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EFFICIENCY OF ISLAMIC BANKS IN INDONESIA: DATA ENVELOPMENT ANALYSIS

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ABSTRACT

This paper measures the efficiency of Islamic commercial banks in Indonesia by analyzing factors that affect the level of efficiency using the two-stage data envelopment analysis (DEA) method. The objects of this study are 10 Islamic commercial banks in Indonesia which are analyzed from 2011 to 2014. Two methods are used in this study, namely nonparametric method of DEA in the first stage and Tobit model in the second stage. The actual average efficiency of Islamic commercial banks in Indonesia is at fairly good level with an average score 91.82, which means that although relatively inefficient, Islamic commercial banks in Indonesia are able to optimize their resource inputs to produce outputs as an intermediary institution. The application of the Tobit model uses asset (ASSET), non-performing financing (NPF), capital adequacy ratio (CAR), number of bank branches (BRANCH) and return on asset (ROA) as the explanatory variables. The results showed that the variables of assets, number of bank branches, and ROA significantly affect Islamic commercial bank efficiency, while CAR and NPF empirically do not have a significant effect on efficiency.

JEL Classification: E44, G21, G32, Z12

Key words: Efficiency, Islamic commercial bank, Data envelopment analysis, Tobit model, Indonesia

1. INTRODUCTION

The Indonesian Islamic banking industry has been progressing quite rapidly, as evident in the last 17 years. The total assets of the Islamic banking industry has increased 152-fold from Rp 1.79 trillion in 2000 to Rp 272 trillion in December 2014. The growth rate of Islamic banks in Indonesia was recorded at 23.57% per year. According to Fauzi (2012), the development of the Indonesian banking industry is continuously in motion because of its great potential based on: (1) Indonesia as one of the emerging markets in which the term is designated for a region that experiences rapid economic growth far exceeding developed economies. In general, the emerging markets are located in the eastern parts of the world and are characterized by high population, one of which is Indonesia; (2) Indonesia is the largest Muslim-majority country in the world with 86% of its population or 205 million out of its 237 million inhabitants (2010 census) identifying themselves as Muslims; and (3) the abundant natural resources, which provide growth opportunities for small, medium, and micro enterprises.

The increasingly rapid Islamic banking industry development in Indonesia requires the measurement of the Islamic banks efficiency level to determine the performance of existing Islamic banks. Financial performance of a bank reflects the bank's soundness. A notice by Bank Indonesia No. 9/24/DPbS mentions that bank rating is influenced by CAMELS factor (Capital, Asset Quality, Management, Earnings, Liquidity, Sensitivity to Market Risk). Aspects of capital include capital adequacy ratio (CAR), aspects of asset quality that covers productive assets quality (PAQ), aspects of earnings include return on equity, return on assets (ROA), and operational efficiency ratio, and aspects of liquidity include financing to deposit ratio (FDR).

Tables 1 and 2 show some financial indicators and financial ratios of Islamic banks and these indicate a fairly rapid growth in the Islamic banking industry in Indonesia. From 2009 to 2014 several financial indicators such as the amount of assets, third party funds, and the financing extended by Islamic banks increased. In addition, the data show that some financial ratios such as non-performing financing (NPF) and the financing deposit ratio (FDR) increased the performance and automatically contributes to the development of Islamic banking industry in Indonesia. With such data, the measurement of the efficiency level is increasingly needed. That is because by knowing the level of efficiency of an Islamic bank, we can

find out how much the bank is able to optimize all its resources and provide greater benefits to society as well as customers.

TABLE 1
Asset Development, Third Party Fund, and Islamic Financing in Indonesia 2009-2014 (in billion Rupiah)

Description	2009	2010	2011	2012	2013	2014
Asset	66.090	97.519	145.467	195.018	242.276	272.343
Third Party Fund	52.271	76.036	115.415	147.512	183.534	217.858
Financing	46.886	66.181	102.655	147.505	184.122	199.330

Source: Statistik Perbankan Syariah, June 2015 (OJK).

TABLE 2
Performance Development of Islamic Banking in Indonesia 2009-2014

Description	2009	2010	2011	2012	2013	2014
Non Performing Financing	4.01%	3.02%	2.52%	2.22%	2.62%	4.33%
Financing to Deposit Ratio	89.70%	89.67%	88.94%	100.00%	100.32%	91.50%

Source: Statistik Perbankan Syariah, June 2015 (OJK).

After the Islamic Banking Act No. 21 Year 2008 concerning Islamic banking legal foundations was passed by the House of Representatives of Indonesia, many conventional banks spun off their Islamic windows to full-fledged Islamic banks and converted rural banks to Islamic rural banks which base their operation within the Islamic tenets (Abduh and Omar, 2012). As shown in Table 3, there was a sudden increase in the number of Islamic commercial banks in Indonesia from 2009 to 2014.

TABLE 3
The Development of Islamic Banking Statistics 2009-2014

Description	2009	2010	2011	2012	2013	2014
Number of Islamic Commercial Banks	6	11	11	11	11	12
Number of Islamic Business Unit	25	23	24	24	23	22
Number of Islamic Rural Banks	138	150	155	158	163	163

Source: Islamic Banking Statistics, June 2015 (OJK).

Measuring the efficiency level in the Islamic banking industry has also become very important given the intense competition in the Islamic banking industry. In Table 3, data shows that between 2009 and 2014 there was an increase in the number of banks from 6 banks to 12 banks. Therefore, Islamic bank efficiency can become an important indicator of the bank's ability to survive and face the intense competition in the Islamic banking industry and in the whole banking industry in Indonesia.

One method often used in analyzing bank efficiency is using the non-parametric method called data envelopment analysis (DEA). DEA is a mathematical optimization method that measures the technical efficiency of an economic unit activity for comparison with to another economic unit activity. This method has an advantage over parametric methods. The advantage of using a non-parametric method is that we can identify the unit that is used as a reference.

The assessment of bank soundness can be seen from many aspects (Martono 2002). Law No. 21 of 2011 article 1, paragraph 1 states that the Financial Services Authority (*Otoritas Jasa Keuangan*), henceforth abbreviated as OJK, is an agency that is independent and free from interference by other parties, which has the functions, duties, and authority of regulation, supervision, inspection, and investigation as referred to in this law. From the abovementioned article, it is concluded that assessment of bank soundness falls under the full authority of OJK.

Explicitly, the purpose of this paper is first, to measure the level of efficiency of Islamic commercial banks in Indonesia in 2011 until 2014; and secondly, to analyze the influence of assets, number of bank branches, return on assets, capital adequacy ratio, and non-performing financing to the efficiency of Islamic commercial banks in Indonesia in 2011 to 2014.

2. THEORETICAL BACKGROUND

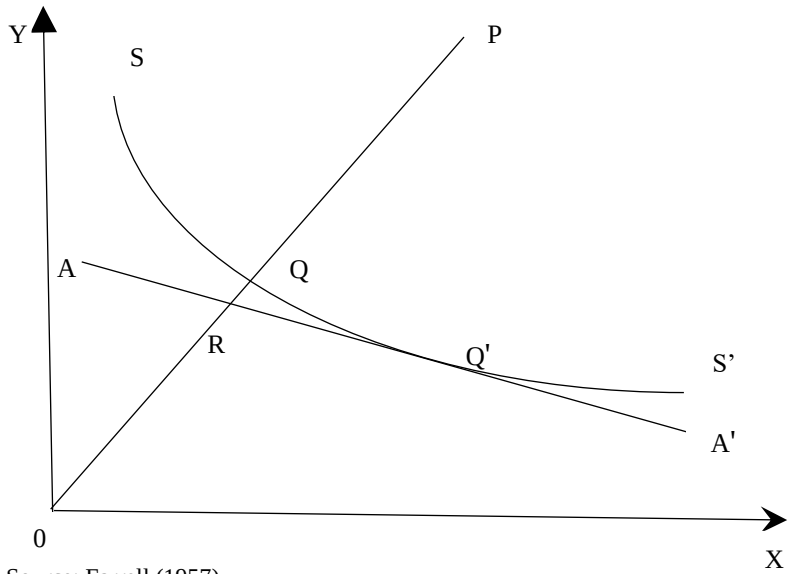
The discussion on the efficiency of an economic unit/firm is always about how to generate maximum output level by a particular amount of input (Farrell, 1957). In describing a condition of achieving efficiency in a firm, Farrell (1957) illustrates his idea by using an example with the case of a particular firm that uses two inputs (x1 and x2) to produce a single output (q) with an assumption of constant return to scale (CRS). By using the isoquant line of a firm with a fully efficient firm, which is represented by the curve SS' in Figure 1, then technical efficiency can be calculated. If a firm has used a certain

number of inputs indicated by point P, to produce a unit of output, then the technical inefficiency of the firm is represented by the distance of QP which is the sum of all inputs that can proportionally reduce or be reduced without causing a reduction in output that can be generated. Indicators are usually written mathematically as a percentage that equals to 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 firms is generally measured using the ratio value:

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

Equation (1) will equal to equation 1-QP / 0P, where the value ranges between zero to one, and therefore generates an indicator of the degree of firm technical efficiency. The value of one implies that the company has achieved full efficient conditions. For example, point Q has reached technical efficiency because it is on the efficient isoquant curve.

FIGURE 1
Technical and Allocative Efficiency



Source: Farrell (1957).

If the ratio of input prices (in Figure 1) is represented by line AA' is known, then the point of allocative efficient production can also

be calculated. The level of allocative efficiency (AE) of a firm that is oriented from the point P can be defined as the ratio of:

$$(2) \qquad AE = 0R/0Q$$

The distance of RQ illustrates the reduction in production costs which can be obtained when production levels are at a point Q' which is allocative efficiency (and technically), in contrast to point Q technically efficient, but allocatively inefficient.

The Total Economic Efficiency is defined as the ratio of:

$$(3) \qquad EE = 0Q/0P$$

The distance from point R to point P can also be interpreted in terms of cost reduction. Note that technically efficient products and allocative ones give meaning that economic efficiency has been achieved overall.

In breaking down the illustrations described by Farrell (1957), a programming model is formulated to measure the relative efficiency level which is called Data Envelopment Analysis (DEA) by Charnes, Cooper and Rhodes (1978).

DEA modeling is used to measure the level of relative efficiency of a firm compared to its peers. Several studies on firm efficiency, especially in the banking industry have been widely used throughout the world.

Previous research on efficiency of Islamic banks in Indonesia have been conducted by Firdaus and Hosen (2013). They used the DEA and found that the islamic commercial bank efficiency level in Indonesia during the second quarter of 2010 until the fourth quarter of 2012, had not yet reached the optimul level of efficiency. In other research, Zuhroh, Ismail and Maskie (2015) showed that cost efficiency of islamic banks is lower than for conventional banks in a national banking industry scope.

Chansarn (2008) conducted research on the commercial bank efficiency in Thailand for the period 2003-2006. Results of the study showed that the efficiency of commercial banks in Thailand was stable and very high with an average of 90% annually during the period of the study. In contrast, research conducted by Kamau (2011) showed the average banking sector efficiency score in Kenya was not more than 40% over the period 1997-2009. Based on these two studies, it appears that there are differences in the efficiency level of the banking

sector in Thailand and Kenya which reflects the state of the banking sector in both countries.

3. METHODOLOGY

This paper has a research objective of determining the efficiency of 10 Islamic commercial banks in Indonesia, namely: BCA Syariah, BNI Syariah, Jabar Banten Syariah, Muamalat Indonesia, Panin Syariah, Syariah BRI, Syariah Mandiri, Syariah Mega Indonesia, Syariah Bukopin and Victoria Syariah from 2011 until 2014. As of 2015, Indonesia has 12 Islamic commercial banks, but this research excludes Bank Maybank Syariah for reasons of abnormal data distribution and also excludes Bank Tabungan Pensiunan Nasional Syariah that was just formed in 2013. The data used in this research is secondary data, which is the quantitative data derived from the financial statements of each banks respectively.

In the first stage, the selection of input and output variables in measuring the level of banking efficiency uses Data Envelopment Analysis (DEA) using the intermediation approach as used by Firdaus and Hosen (2013) and Efendic (2011). The input variables in this research are third-party funds, total assets, and labor costs. Whereas the output variables are financing and operating income.

For the second stage, the dependent variable used to measure the level of efficiency of an Islamic commercial bank is the DEA score. The independent variables used are asset (ASSET), the number of bank branches (BRANCHES), return on assets (ROA), capital adequacy ratio (CAR), and non-performing financing (NPF). The Tobit model is as follows:

$$Y = ASSET + BRANCHES + ROA + CAR + NPF \quad (4)$$

3.1 DATA ENVELOPMENT ANALYSIS (DEA)

Data envelopment analysis (DEA) is a nonparametric method used in assessing the efficiency of an economic activity unit. The DEA is a method used to evaluate the efficiency of a decision making unit (DMU) responsible to use a number of input to obtain a targeted output. In particular, DEA is a linear programming based technique in which there is objective function and constraint function. Here is the general equation of DEA:

$$(5) \qquad h_s = \frac{\sum_{i=1}^{m} u_{is} y_{is}}{\sum_{j=1}^{n} v_{js} x_{js}}$$

where:
h_s = bank *s* technical efficiency
u_{is} = weighted output *i*
v_{js} = weighted input *j*
y_{is} = number of outputs *i*
x_{js} = number of inputs *j*

In this case, as well as finding the value for *u* and *v*, as a maximum measurement of efficiency h_s. With view to the constraint that all the efficiency measurement should be less than or equal to one, one of the problems with the formulation of this ratio is that it has a number of solutions that are infinite. To avoid this, we can determine the constraints that will specify and ease the next process using the computational techniques that continues to experience development. The constraint function is:

$$(6) \qquad \frac{\sum_{i=1}^{m} u_{is} y_{is}}{\sum_{j=1}^{n} v_{js} x_{js}} \leq 1 \; ; \; \mathrm{s} = 1,2, \ldots, N \text{ and } y_i, x_j \geq 0$$

where *s* denotes the number of banks in the sample. The first inequality shows the presence of efficiency ratio for other firms not more than 1, while both inequalities are positive. The ratio will vary between 0 and 1. Banks are said to be efficient if they have a ratio close to 1 or 100 percent; on the contrary if the ratio is close to 0, it indicates the low efficiency of a bank. On DEA, each bank can determine its own weighting and ensure that the weighting chosen will produce the best measurement of performance.

Associated with the inputs and outputs used in measuring efficiency, three approaches are used, namely asset approach, the production approach, and the intermediation approach. This research uses the intermediation approach because according to Hadad et al. (2003) it explains the actual activities of a banking institution to function as an intermediary institution.

Moreover, the intermediation approach has been widely used in researches to measure the level of bank efficiency in many countries. In addition to determining the input and output of research, there are two models of the measurement of the efficiency level used to analyze the efficiency of an economic activity unit. The first model

developed was the model with the assumption constant return to scale (CRS) or so-called CCR model (Charnes-Cooper-Rhodes model). In the model of constant return to scale every economic activity unit will be compared with the entire of economic activity unit in the sample. According to Charnes, Cooper, and Rhodes (1978), this model can show the overall technical efficiency or value of profit efficiency for each economic activity unit.

In the CRS model, there is a mathematical model that has been generally explained in the general equation above. These equations can explain that the value or score of technical efficiency is obtained by a comparison between the output ratio to input ratio. Furthermore, the equation explains that the value in the measurement of the efficiency level is limited in the range of 0 to 1 and the values must be positive. Through the equation, it can be concluded that banks are said to be efficient if they have ratios close to 1 or 100 percent; on the contrary if it is close to 0, it indicates the low efficiency of a bank. The equation on the model CCR is:

(7) $\max h_s = \sum_{i=1}^{m} u_i y_{is}$

subject to:

(8) $\sum_{i=1}^{m} u_i y_{is} - \sum_{j=1}^{m} v_j x_{js} \leq 0 \; ; s = 1, \dots, N$

(9) $\sum_{j=1}^{m} v_j x_{js} = 1$

(10) $u_i, v_j \geq 0$

In the equations above, the objective function maximizes output subject to the constraint that input value is equal to one, so that the output value subtracted by the input value is less than or equal to 0. It means that all banks will be at or below the level of technical efficiency.

The second model developed for measuring efficiency level is the model with the assumption of variable return to scale (VRS) or the so-called BCC model (Bankers-Charnes-Cooper model). In this model it is assumed that the conditions of all economic unit activity are not the same or it can be said that not all economic unit activity operates optimally. Imperfect competition, financial constraints, and so forth, may cause a firm to not operate at an optimal scale. The mathematical model with the VRS approach is obtained through modifying the CRS model and remains guided by the general mathematical model of DEA as an equation in measuring the level of technical efficiency. By

adding convexity constraint into the equation, the mathematical formula becomes:

(11) $\max h_s = \sum_{i=1}^{m} u_i y_{is} + U_0$

subject to:

(12) $\sum_{i=1}^{m} u_i y_{is} - \sum_{j=1}^{m} v_j x_{js} \leq 0 \;\; ; s = 1, \ldots, N$

(13) $\sum_{j=1}^{m} v_j x_{js} = 1$

(14) $u_i v_j \geq 0$

where U_0 is a convexity constraint that can be positive or negative.

In this research, the model with the assumption of constant return to scale (CRS) or also known as the CRR model (Charnes-Cooper-Rhodes model) will be used. The model was chosen based on research conducted by Firdaus and Hosen (2013) on the efficiency of Islamic commercial banks. This research also utilizes efficiency based on output-oriented approach because ultimately the goal of an economic activity unit is to receive maximum benefit by optimizing the resources owned.

3.2 TOBIT MODEL

At this stage, there will be an analysis of the factors affecting the efficiency level. By first getting the efficiency of the first stage using the DEA method, then the value will be analyzed by some environment variables to know the relationship and the nature of the relationship between these variables to the efficiency level (second stage). Those two stages in this research are called the Two-Stage Data Envelopment Analysis. So, the Tobit Model is used in analyzing the factors affecting the level of efficiency.

The Tobit calculation was founded by James Tobin in 1958 when he analyzed the spending of households in the United States to buy a car. Some households did not buy a car so the spending on cars would be zero, and this affected the result of the regression analysis. He found that if ordinary least squares (OLS) was still used, the calculation of the parameters will tend to approach zero or be insignificant or if it becomes significant, its value is biased (too high or too low) and also inconsistent (if there is new data, the results are not the same or not in accordance with the original results).

In short, the Tobit method assumes that the independent variables are non-censured and only the dependent variable are censured; all variables (either independent or dependent) are measured correctly; no autocorrelation; no heteroscedascity; there is no perfect multicollinearity; and the mathematical model used is appropriate. In the use of regression analysis method to research the social and economic fields, there are many data structures in which the response variable has a value of zero for parts of the observations, whereas other parts of the observation have particular values that vary. Such data structures are called the censored data (Gujarati, 2009).

4. RESULTS AND DISCUSSION

4.1 Results of the Level of Efficiency of Islamic Commercial Banks 2011-2014 (First Stage)

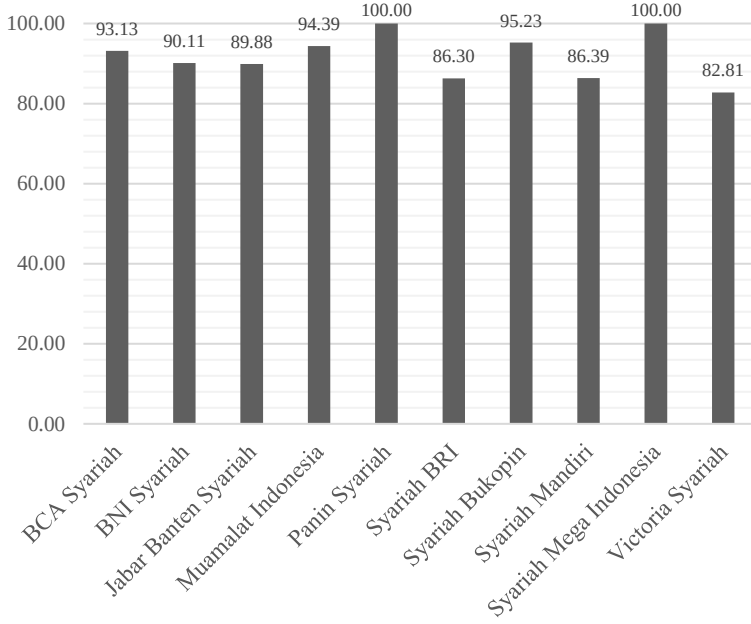
This research will discuss the efficiency levels of 10 Islamic commercial banks in Indonesia during the period 2011 to 2014. The method used is DEA using a two-stage approach. The efficiency level is processed using the DEA approach, while the input and output variables are obtained from the publication of financial statements of Islamic banks. In the DEA method, it will display the results of the efficiency measurement through an efficiency score ranging from 1 to 100. A score of 100 illustrates the ability of an Islamic bank in optimizing its resources maximally. Whereas an efficiency score further away from 100 will indicate that an Islamic bank is inefficient in optimizing its resources and is unable to perform its role as an intermediary institution optimally. Here are the DEA processing results that we describe (Figure 2).

The measurement result in Figure 2 shows the average efficiency level of Islamic banks from 2011 to 2014 of each bank is above 80. A few banks obtained an efficiency score of 100, or it can be interpreted that the bank has been able to optimize all its resources and is categorized as an efficient bank. The banks categorized as efficient in this research are Bank Panin Syariah and Bank Syariah Mega Indonesia. These banks in the last four years from 2014 have optimal efficiency or have an efficiency score of 100 during the last four years in a row, while other banks are still considered inefficient, or unable to optimize resources optimally.

If we look at the efficiency score of Bank Muamalat Indonesia as the first Islamic bank in Indonesia, it shows a fairly good efficiency score of 94.39. But we can see the relatively new banks such as Bank

Panin Syariah, Bank Syariah Mega Indonesia prove to have better efficiency score. The bank that achieved the lowest efficiency score is Bank Victoria Syariah with a score of 82.81. Overall, the level of Islamic bank efficiency in Indonesia is fairly good with an average score of 91.82, which means that although relatively inefficient, Islamic banks in Indonesia are able to optimize their resource inputs to produce outputs as an intermediary institution.

FIGURE 2
Average Efficiency of Islamic Commercial Banks 2011-2014



Meanwhile, if we look at the following Figure 3, the efficiency of Islamic Banks per year during the research period shown, it appears that the efficiency of Islamic banks in Indonesia has a trend of fluctuations and trends of different directions except for Bank Panin Syariah and Bank Syariah Mega Indonesia as discussed previously which have a stagnant efficiency score of 100. We can see during the research period that BCA Syariah, BNI Syariah, Syariah Mandiri have a negative trend when viewed from banking efficiency.

The highest efficiency score was in 2011 (i.e., 94.77) and the lowest efficiency score was in 2013 (i.e., 89.56). The overall trend shows no consistency; decreasing in 2013, but increasing again during 2014.

FIGURE 3
Efficiency of Each Islamic Commercial Banks 2011-2014

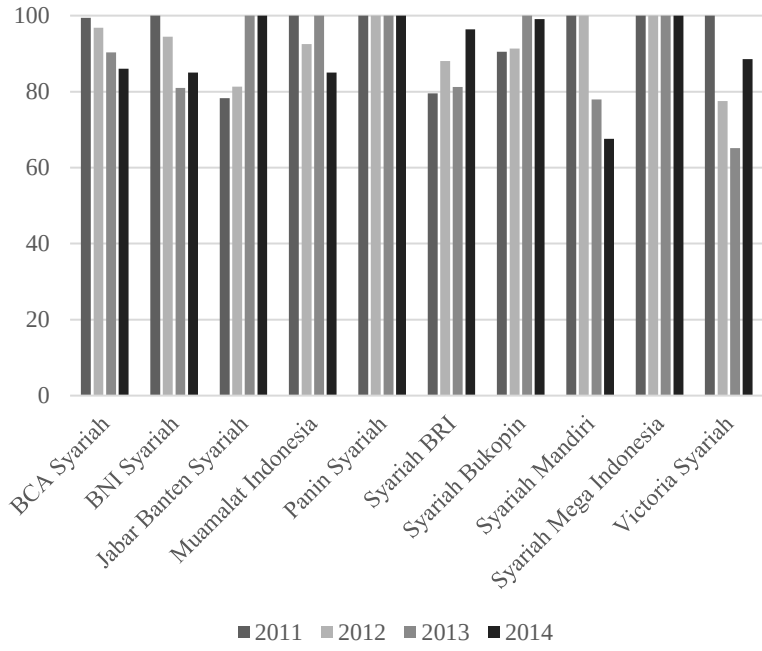


FIGURE 4
Average Efficiency of all Islamic Commercial Banks 2011-2014

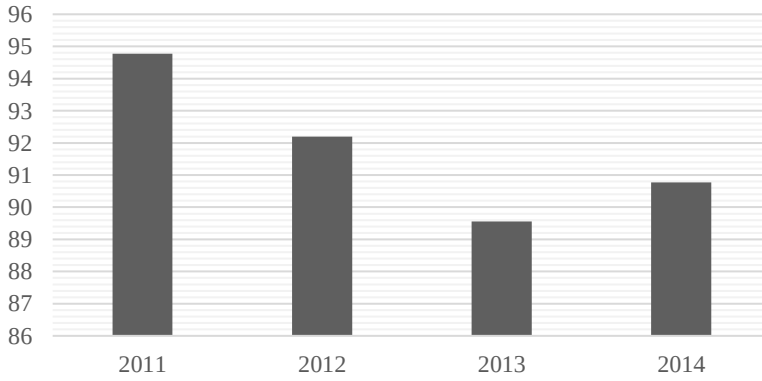


Figure 4 shows the required target each Islamic bank as analyzed by DEA in order to optimize its resources to gain an efficiency score of 100 in the period of the study. The calculation in

Table 4 is in percentage, averaged over the period of the study. The following analysis can be a cornerstone of the respective Islamic banks policies in order to optimize efficiency as an intermediary institution.

TABLE 4
Targets to Full Efficiency (in Percentage)

Islamic Commercial Banks	Third-Party Fund	Asset	Cost of Labor	Financing	Operating Income
BCA Syariah	7.60	7.85	10.38	2.58	0.00
BNI Syariah	7.93	9.93	18.88	0.00	0.00
Jabar Banten Syariah	10.13	10.13	10.13	1.23	0.00
Muamalat Indonesia	11.68	5.63	5.63	8.90	1.00
Panin Syariah	0.00	0.00	0.00	0.00	0.00
Syariah BRI	21.75	12.53	14.58	9.38	0.00
Syariah Bukopin	6.45	6.55	4.65	31.90	0.00
Syariah Mandiri	15.43	12.58	12.58	19.60	0.00
Syariah Mega Indonesia	0.00	0.00	0.00	0.00	0.00
Victoria Syariah	16.33	18.23	20.38	3.25	0.00

For example, Victoria Syariah that achieved the lowest efficiency, in order to streamline its resources, it needs to increase its Third Party Funds by 16.33%, increase its assets by 18.23%, increase its cost of labor by 20.38%, and increase its financing by 3.25%. The DEA analysis can calculate the target of variables of input or output that needs to be increased in order to generate full efficiency or an efficiency score of 100. Another example is Syariah Mandiri, a state-owned bank. In order to streamline its resources, it needs to increase of third-party funds, assets, cost of labor, and financing by 15.43%, 12.58%, 12.58 %, and 19.6% respectively.

4.2 RESULTS OF THE ANALYSIS OF FACTORS INFLUENCING LEVEL OF EFFICIENCY OF ISLAMIC COMMERCIAL BANKS 2011 - 2014 (SECOND STAGE)

In the next stage of this research, the factors affecting efficiency level of Islamic Commercial Banks will be analyzed using the Tobit model so that the whole procedure of this research is called Two-Stage DEA. The Tobit model analysis result in this study uses Eviews 7. The analysis of Tobit model is used to conclude the factors affecting the

efficiency level of Islamic Commercial Banks. Here are the results of analysis using the Tobit model (4).

TABLE 5
Estimation Results

Variable	Coefficient	Std. Error	*z*-statistic	Prob.
Constant	-0.8799**	0.3715	-2.37	0.018
ASSET	0.0625**	0.0300	2.00	0.045
BRANCH	-0.0643*	0.0344	-1.87	0.062
ROA	0.0567**	0.0168	3.37	0.001
CAR	-0.0301	0.0503	-0.60	0.549
NPF	-0.0091	0.0157	-0.58	0.561
N	40			
Wald χ^2	14.65			0.012

Note: ** Significant at 5%, * significant at 10%.

Based on the estimation in Table 5, it can be seen that some variables affect efficiency both positively and negatively, and there are also variables that did not significantly affect the efficiency of the empirical case study of Indonesian Islamic Commercial Banks during the research period from 2011 to 2014. In the Tobit model estimation, assets of Islamic Commercial Banks (ASSET) have a positive and significant impact on the Islamic Commercial Bank efficiency. This is indicated by the large amount of assets of a firm that can more freely conduct its operational activities so that it can achieve optimal resource utilization and ultimately attain better performance. Sugiarto (2003) also explains that in order to create an efficient bank, it is necessary to have business scale (assets) and a large amount of capital. For example, firms having a large asset base can better adopt new technologies thereby reducing operational costs such as reducing management costs. This result is similar to the research of Firdaus and Hosen (2013) and Ismail, Abd Majid and Ab Rahim (2013), which reveals that assets have a positive effect on Islamic Commercial Bank efficiency.

The next variable of the number branches of banks (BRANCH) have indicated a negative effect and significance to the efficiency of Islamic commercial banks. In other words, the more branches of an Islamic Bank, the more inefficient it will be in managing its resources. It is indicated due to the level of economies of scale in Islamic banks which incidentally is quite a new industry than conventional banks. In the current phase, the addition of bank branches will increase the costs incurred by the Islamic commercial

banks. However, in accordance to the theory of production, it is predicted that gradually, the increasing number of branches will have a positive effect given the higher economies of scale. This is similar to the research done by Firdaus and Hosen (2013). in a similar study conducted in Turkey.

Return on Assets (ROA) has a positive and significant impact on Islamic Commercial Bank efficiency. It is indicated that ROA that describes the higher level of bank profitability will produce a more efficient bank. Banks that have higher profit levels could potentially have a higher level of efficiency, as described by Firdaus and Hosen (2013).

Capital Adequacy Ratio (CAR) and Non Performing Finance (NPF) empirically turned out to not have a significant effect on efficiency. However, according to the mark test, variable CAR and NPF have a negative sign in accordance with previous research of Firdaus and Hosen (2013) and Ismail, Abd Majid and Ab Rahim (2013). The variable does not have a significant effect on efficiency, as aligned with the findings of Irawati (2008) and Nurwulan (2011). NPF of Islamic commercial banks that is relatively small indicates that it does not influence efficiency. Likewise, CAR ratio in Islamic commercial banks indicates an effect of efficiency because Islamic commercial banks have had enough CAR ratio that is above that set by the Government of Indonesia at 8%.

5. CONCLUSION

This research focuses on 10 Islamic banks which has a fluctuating trend from 2011 to 2014. The ten banks are BCA Syariah, BNI Syariah, Jabar Banten Syariah, Muamalat Indonesia, Panin Syariah, Syariah BRI, Syariah Bukopin, Syariah Mandiri, Syariah Mega Indonesia, and Victoria Syariah. The other two Islamic banks, namely Maybank Syariah and Bank Tabungan Pensiunan Nasional Syariah, were excluded because their abnormal data distribution did not meet the requirements of the research. From the research data, the general level of efficiency of 10 Islamic banks has a fluctuating trend during the research period. The banks categorized as very efficient in this research were Panin Syariah and Syariah Mega Indonesia in the last four years from 2014 by having an optimal efficiency or having an efficiency score of 100 four years in a row. While data show that the lowest efficiency was achieved by Victoria Syariah with a score of 82.81, the actual overall efficiency of Islamic banks in Indonesia was at a fairly good level with an average score of 91.82, which means that

although relatively inefficient, Islamic banks in Indonesia are able to optimize resource inputs to produce outputs as an intermediary institution.

Secondly, the Tobit model estimation used asset (ASSET), the number of bank branches (BRANCH), non-performing financing (NPF), capital adequacy ratio (CAR), and return on assets (ROA) as the explanatory variables. The results show that variable of assets, number of branches, and ROA significantly affect Islamic commercial bank efficiency. A relatively large asset base indicates that the bank is more efficient, while ROA is an indicator of the bank's profits. Number of bank branches has a negative effect, indicating the Islamic banking industry has just been newly established or its economies of scale are not yet optimal. CAR and NPF empirically do not have a significant effect on efficiency. These findings have several policy consequences, specifically the need to monitor and support the factors influencing the level of efficiency.

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