important. The concept of efficiency is often defined as doing the thing right. This is always associated with how the company in achieving its objectives. Therefore, the concept of efficiency is often seen from the cost side as input and profit as output. The business entity always tries to keep the cost level down to a minimum level to produce a maximum output level of output.

The concept of efficiency comes from the micro-economic concept of producer theory. Manufacturers' theory attempts to maximize profits or minimize costs from the producer's point of view. In the theory of producers there is a production frontier curve which describes the relationship between input and output of the production process. This production frontier curve represents the maximum output level of any input usage that represents the use of technology from a company or industry (Ascarya and Yumanita, 2007).

The Malmquist index is a bilateral index used to compare production technologies of two economic elements. The Malmquist index is based on the concept of a production function that measures the maximum production function with defined

input limits. In the calculation, this index consists of several results: efficiency change, technological change, pure efficiency change, economic scale change and TFP change. In the first generation model developed by Caves et.al (1982), there are 2 (two) Malmquist productivity index models (Bjurek, 1996). The first is 'Malmquist input quantity index' and the second is 'Malmquist output quantity index'. Malmquist input quantity index for a production unit, at observation time  $t$  and  $t + 1$ , for tech reference in period  $k$ ,  $k = t$  and  $t + 1$ . The Malmquist input quantity index measures only the change in the quantity of inputs observed between time  $t$  and  $t + 1$ .

As time goes by, the model of frontier efficiency measurement has increased, both in theory and practice concepts. In general, the efficiency level measurement model is divided into two parts: parametric and nonparametric.

Yudhistira (2003) conducted a study of 18 Shariah banks around the world during the period of 1997-2000 using the DEA approach and input-output specifications based on the intermediation approach. Based on the results of the study, the overall efficiency of 18 Shariah banks observed was slightly inefficient at a fair rate of 10% when compared to conventional banks. This is because in the period of 1998-1999 banks are experiencing a global crisis affecting its performance. Small Shariah banks tend to be uneconomical. Therefore, it is recommended that banks with economies of scale are still small to merge or acquisition.

Research on the efficiency of Islamic banks is supported by Hasan (2003) that explain the cost, profit, revenue, and X-efficiency of Islamic banks around the world. First, the study made a stochastic cost frontier approach to calculate the cost efficiency of Islamic banks in the period of 1996-2002. Second, calculate profit efficiency by focus on cost and revenue. Third, determine the revenue efficiency to find out whether Islamic banks are making innovative banking products to increase their income. Fourth, using the non-parametric Data Envelopment Analysis (DEA) method to calculate the overall efficiency, i.e. technical, pure technical, allocative, and scale efficiency. The result is that on average, the Islamic banking industry is relatively less efficient than conventional banks.

The other thing that show the increased efficiency of Islamic banks in Shariah Bank in Malayasia, Sufian (2006) measure and analyze the efficiency of Islamic banks both foreign and domestic in Malaysia, during the period of 2001-2004. DEA analysis method used in this study, with

input variables consisting of total savings, labor costs, and assets. Moreover, financing variable and operating income as output. The results of this study states that the efficiency of Shariah banks in Malaysia has increased. This study reveals that Shariah foreign banks are on average less efficient than Shariah domestic banks during the year of observation.

### 3 RESEARCH METHOD

Method used in this research is Data Envelopment Analysis (DEA). DEA is a nonparametric method that uses a linear programming model to calculate the ratio of output and input ratios for all comparable units. The advantage of using this DEA is that this approach does not require an explicit specification of the functional form and requires only a few structures to form the efficiency frontier. The weaknesses that may arise are self identifier and near self identifier. DEA was first developed by Farrel (1957) which measures the efficiency of one input technique and one output to multi input and multi output.

The productivity index is expressed by the TFP index of Malmquist over a given period. As the suggestion of Caves et.al (1982), this index is defined using a distance function that permits multi-input and multi-output use without the need to involve explicit price information. The function of this distance can be classified into a distance

function oriented to the input and output. The input distance function seeks a minimal proportional expansion of input vectors for a constant output vector. In contrast, the output distance function seeks a minimum proportional expansion of the output vector for a constant input vector.

Furthermore, the DEA method is widely used to measure the technical, scale and economic efficiency of the industry of banks and financial institutions (Coelli et.al (2005), and Cooper (2010)) as Hadad et al (2003), Rani et al (2017), Ozdemir (2013), Shahreki (2012) and Tsolas and Dimitris (2012). However, DEA is also widely used to measure the efficiency of non-bank institutions, such as hospitals, universities, tax offices, as well as nonprofits (Rusydiana, 2013) such as zakat institutions (Rusydiana et al., 2016).

The data used in this research are all Shariah Commercial Banks in period of 2011-2017 that amounted to 11 banks. Data of input and output variables are obtained from the balance sheet and income statement of each bank. Two inputs and two outputs are used to measure efficiency and stability of Shariah bank efficiency. As input variables are Third Party Fund (X1) and Personnel Cost (X2). Meanwhile, the output variables are Total Financing (Y1) and Operating Income (X2). Use of DPK and financing in input-output because this research uses intermediation approach. Table 2 describes the descriptive statistics of each of the input and output variables used in this study.

Table 2: Descriptive Statistics of Input-Output

Variable	Output (IDR Million)		Input (IDR Million)	
	Total Financing	Operating Income	Third Party Fund	Personalia Cost
Mean	9,084,978	1,179,864	10,067,346	221,309
Max	50,460,000	6,851,461	59,283,492	1,359,776
Min	1,614	404	4,556	1,871
Std.Dev	13,206,909	1,591,290	14,881,403	293,568

Analysis tool used in this research is Banxia Frontier Analyst 3 to measure the efficiency level of all DMU (Decision Making Unit) of Shariah bank during 2007-2017. Furthermore, to make a plot of Shariah bank group quadrant with 2 categories (efficiency and stability) on x and y axis, SPSS 16 software is used as a tool. This grouping follows research conducted by Rusydiana and Sanrego (2018) and Rusydiana and Firmansyah (2017). The first calculation of efficiency with the CRS (Constant Return to Scale) or CCR (Constant Return

to Scale) approach introduced by Charnes et.al (1978).

### 4 RESULTS & DISCUSSION

Table 3 (appendix) showed that the efficiency of CRS on Shariah banks in Indonesia from 2007-2017 has fluctuated. The average value of the overall efficiency of Shariah commercial bank in Indonesia is relatively low at 68%, while the mean standard

deviation is 0.12. This indicates the poor performance of Shariah banks in Indonesia.

The best performers based on efficiency levels during the study period were Maybank Shariah with an average of efficiency is 94% and standard deviation is 0.06. The second best of Shariah commercial bank is BMI with an average of efficiency of 75% and standard deviation is 0.10. BRI Shariah and Panin have the average efficiency

rating of 73% but with a fairly large standard deviation of 0.14 and 0.29. Beyond that, other Shariah commercial banks have only average efficiency under 70%. Bank Mega Shariah (52%), Victoria Shariah (55%) and BCA Shariah (56%) are the three Islamic banks with the lowest average efficiency compared to other Shariah commercial bank.

Table 3: Level of Efficiency of CRS and Shariah Commercial Bank Stability in Indonesia in the period of 2011-2017

DMU	2011	2012	2013	2014	2015	2016	2017	Mean	StD
BSM	0,64	0,73	0,68	0,61	0,65	0,71	0,66	0,67	0,04
BMI	0,71	0,81	0,80	0,69	0,62	0,66	0,63	0,75	0,10
BRIS	0,63	0,65	0,68	0,63	0,71	0,65	0,68	0,73	0,14
BNIS	0,54	0,53	0,56	0,53	0,77	0,79	0,81	0,65	0,11
Mega	0,40	0,49	0,53	0,47	0,53	0,58	0,49	0,52	0,13
Panin	0,66	1,00	0,82	0,88	0,85	0,92	0,88	0,73	0,29
BJBS	0,53	0,65	0,65	0,63	0,71	0,74	0,62	0,67	0,09
BSB	0,66	0,73	0,78	0,76	0,71	0,69	0,78	0,65	0,21
BCAS	0,49	0,53	0,61	0,68	0,62	0,61	0,58	0,56	0,07
Maybank	1,00	0,84	1,00	0,90	0,93	0,95	0,94	0,94	0,06
Victoria	0,42	0,45	0,55	0,65	0,68	0,53	0,54	0,55	0,10
<b>MEAN</b>								<b>0,68</b>	<b>0,12</b>

#### Shariah Commercial Banks Quadrant Based on CRS Efficiency Level and Its Stability

Shariah Commercial Banks are grouped into 4 (four) quadrants based on the category of efficiency level and its efficiency level stability, i.e. high and low. Quadrant 2 includes Shariah banks which has high efficiency and stability efficiency, so it can be considered as the best Shariah banks compared to other quadrant groups. On the other hand, Quadrant 4 is a group of Shariah banks with low efficiency and high efficiency stability. This group can be regarded as Shariah banks with low efficiency and relatively persistent level of efficiency. That is, there tends to be no increase in the level of efficiency it achieves.

Quadrant 1 includes Shariah commercial banks that have a high level of efficiency, but on the other hand has a low level of efficiency stability. This

group can be considered as a Shariah bank with a high efficiency but relatively unstable efficiency. This means that the high efficiency of Shariah banks in this quadrant is not persistently achieved, but there is fluctuation (increase and decrease) efficiency figures. Quadrant 3 includes groups of Shariah commercial banks that have a low level of efficiency, but on the other hand has a relatively high level of efficiency stability. This group can be considered as a Shariah bank with relatively low efficiency and fluctuating value of its efficiency. The good side is, the Shariah commercial banks group in this quadrant is expected to achieve an increase in efficiency level in the future.

Figure 1 showed the division of a group of Shariah commercial banks based on the calculated level of efficiency (CRS) and its efficiency stability, based on two categories i.e. efficiency on the y-axis

and the standard deviation value of the efficiency figure during the study period, on the x-axis.

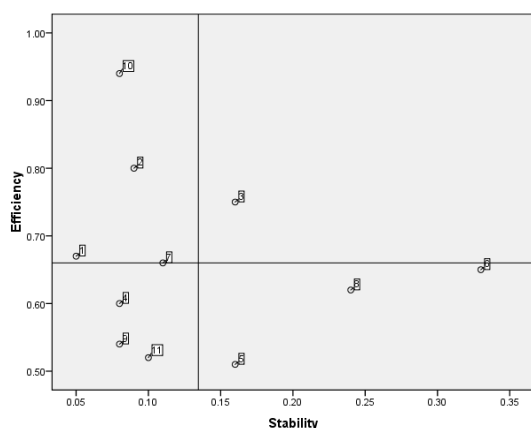


Figure 1: Four Shariah commercial bank Quadrants Based on Level of Efficiency & Stability

#### Where:

Quadrant 1 (High Efficiency, Low Stability): BRIS  
 Quadrant 2 (High Efficiency, High Stability): BSM, BMI, Maybank,  
 Quadrant 3 (Low Efficiency, Low Stability): Mega, Panin, BSB  
 Quadrant 4 (Low Efficiency, High Stability): Victoria, BCAS, BNIS, and BJBS

Figure 1 shows that during this period study, there is 1 Shariah commercial bank that is in quadrant 1, there are 3 Shariah commercial banks located in quadrant 2, and 3 Shariah commercial banks that enter into quadrant 3. Meanwhile there are 4 Shariah commercial banks which are included in quadrant 4.

Group of quadrant 1 is Shariah commercial bank category that has high efficiency, but on the other hand has low efficiency stability value. Shariah commercial banks that fall into this category are BRI Shariah. BRI Shariah has an average efficiency rating of 73% and a standard deviation of efficiency of 0.14. Therefore, BRI Shariah is included in Shariah commercial bank with high efficiency but relatively unstable efficiency value.

Group of Quadrant 2 is Shariah commercial bank category that has high efficiency level and high value of efficiency stability. There are 3 Shariah commercial banks that include into this category, i.e.: BSM, BMI and Maybank Shariah. BSM has an average efficiency rating of 67% and a standard deviation of efficiency of 0.04. BMI has a fairly high average efficiency value of 75% and a standard deviation of efficiency of 0.10. Maybank has the

highest efficiency rating of 94% and standard deviation of efficiency of 0.06. This group is deemed as shariah commercial banks with high efficiency and relatively stable value of efficiency, or the best compared to other quadrants.

Group of Quadrant 3 is shariah commercial bank category that has an average of low efficiency and low efficiency stability. There are 3 Shariah banks that include into this category, i.e.: Bank Shariah Mega Indonesia, Panin Shariah and Bank Shariah Bukopin (BSB). Bank Mega Shariah has an average efficiency rating of 52% and a standard deviation of efficiency of 0.13. Panin Shariah has an average efficiency rating of 73% and a standard deviation of efficiency of 0.29. Meanwhile BSB has an average efficiency rating of 65% and a standard deviation of efficiency of 0.21. These groups of shariah commercial banks in quadrant 3 are Shariah banks with relatively low efficiency and fluctuating value of its efficiency.

Quadrant 4 is a group of Shariah banks that have low level of efficiency but on the other hand has high efficiency stability value. There are 4 Shariah banks that include into this category, i.e.: Victoria Shariah, BCA Shariah, BNI Shariah and BJB Shariah. Bank Victoria Shariah has an average efficiency rating of 55% and a standard deviation of efficiency of 0.10. BCA Shariah has an average efficiency rating of 56% and a standard deviation of efficiency of 0.07. BNI Shariah has an average efficiency value of 65% and a standard deviation of efficiency of 0.11. Meanwhile BJB Shariah has an average efficiency value of 67% and a standard deviation of efficiency of 0.09. This group can be regarded as Shariah banks with low efficiency and relatively persistent level of efficiency.

#### Productivity of Indonesia Shariah Banks

Table 4. Results of TFPCH of Islamic Banks

Periods	EFFCH	TECHCH	PECH	SECH	TFPCH
2011-2012	1.051	0.683	1.000	1.051	0.717
2012-2013	0.987	0.974	1.000	0.987	0.962
2013-2014	0.977	0.703	1.000	0.977	0.687
2014-2015	1.037	0.842	1.000	1.037	0.874
2015-2016	0.991	1.878	0.995	0.996	1.861
2016-2017	0.967	0.908	1.000	0.997	0.897
GeoMean	1.005	0.997	0.999	1.003	0.998

On table 4, it appears that for the duration of the study is 2011 - 2017, Islamic Bank's in Indonesia show a decline in productivity growth, as indicated by the value TFPCH of 0.998. The decline in this TFPCH showed lower levels of productivity in the banking sector in Indonesia. This is evidenced by the



decrease (*Regress*) TECHCH under 1 is (0.997) and PECH (0.999), although there was a slight increase in SECH (1.003) and EFFCH (1.005). In another sense, a decrease in the level of productivity of Islamic Banks in Indonesia contributed largely by the low level of banking technology innovation or technological change (TECHCH) and the efficiency (PECH).

So, from the results of this research, we can state that the average value of CRS (Constant Return to Scale) efficiency of a whole Shariah commercial banks in Indonesia is relatively low at 68%, while the mean standard deviation is 0.12. The results of the Malmquist Productivity Index of Islamic Commercial Banks in Indonesia showed a decline in productivity growth (TFPCH), the reason for the decline was also caused by the level of technological innovation of banking (TECHCH) and stagnation of changes in the level of efficiency (EFFCH).

## 5 CONCLUSIONS

As part of the financial system, Shariah banks in Indonesia have a role to play in economic growth in general. Currently, the development of Shariah banking industry in Indonesia is relatively stagnant compared to neighboring countries. With the various challenges faced, Shariah banks in Indonesia need to maintain its existence.

One of the important issues in the analysis and discussion of the banking industry, including the Islamic banks, is related to efficiency and stability. This paper focus in that area. This research tries to describe the level of efficiency achieved by Shariah Public Bank in the period of 2011 to 2017 and its efficiency stability.

The average value of the overall CRS efficiency of shariah commercial bank in Indonesia is relatively low at 68%, while the mean standard deviation is 0.12. This indicates that the performance of Shariah banks industry in Indonesia is lack in general. Shariah banks that enter into groups with high efficiency and stable value are: Maybank Shariah, BMI and BSM. Then coupled with BRI Shariah on the CRS approach. For this group of Shariah banks, they need to maintain the achievement of efficiency achieved. If performance increased, it will be better.

Meanwhile, shariah commercial bank that fall into low efficiency and stable group in low efficiency position are Victoria Shariah and BCA Shariah. For these two banks, efforts to improve efficiency are a priority, both in terms of the effectiveness of existing inputs as well as increased

output such as the addition of total financing and increase in operating income. Beyond that, the fluctuating shariah commercial banks value of efficiency and stability are: BNI Shariah, Mega Shariah, BJBS, BSB and Panin Shariah. This group of banks is quite vulnerable, both due to the macroeconomic impacts as well as the internal conditions and policies of each bank. Therefore, for this last group, maintaining the stability of efficiency value is the main goal. So the target achievement is expected, able to achieve well and maximum.

The results of the Malmquist Productivity Index of Islamic Commercial Banks in Indonesia showed a decline in productivity growth (TFPCH), the reason for the decline was also caused by the level of technological innovation of banking (TECHCH) and stagnation of changes in the level of efficiency (EFFCH). Therefore Islamic banks need to carry out effective strategies in the current era of technological disruption. One of the limitation of this study is the lack of complete data, especially some DMU of Islamic banks in the initial period of observation.

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