

## **Analysis of Efficiency Islamic Banking In Indonesia: Stochastic Frontier Approach**

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### **ABSTRACT**

*This research to determine the efficiency of Islamic banking in Indonesia using a stochastic frontier approach. This research was conducted on general sharia banking in Indonesia. The research method used is calculating the efficiency of Islamic banks in terms of profit using an alternative profit efficiency approach method, while for calculations using the Stochastic Frontier Approach (SFA) approach which calculates deviations from the profit function estimated first with its profit frontier. The data used is secondary data, the data collection method comes from documentation. The data analysis used is quantitative. The results of this research show that the efficiency of sharia banking continues to increase every year. The magnitude of the increase was 87.97% in 2019 to 92.75% in 2020 or 96.66 in 2019. The average efficiency of sharia banking increased by 4.77% from 2019. Meanwhile, in 2021 the average efficiency experienced an increase of 0.86% from 2020 and in 2022 there was an increase of 3.04% from 2021. This can be interpreted that from 2019 to 2022 sharia banking experienced an average growth of 2.16% per the year.*

**Keywords:** Keywords: Efficiency, Stochastic Frontier Approach, Sharia Commercial Banks

### **1. Introduction**

The Indonesian banking industry has still not fully recovered due to the impact of the economic crisis since mid-1998. Various banking indicators such as the Loan to Deposit Ratio (LDR) have reached 50-60% since 1998 and the structure of third party funds is still dominated by short-term funds such as current accounts and savings, shows that banking has not been able to carry out its main function in the economic system, namely the intermediation function. During this period of intense rivalry, the manufacturing sector is going through a number of changes, some of which are significant while others are more minor (Faried, et al., 2023). However, in line with the banking restructuring program, the banking improvement industry is slowly starting to show improved performance from its downturn during the economic crisis, although it has not yet reached the level of performance before the crisis.

Efficiency is very important and needs attention so that sharia banking can be competitive, develop and be able to play a more optimal role in national development. As a business entity, sharia banking is required to always work efficiently. Efficiency in the banking world is a performance parameter that is quite popular, widely used because it is the answer to difficulties in calculating

banking performance measures. Often, profit level calculations show good performance, not falling within the "healthy" or achieving criteria from a regulatory perspective. As is known, the banking industry is the industry most regulated by regulations which are also a measure of the performance of the banking world. Capital Adequacy Ratio (CAR), Reserve Requirements, Legal Lending Limits and the credibility of bank managers are examples of regulations which are also performance criteria in the banking world.

Law no. 21 of 2008 (article 1 number 1) states that Sharia Banking is everything that concerns Sharia Banks and Sharia Business Units, including institutions, business activities as well as methods and processes for carrying out business activities. Furthermore, in article 1 number 8 it is stated that Sharia Commercial Banks are Sharia Banks whose activities provide services in payment traffic. The existence of sharia banking in Indonesia is a reflection of the need for a banking system that can contribute to stability to the national financial system. Judicial recognition provides an opportunity for sharia banking to grow and develop widely. This also provides an opportunity for conventional banking to convert itself into sharia banking. This condition raises the question of the level of efficiency of sharia banking in Indonesia.

## 2. Methods

This research is quantitative research. Quantitative is a research method that emphasizes testing theories through measuring research variables with numbers and analyzing data using statistical procedures. Data was taken from January 2019 to December 2022 . latest data can be accounted for research. The objects of this research are banks that adhere to sharia principles (profit sharing) whether they are Sharia Commercial Banks (BUS) or Sharia Business Units (UUS) in Indonesia and do not include BPRS.

This indicator is usually written mathematically in a percentage which is the ratio of QP/0P, which is a depiction of the percentage of input that can be reduced. The level of technical efficiency (TE) of a company is generally measured using the ratio value:

$$TE = 0Q/0P.....(1)$$

This equation will be the same as the 1-QP/0P equation, where the value ranges between zero and one, and therefore produces an indicator of the degree of technical efficiency of the company. A value of one implies that the company has reached a fully efficient condition. For example, point Q has achieved technical efficiency because it is on an efficient isoquant curve.

$$AE = 0R/0Q .....(2)$$

Total economic efficiency is defined as the ratio of:

$$EE = 0R/0QP.....(3)$$

products that are technically efficient and allocatively provide meaning that overall economic efficiency has been achieved:

$$Te \times AE = (0Q/0P) \times (0R/0Q) = (0R/0P) =EE .....(4)$$

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Cost Efficiency basically measures the level of costs of a bank compared to banks that have the best operating costs (best practice bank's costs) that produce the same output with the same technology. By using the stochastic cost frontier equation, the cost equation can be written as follows:

$$\log C = f(w,y) + \log u + \log v.....(5)$$

This SFA method was developed by Aigner, Lovell, Schmidt (1977). In this method, the profit of a bank is modeled to deviate from its profit efficient frontier due to random noise and inefficiency. The standard Stochastic Profit Frontier function has the following general form (log):

$$\log \pi_i = f(\log X_i, \log Y_i) + e_i.....(6)$$

### 3. Results and Discussion

The efficiency of Islamic banks is based on the ability of Islamic banks to generate profits from and the output they use, so the terms profit and efficiency in this research have the same meaning. Meanwhile, the output (Y) used in this research is placements with Bank Indonesia, placements with other banks, financing provided. Meanwhile, the input (X) used is Third Party Funds (DPK consisting of wadiah demand deposits, mudharabah savings and mudharabah deposits), and paid-in capital.

#### 1. Multiple Regression test results

By entering the input variables and output variables that have been determined into the regression model, the SFA equation can be rewritten as: To carry out data processing using regression, use the Eviews 6.1 programming software. After carrying out the regression on the model above, the results are as shown in the following table:

$$\log LR = \beta_0 + \beta_1 \log DPK + \beta_2 \log MDS + \beta_3 \log PBI + \beta_4 \log PBL + \beta_5 \log PD + e_i$$

**Table 1. Results of Multiple Regression Estimation by OLS Method**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.591070	3.103241	1.369214	0.1465
LOG(DPK)	-1.734326	1.383823	-1.427123	0.1756
LOG(MDS)	-1.755414	0.804512	-1.973426	0.0172
LOG(PBI)	0.654561	0.268816	1.945812	0.0107
LOG(PBL)	-0.045876	0.286967	-1.439016	0.8545
LOG(PD)	2.944312	1.421110	2.386436	0.0532
R-squared	0.836501	Mean dependent var	3.566432	
Adjusted R-squared	0.699973	S.D. dependent var	0.987654	
S.E. of regression	0.569259	Akaike info criterion	0.919676	
Sum squared resid	5.321988	Schwarz criterion	1.234510	
Log likelihood	-18.80971	F-statistic	12.94533	
Durbin-Watson stat	1.456116	Prob(F-statistic)	0.000043	

Source: E-Views, 2023.

The regression results above can be written:

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$$\log(LR) = 2.591070 - 1.734326 \log(DPK) - 1.755414 \log(MDS) + 0.654561 \log(PBI) - 0.045876 \log(PBL) + 2.944312 \log(PD)$$

In the regression equation above, the LR constant is 2.591070. This means that if the input variables and output variables (third party funds, paid-in capital, placement with Bank Indonesia, placement with other banks, financing provided) are considered constant (fixed or considered 1) then sharia banking will experience a profit of 13,352,314,938 billion ( antilog 2.591070).

**Table 2. Sharia Banking Efficiency in Indonesia (%)**

	2019	2020	2021	2022
January	87,2133	91,2344	94,2302	96,3987
February	87,9082	91,9871	94,8401	96,8012
March	84,3244	92,7656	95,3209	95,4886
April	84,2276	92,4071	95,3940	96,9072
May	85,8876	92,3017	92,2335	96,5064
June	86,3880	89,9288	91,4021	95,6599
July	87,7992	92,5262	92,3566	95,7630
August	89,8149	92,9810	92,2301	96,1023
September	89,1100	93,7138	91,6731	96,5047
October	90,5396	93,4534	91,6087	97,6054
November	90,9092	94,0982	95,3210	97,5987
December	91,6219	95,6917	96,8966	98,6774
<b>average</b>	<b>87,9786</b>	<b>92,7574</b>	<b>93,6255</b>	<b>96,6677</b>

By looking at the table above, it can be seen that in general the average efficiency of sharia banking continues to increase every year. The magnitude of the increase was 87.97% in 2019 to 92.75% in 2016 or 96.66 in 2022. The average efficiency of sharia banking increased by 4.77% from 2019. Meanwhile, in 2021 the average efficiency experienced an increase of 0.86% from 2020 and in 2022 there was an increase of 3.04% from 2022. This can be interpreted that from 2019 to 2022 sharia banking experienced an average growth of 2.16% per the year.

## 2. Coefficient of Determination Test

Statistically, to determine the influence of independent variables (independent variables) simultaneously on the dependent variable (dependent variable) can be seen from the size of the multiple correlation coefficient. Table 2 shows that the coefficient of determination is 0.8365, which shows that the independent variables together influence the dependent variable by 83.65%, the remaining 16.35% is influenced by other variables not included in the research model. This means that the input and output variables entered (Third Party Funds, Paid-in Capital, Placements with BI, placements with other banks, and Financing provided) together influence sharia banking profits by

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83.65% and the remaining 16.35% are influenced by other variables that are not included in the regression equation model above

### 3. F test

The F test results obtained Fcount of 12.94 which is greater than FTable with  $N1 (k-1) = 4$  and  $N2 (n-k) = 43$ , so FTable is 2.61. Because Fcount is greater than FTable,  $H_0$  is rejected and  $H_1$  is accepted, or it can be interpreted that simultaneously (together) the input and output variables (Third Party Funds, paid-up capital, placement with BI, placement with other banks, and financing provided) have an effect on profits in sharia banking in Indonesia.

### 4. t test

By comparing the ttable and tcount values obtained from each variable using a significance level of 95% ( $\alpha = 5\%$ ). With degrees of freedom ( $DF = N-k-1 = 48-5-1 = 42$ ) the ttable is  $\pm 1.684$ . Meanwhile, to find out how much influence the independent variables and dependent variables individually have on profits, it can be seen from the tcount in the regression results as in table 3 below:

**Table 3. T-test value in regression**

Variable	T <sub>test</sub>	T <sub>table</sub>
Third Party Funds	-1,427	-1,684
Paid-in Capital	-1,973	-1,684
Placement at BI	1.945	1,684
Placements with other Banks	-1,439	-1,684
Funding Provider	2,386	1,684

By comparing t table and tcount in table 3 above, it can be seen that individually there are variables that do not significantly influence sharia banking profits and there are those that significantly influence sharia banking profits in Indonesia. Third Party Funds, this variable is not statistically significant to sharia banking profits, Paid-in capital, this variable is statistically significant to sharia banking profits, Placements with Bank Indonesia are statistically significant to sharia banking profits (Faried & Sembiring, *Perekonomian Indonesia: Antara Konsep dan Realita Keberlanjutan*, 2019), Placements with other banks are statistically not significant to profits sharia banking, the financing provided is statistically significant to profits in sharia banking.

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**Figure 1. Graph of Sharia Banking efficiency in Indonesia 2019-2022**

From Figure 3 above, it can be seen that in general the efficiency of sharia banking has increased. However, if you look at the efficiency every month it fluctuates (ups and downs). The highest efficiency growth from 2019 to 2022 occurred in December 2022, while the lowest growth occurred in May 2022.

**Table 4. Efficiency Growth Every Month**

Bulan	2019*	2020	2021	2022	Average
January	0	4,30	2,78	1,15	2,06
February	0	3,94	2,67	1,14	1,94
March	0	7,33	2,10	0,49	2,48
April	0	8,84	1,91	0,95	2,93
May	0	6,94	-0,59	4,52	2,72
June	0	4,01	1,72	5,51	2,81
July	0	5,26	-1,31	5,15	2,28
August	0	4,59	-2,00	6,55	2,28
September	0	5,05	-2,88	6,58	2,19
October	0	2,07	-2,08	6,54	1,63
November	0	2,36	-0,63	5,32	1,76
December	0	3,28	0,62	2,78	1,67
<b>Max</b>	<b>8,84</b>	<b>min</b>	<b>-2,88</b>	<b>Average</b>	<b>2,23</b>

Partially (individually), some of the input and output variables used influence profits and some have no effect on profits. Variables that do not influence the profits obtained by sharia banking in Indonesia are third party funds and placements with other banks. Even though in the simultaneous test (F test) these two variables have an effect on sharia banking profits, the effect is negative or can be interpreted as meaning that during the 2019-2022 period these two variables were inefficient.

Meanwhile, the influencing variables are paid-in capital, placement with Bank Indonesia, and financing provided. Paid-in capital has a negative (-) effect on profits. This means that during 2019-2022, if sharia banking increases paid-in capital by 100%, sharia banking profits will decrease by 98.027%. This can also mean that there is inefficiency in paid-in capital.

For placements with Bank Indonesia, during 2019-2022 it had a positive effect on sharia banking profits in Indonesia. If sharia banking increases placements with Bank Indonesia by 100%, sharia banking profits will also increase by 98.055%.

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Likewise, the financing variable provided also has a positive effect on sharia banking profits in Indonesia, if sharia banking increases its financing by 100%, then sharia banking profits will also increase by 97.6%. This is in accordance with research conducted by Atmawardhana which states that financing influences the efficiency of sharia banking.

## 5. Conclusion

- a. The hypothesis which states that input and output variables influence sharia banking profits is acceptable. This means that the variables used in this research influence Islamic banking profits in Indonesia.
- b. Even though paid-up capital in this study has an effect on sharia banking profits, this paid-up capital has a negative (inefficient) effect on sharia banking profits in Indonesia. Meanwhile, placement with Bank Indonesia and the financing provided both have a positive effect on sharia banking profits in Indonesia.
- c. In general, the efficiency of sharia banking in Indonesia during the period studied (January 2022 – December 2022) has increased, but for several months the efficiency of sharia banking has decreased.

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