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AL-AMWAL

Efficiency Analysis of Islamic Banking in Indonesia 2015-2018 using Stochastic Frontier Method

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Abstract

The research objective is to analyze the efficiency of Islamic banking in Indonesia from 2015 to 2018. The quantitative approach was chosen to be used to determine and answer in this research stage. The choice of analysis in this study uses the Stochastic Frontier Approach (SFA) method. The criteria for determining variables based on estimated cost functions consist of input variables in the form of savings and labor and output variables in financing and securities; the independent variable is total costs. The sample consisted of 10 Islamic Commercial Banks used in this study. The overall average efficiency value of Islamic banking is 85.7%, with an increase in value every year in the observation period. Savings and labor variables positively affect total costs, financing variables, and securities negatively sign of total costs during the selected observation period.

Keywords: *Efficiency, Stochastic Frontier Approach (SFA), Sharia Banks*

Abstrak

Tujuan penelitian adalah menganalisis level efisiensi perbankan syariah di Indonesia tahun 2015-2018. Pendekatan kuantitatif digunakan menentukan dan menjawab tahapan penelitian ini. Pilihan analisis menggunakan metode *Stochastic Frontier Approach (SFA)*. Kriteria penentuan variable berdasarkan estimasi fungsi biaya terdiri

dari variabel input berupa tabungan dan tenaga kerja, dan variabel output berupa pembiayaan dan sekuritas, variabel independen yaitu total biaya. Sampel terdiri dari 10 Bank Umum Syariah (BUS). Nilai efisiensi rata-rata keseluruhan perbankan syariah adalah 85,7% dengan peningkatan nilai setiap tahun pada periode pengamatan. Variabel tabungan dan tenaga kerja berpengaruh positif pada total biaya, variabel pembiayaan dan surat berharga berpengaruh negatif pada total biaya selama periode pengamatan terpilih.

Kata Kunci: *Efisiensi, Stochastic Frontier Approach (SFA), Perbankan Syariah*

INTRODUCTION

Looking at the history of Indonesian banking, the existence of conventional banks existed earlier than Islamic banks. Therefore, conventional banks dominate the national banking market. As part of the national banking industry, Islamic banking has a role not much different from other conventional banks. One that distinguishes conventional banks from Islamic banks be located in the returns and profit-sharing. Islamic banks do not use interest as a tool to earn income as in conventional banks but use the principle of profit and loss sharing (Sudarsono, 2008).

As an intermediary institution, banks are required to have good performance. The organizational performance will be primarily determined by the strength of the industry in competition. According to the Industrial Organization theory, the more companies there are in the industry, the more competition will occur. Therefore, the better the organizational performance, the stronger the Islamic banking will compete in the banking industry. Under these conditions, Islamic banking is required to have good performance and operate as efficiently as possible. It is necessary to measure efficiency in Islamic banking because it is one of its performance parameters (Novandra, 2014).

Efficiency can be defined as a comparison between input and output (Huri & Susilowati, 2004). The efficiency analysis is based on banks' ability to produce optimal output levels using existing input levels or vice versa. If a bank becomes efficient in its performance, it will be stable in running its operations and long-term returns for customers.

One of the efficiency measurements in the banking industry carried out by the OJK is by using the ratio of BOPO (Operating Costs to Operating Income). Based on data obtained at the OJK, it is known that the average ratio of BOPO for conventional commercial banks in 2014-2018 is smaller than Islamic commercial banks, namely conventional commercial banks at 79.3% and Islamic commercial banks at 94.8%. This means that conventional commercial banks are more effective in serving, or Islamic commercial banks have not been efficient in using operational costs. Similar to Wahab, Hosen, & Muhari (2014), using data envelopment analysis (DEA) states that conventional banking, on average, has a better efficient value than Islamic banking. In their research, they state that there is a striking difference, namely in the profit-sharing system run by Islamic Commercial Banks, which causes Islamic Commercial Banks to be unable to compete with Conventional Commercial Banks.

Another case with research conducted by Paramu, Sukarno, & Anwar (2017) and Adawiyah (2015) using Data Envelopment Analysis (DEA), which states that

Islamic Commercial Banks have a relatively better average level of efficiency compared to Conventional Commercial Banks during the observation period. These results indicate that Islamic Commercial Banks carry out an intermediation function relatively well compared to Conventional Commercial Banks. Similar research conducted by Anwar (2016) and Yulita & Rizal (2016) states that the size of Islamic banking's efficiency score is caused by the total financing variable, where the efficiency score of Islamic banks tends to increase with the increasing proportion of their small business financing.

Although there is quite a lot of research on the efficiency of Islamic banking Beck, T. et al. (2013), various studies still show different results using non-parametric (DEA) methods. There are still gaps in research on the efficiency of Islamic banking by using other methods. Fill the research gap; this study uses a parametric approach to examine Islamic banking efficiency in Indonesia 2015-2018 using the stochastic frontier method.

This study is based on measuring this study's efficiency using a parametric approach, where many previous studies used a non-parametric approach to measuring efficiency. The use of the stochastic frontier parametric approach, because this approach has the advantage of including the disturbance term caused by the influence of variables not included in the study, makes it easier to identify data outside the average. Besides, this study also examines whether Islamic banks are already efficient or not. This study aims to analyze the efficiency of Islamic banking in Indonesia. It is hoped that later Islamic banking can increase its efficiency and compete in the Indonesian banking industry because Islamic banks' existence has more significant potential to increase Islamic banking development.

LITERATURE REVIEW

Financial Intermediary Institution

Financial institutions are institutions whose main activity is to carry out financial-economic activities. According to article 3 of the Banking Law, banking's primary function is to collect and channel public funds. According to Ismanto (2019), this function mentions banks as intermediary implementing institutions, namely banks, as intermediate institutions that play a role in collecting funds from the public in the form of deposits and channeling funds to the public the form of loans (credit). The intermediation that is carried out by banks is financial intermediation. Soemitra (2009: 29) defines financial intermediation as the process of absorbing funds from economic surplus units, the business sector, government institutions, and individuals (households) to provide funds for other economic units. In short, financial intermediation is an activity to transfer funds from surplus economic units to deficit economic units.

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Efficiency and Stochastic Frontier Approach

Efficiency, in theory, is one of the performance parameters of an organization. Efficiency is defined as a measure of effectiveness that minimizes wasted time, effort, and skills (Archer, 2010). According to Berger and Mester, there are three basic banking efficiency concepts: cost efficiency, standard profit efficiency, and alternative profit efficiency. This study uses a cost efficiency approach or analyzes the cost efficiency of banking. Cost efficiency measures a bank's cost level compared to a bank with the best operating costs (best practice banks cost), which produces the same output. In this case, the bank has the minimum cost in producing output and is faced with the input variables and other variables' prices. Cost efficiency generally emphasizes the input side, which is based on minimizing costs at a certain output level.

Efficiency measurements are carried out using the stochastic frontier parametric approach. The stochastic frontier approach is one of the parametric approaches used in measuring efficiency. According to Coelli (2005), this approach's advantages are that it involves a disturbance term in the calculation, allows hypothesis testing using statistics, and is easier to identify outliers. It can measure the efficiency of businesses that have many outputs.

Several previous studies analyze Islamic banking's efficiency, such as Fadhlullah (2015) research regarding the efficiency level of Islamic BPD in Indonesia. The findings show that the average BPD efficiency from 2008 - 2012 has increased, reaching 71.8% in 2018 from 2008 to only 33.5%. Also, Rahmawati (2015) research regarding the cost efficiency of Islamic commercial banks suggests that the cost efficiency level is still inefficient, and the resulting profit is not optimal. Based on the description above, the following research model framework can be made in Figure 1:

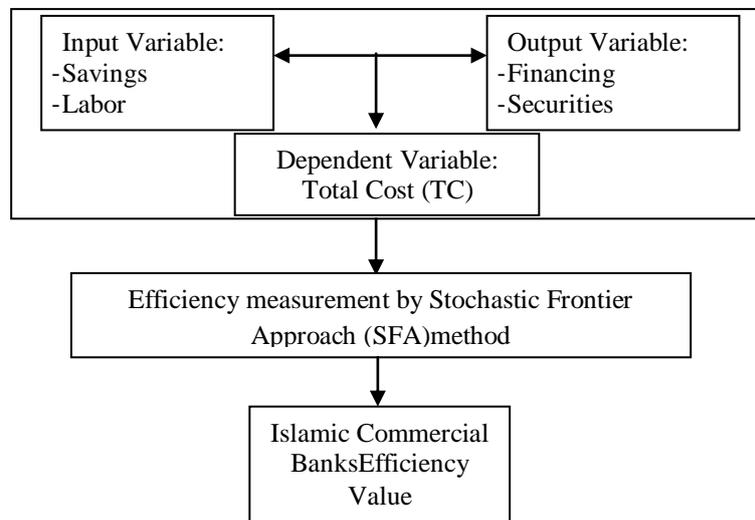


Figure 1. Research Model

METHOD

This research is a type of quantitative research. The data used is secondary data, that is, a panel. Secondary data used comes from each bank's website, which is the sample with this data collection method in the form of documentation. This study's population is all Islamic commercial banks recorded at the Financial Services Authority (OJK) during the 2015 to 2018 period, namely 24 Islamic commercial banks. The sampling technique was carried out using purposive sampling with the criteria of conventional commercial banks operating and listed on the OJK, there is a complete

annual financial report regarding the variables used from 2015 - 2018, and the bank has the largest asset of the total population. Based on these criteria, the samples in this study were 15 conventional commercial banks.

The independent research variables used are profit-sharing, labor costs, total financing, and securities, and the dependent variable used is total costs. This study's data analysis techniques included the Classical Assumption Test, Stochastic Frontier Approach (SFA), and Statistical Test.

RESULT AND DISCUSSION

Classic Assumption Test

The normality test results show that the data is normally distributed with a JarqueBera probability value greater than 0.05. Likewise, the multicollinearity test results; there is no multicollinearity symptom because each variable has a coefficient value smaller than 0.80. The results of the Durbin Watson test show that the Durbin Watson value lies in an area where there is no autocorrelation. It means that sharia is free from autocorrelation problems. Furthermore, the last is the heteroscedasticity test, where the white test results, the value of Obs * R-squared, is more significant than 0.05, which means that there are no symptoms of heteroscedasticity.

Stochastic Frontier Approach

Data processing was carried out using frontier 4.1 software, and hypothesis testing to determine the dependent variable's effect on the independent variable can be seen in Table 1 below. Following are the results of the estimated cost function of Islamic banking:

Table 1. Estimation Results of Cost Function Parameters of Sharia Banking Stochastic Frontier

Variables	Parameter	Coefficient	Std. Error	T-ratio
Constanta	B ₀	0.0861	0.6503	0.1324
Profit-sharing expense (Ps₁)	B ₁	0.5437	0.0978	5.5561
Labor Load (Ps₂)	B ₂	0.2925	0.1204	0.2429
Total financing (Qs₁)	B ₃	-0.1546	0.0466	-3.3143
Securities (Qs₂)	B ₄	-0.0309	0.0273	-1.1339
Sigma – squared		0.0169	0.0096	1.7598
Gamma		0.5637	0.2591	2.1759
Log-likelihood	33.415750			
LR test of one-sided	11.283006			

Source: Data analysis, 2020.

Based on table 1 above, the cost function estimation model can be obtained as follows:

$$\ln TC = 0.0861 + 0.5437 \ln Ps_1 + 0.2925 \ln Ps_2 - 0.1546 \ln Qs_1 - 0.0309 \ln Qs_2$$

From the regression equation above, the constant value of total costs (TC) is 0.0861, meaning that if the input and output variables are considered consistent, Islamic banks will pay the maximum cost for the output level of 0.0861. The following is a test between the dependent variable and the independent variable based on table 1 above:

1. The Profit-sharing expense has a positive and significant effect on total costs. It can be seen from the amount of t arithmetic, which is greater than the t table ($5.5561 > 2.03011$). The coefficient of profit-sharing is a positive value of 0.5437 so that the profit-sharing expense affects the total cost. It means that an increase in profit sharing expenses by 1% will increase the total costs by 0.54%.
2. Labor load has a positive and insignificant effect on total costs. This can be seen from the amount of t count, which is smaller than the t table ($0.2429 < 2.03011$), and the coefficient value of the labor load is positive at 0.2925 so that the labor load has a positive effect on the total cost.
3. Total financing has a negative and significant effect on total costs. This can be seen from the absolute magnitude of T count, which is greater than the t table ($|-3.3143| > 2.03011$). The coefficient value of total financing is negative at 0.1546, which means that total financing has a negative sign of total costs. This means that an increase in total financing by 1% will reduce total costs by 0.15%.
4. Marketable securities have a negative and insignificant effect on total costs. This can be seen from the absolute value of t count, which is smaller than the t table ($|-1.1339| < 2.03011$). The securities negatively sign total costs because the securities' coefficient value is negative at 0.0309.

The following is the result of the coefficient of determination:

Table 2. Results of the Coefficient of Determination in Islamic banking

Testing	Score
R-squared	0.803933
Adjusted R-squared	0.781525
S.E. of regression	0.087820
F-statistic	35.87758
Prob(F-statistic)	0.000000

Source: Data analysis, 2020.

Based on table 2, it can be seen that the coefficient of determination is 0.781525, which means that the independent variables (profit-sharing expense, labor load, total financing, and securities) have a contribution to influence the total cost variable by 78.15%. The rest is influenced by other variables that are not in the model.

Based on table 2, the F statistical test results are 35.87, and the f table is 2.86, where f is greater than the f table ($35.87 > 2.86$) with a probability smaller than $\alpha = 5\%$. Thus the independent variables (profit-sharing expense, labor load, total financing, and securities) together significantly affect the total cost variable.

The following is the influence of the input and output variables on the total cost of Islamic banking.

Deposits in Islamic banking have a positive and significant effect on total costs. In this study, savings in Islamic banking are measured by profit-sharing expenses. It means that the higher the interest expense and profit-sharing expenses of a bank, the bank's total cost will also increase. It has led to the smaller value of the efficiency of Islamic banking. Therefore, it is necessary to manage deposits from customers that are good for rotating and generating enormous profits to reduce bank fees. This study's results are also in line with Hosen and Rahmawati (2014) research results, which also

produce the same conclusion that profit-sharing expenses in Islamic banking have a positive effect on total costs. Thus, this study hypothesizes that savings have a positive effect on the total cost received.

Labor in Islamic banking has a positive and insignificant effect on total costs. It means that if the labor load increases, the total bank fees will also increase. Therefore, it is necessary to reduce the labor load to reduce total bank costs and increase bank efficiency. This research is in line with Rahmawati (2015) and Fadhlullah (2015), stating that the workforce burden on Islamic banking positively affects. Thus, this study's hypothesis that the labor variable positively affects total bank fees is accepted.

Total financing in Islamic banking has a negative and significant effect on total costs. It means that an increase in total funding will cause a decrease in the bank's total cost. This study's results, which have a negative effect, indicate that bank financing needs to be increased again because it can generate benefits for Islamic Commercial Banks to reduce expenses. The level of efficiency can be increased. For example, if the financing in Islamic Commercial Banks increases, the bank will reduce the burden on making it more competitive and attractive to the public. This research is in line with Rahmawati (2015) research regarding Islamic banks' total financing, where the results have a negative sign of total costs. Thus, the hypothesis of this study that financing has a positive effect on total costs is rejected.

Securities owned by banks in Islamic banking have a negative and insignificant effect on total costs. It means that if the securities held by the bank decrease, the total cost will increase. Therefore, it is necessary to optimize securities to increase bank efficiency. The results of this study are in line with the research of Rahmawati (2015) and Hosen and Rahmawati (2014), which state that securities owned by banks do not have a significant and negative effect on total costs. Thus, this study hypothesizes that securities have a negative sign on the total cost received.

Sharia Banking Cost Efficiency Analysis

This method is used to measure the level of efficiency of each bank. The efficiency level is analyzed from the cost function model. Before calculating the level of efficiency in the aggregate, it is necessary to test the hypothesis regarding whether Islamic banks are already efficient or not. The limit used is 0.5, where the bank is said to be towards efficiency if the efficiency value is > 0.5 . Islamic banks are said to be efficient, and vice versa; the bank is said to be inefficient if the value is < 0.5 .

This test is carried out using one sample average t-test using ten samples of Islamic commercial banks.

Table 3. Test the Average of One Sample

Name of Bank	N	Mean	Deviation Std.	T count	Significant
ShariaBanking	10	0,8577	0,07007	16,144	0,000

Source: Data analysis, 2020.

Based on table 3, it can be seen that the average result is 0.8577, with a standard deviation of 0.07007. The T value obtained is 16.144 and seen the amount of t table is 2.03011, which means the value of $t \text{ count} > t \text{ table}$. So it can be concluded that the average test rejects H_0 and accepts H_a means that Islamic commercial banks' performance has headed efficiently. After that, it can be calculated using the stochastic

frontier to determine the efficiency of Islamic banking. The following are the results of the level of cost-efficiency.

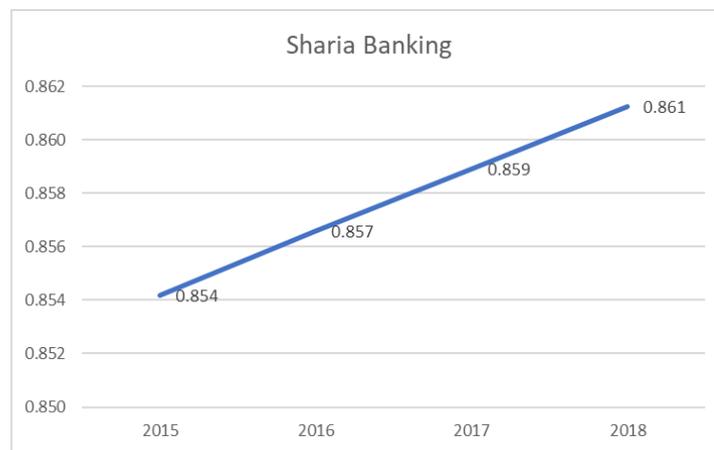


Figure 2. The Average Efficiency of Islamic Banking

Based on Figure 2 above shows the average cost efficiency value of Islamic banking in 2015 - 2018. Based on the graph, Islamic banking's average efficiency has an increasing trend from 2015 - 2018. The level of cost-efficiency of Islamic banking on an average of Islamic banking is 0.852551 or 85.7%. It means that overall Islamic banking is only efficient in using its costs of 85.7% while the remaining 14.3% of expenses are wasted. If viewed from each bank, the following are the level of cost-efficiency can be looked from Table 4.

Table 4. Level of Cost Efficiency of Islamic Banking

No	Name of Bank	Year				Mean
		2015	2016	2017	2018	
1	Bank Muamalat	0.9373	0.9384	0.9395	0.9405	0.9389
2	Bank BRI Syariah	0.8132	0.8162	0.8192	0.8221	0.8177
3	Bank BNI Syariah	0.8562	0.8586	0.8610	0.8633	0.8598
4	BSM (Bank SyariahMandiri)	0.7788	0.7823	0.7858	0.7892	0.7840
5	Bank BCA Syariah	0.9468	0.9477	0.9487	0.9496	0.9482
6	Bank Victoria Syariah	0.8555	0.8580	0.8603	0.8627	0.8591
7	Bank Panin Dubai Syariah	0.8058	0.8090	0.8121	0.8151	0.8105
8	Bank SyariahBukopin	0.8632	0.8655	0.8678	0.8700	0.8666
9	Bank Aceh Syariah	0.9442	0.9452	0.9462	0.9471	0.9457
10	Bank Mega Syariah	0.7408	0.7448	0.7488	0.7527	0.7467
						0.8577

Source: Data Processed, 2020.

Cost efficiency is defined as the ratio between the minimum costs to a bank that can produce a specific output to banks' actual costs. The smaller the actual costs used than the minimum costs, the higher the bank cost efficiency (Rahmawati, 2015). Thus,

the smaller the bank fees incurred, the higher efficiency will be because it can provide competitive prices in the banking industry.

CONCLUSION

Based on the research that has been done, the results show that the efficiency of Islamic banking is 85.7%. It is still necessary to increase the efficiency of Islamic banking by minimizing costs and increasing bank profits. The efficiency of the bank is mostly influenced by the burden of profit sharing and labor load. The higher the profit-sharing burden and the labor load, the higher the bank's total costs and will reduce the value of efficiency. So it is necessary to increase the total financing and securities owned by the bank to reduce total bank costs and increase the efficiency of Islamic banking.

The author hopes that Islamic banking management continues to improve efficiency in terms of costs because banks' costs are still funds that are not used efficiently. Regulators, Bank Indonesia, and OJK can make rules that support the development of the financial industry and Islamic banking in Indonesia. Islamic Banking Finance is a nascent industry in Indonesia. Besides, Indonesian society is a Muslim community, so it has enormous potential to increase Islamic banking development.

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