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Nik Hazimah Nik Mat and Rowena Barrett

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Nik Hazimah Nik Mat, Hayatul Safrah Salleh, Yusnita Yusof, Wan Norhayati Mohamed, and Muhammad Abi Sofian Abdul Halim

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Muhammad Nor bin Abdurrahim and Amilia binti Saidin

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Norsiah Hami, Fadhilah Mat Yamin, Shafini Mohd Shafie, and Mohd Razali Muhamad

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Dividend Payout Ratio Influence Towards Stock Price (Survey of the Firm LQ 45 Listed in Indonesian Stock Exchange)

Jajang Badruzaman and Dedi Kusmayadia

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Factors Affecting Risk Takings by Investors on Mutual Fund in Malaysia

Tong Yee Chien, Devinaga Rasiah, Yuen Yee Yen, and Suganthi Ramasamy

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Ng Chee Yieng, Devinaga Rasiah, Yuen Yee Yen, and Suganthi Ramasamy

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Dedi Kusmayadi, Jajang Badruzaman, and Irman Firmansyah

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Nur Rifhan Bte A. Rahim and Ahmad Jusoh

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Efficiency and Profitability of Islamic Banks in Indonesia

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This paper investigates the efficiency and profitability as well as the relationship between both variables in Indonesian Islamic banks during the period from 2013 to 2014. This research also relates the profitability with the important variables i.e. capital adequacy ratio (CAR), net interest margin (NIM), nonperforming financing (NPF), size and operational costs. Return on asset (ROA) is used as a proxy for profitability and efficiency is estimated data envelopment analysis (DEA). The data is sourced from Central Bank of Indonesia. This research uses three stages of estimation: (i) examining of technical efficiency of Islamic Banks using Data Envelopment Analysis (DEA), (ii) examining effect of independent variables on dependent variable using multiple regression analysis, and (iii) examining efficiency in the relationship between independent variables and dependent variable using Moderated Regression Analysis (MRA). The results find that only Bank Victoria Syariah is efficient during the period from 2013 to 2014. Furthermore, only CAR, NIM, SIZE and operational costs affect the significantly the profitability. In addition, the efficiency only moderates the effects of CAR, NIM, NPF and SIZE on ROA.

Keywords: DEA, Technical Efficiency, MRA, Islamic Banks, Indonesia

1. INTRODUCTION

The bank is an intermediary institution that serves as the channeling institution that excess funds from sectors which have over funds to sectors which the lack of funds. The existence of the banking sector as a sub-system in the economy of a country has an important role. Even in the daily modern life, almost all parties engage the services of the banking sector¹⁴. Therefore, in order to perform its functions properly then, banks stability must be maintained. Because there are many cases of banks which are failed to operate. Bank Failure is a problem in many countries. Establishing an understanding of and finding a solution to the problem have been the focus of a great deal of research⁸.

Indonesia implements a dual banking system namely conventional banks and Islamic banks. Islamic banking system is based on shariah principle, while non-Islamic banking system is based on the interest rate¹. Currently, the development of banking assets especially in the Islamic banking seems growing quickly. In 2014, Islamic commercial bank assets and financing disbursed in Indonesia continue to increase so that it needs to conduct the research on the level of efficiency of Islamic banks. It is because of a great asset ownership and the distribution of funding that is greater not necessarily indicate the optimal efficiency of existing financial proportions in the bank which must comply with the requirements in order to achieve the efficiency levels. Asset development and distribution of public financing Islamic banks can be seen in figure 1. The urgency that needs to be focused at this time is the ownership Islamic banks assets which are growing and should be supported by good earnings so it is resulting in the good financial performance. This is to maintain

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maintain the financial stability of Islamic banks as the progress of Islamic banks especially in the proportion of assets obtained from the profits instead of loans or third party fund because it is a burden to the bank. Therefore, it is important to know the level of efficiency of the bank in order to maximize the potential of every Islamic bank so that every potential will generate the maximum profit. Furthermore, it needs to conduct the research which can provide the comprehensive information on the level of efficiency of Islamic banking.

Based on the background above, this study will analyze the technical efficiency by applying nonparametric method approach namely the application of Data Envelopment Analysis (DEA) and examining the role of technical efficiency on the profitability of the Islamic banks. It aims at determining whether the independent variables (predictors) affects the profitability of Islamic banks which is also determined by the high and low levels of the Islamic bank efficiency. Several independent variables predicted to affect the profitability (ROA) as a measure of financial performance including the CAR, NIM, NPF, SIZE and Operational Cost. So as to address the problems, it is applied a parametric approach through Multiple Regression Analysis and Moderated Regression Analysis (MRA).

2. EMPIRICAL REVIEW

Several studies have been conducted in order to measure the efficiency of Islamic banks. Ascarya et al conducted a study in Indonesia by comparing the efficiency of Islamic and conventional banks by using the methods of DEA. The results showed that the Islamic banks are relatively more efficient than conventional banks⁶. Mokhtar et al examined the efficiency of Islamic banking in Malaysia with the technique of Stochastic

Frontier Approach (SFA). Mokhtar found that the overall efficiency of Islamic banks in Malaysia continues to increase¹³. Sheldon indicates that banks that have large assets, the specificity of the products and orientation to the retail market showed a better level of efficiency¹⁵. Al-Delaimi and Al-Ani use the DEA as an analytical tool to measure the relative efficiency at 24 institutions of Islamic banks in Iraq. The results showed that the Islamic bank institutions in Iraq are relatively efficient⁴.

In addition, several independent variables that are predicted affect the profitability (ROA) are also based on the results of previous studies include the CAR in accordance with the results of the study conducted by Mawardi¹¹, Mahardian¹⁰, Mintarti¹² and Akhtar³, NIM which is based on the research results conducted by Mawardi¹¹ and Mahardian¹⁰, NPF which is based on the research results Mawardi¹¹, and Akhtar³, SIZE which is based on the results of research conducted by Alper and Anbar⁵, Operational Costs which is based on the research results of San and Heng⁷.

3. METHODOLOGY

3.1. POPULATION

Population in this research were the Islamic banks in Indonesia from 2013 to 2014, then it was gained as much as 11 Islamic banks which are all worth to be studied, Bank Muamalat Indonesia, Bank Syariah Mandiri, Bank Syariah Mega Indonesia, Bank Bukopin Syariah, Bank BRI Syariah, Bank BJB Syariah, Bank Panin Syariah, Bank BNI Syariah, Bank BCA Syariah, Bank Victoria Syariah and Maybank Syariah Indonesia.

3.2. TYPE AND THE SOURCES OF DATA

This research is a quantitative research using secondary data obtained from quarterly financial statements of the Islamic banks.

3.3. RESEARCH VARIABLES

There are three variables used in this study are: a) input variables and output variables that will be used to assess the efficiency, b) the independent variables to find the factors that affect the dependent (profitability), and 3) the dependent variable (profitability) to test the efficiency of a moderating variable between the independent variable on the dependent variable. Here are the explanations of each of these variables:

a. Efficiency variables

INPUT VARIABLE

1. Deposit (I1), consisting of Giro Sharia, Deposits Sharia and Savings Sharia
2. Asset (I2), is the amount of total assets
3. The cost of labor (I3), is the cost of salaries, education and welfare of employees.

OUTPUT VARIABLE

1. Financing (O1) consists of Financing with the principle of buying and selling (tjaroj), leasing (Ijarah), profit sharing (shirkah) and others.
2. Operational Income (O2) consists of income from fund distribution and other operational income.

b. Independent Variables

CAR (X₁) is the capital adequacy ratio of the bank or the bank's ability to exist capital to cover possible losses in the finance or trade securities.

CAR = equity / Risk Weighted Assets

NPF (X₂) is the ratio that indicates the ratio of funding stalled.

NPF = financing problem / total financing

NIM (X₃) is the ratio which measures the bank's ability to generate profits.

NIM = Profit / Average Earning Assets

SIZE (X₄) is the size of the bank's wealth as measured by total assets.

SIZE = Ln Total assets

Operational Costs (X₅) is the total operational costs incurred.

c. Dependent Variables

ROA is the ratio that measures the ability of assets to generate earnings that are used as a measure of the bank's financial performance.

ROA = EBIT / Total Assets

3.4. ANALYSIS METHOD

Step one: The Efficiency Techniques Measurement

Charnes, Cooper, and Rhodes² developed a DEA model with the method of constant returns to scale (CRS) and further, it was developed by Banker, Charnes, and Cooper with the method of variable returns to scale (VRS) which is finally famous model CCR (Charnes-Cooper-Rhodes) and BCC (Banker-Charnes-Cooper). DEA is a procedure that is designed specifically to measure the relative efficiency of a bank that uses multiple inputs and multiple outputs, in which the incorporation of inputs and outputs is not possible. Relative efficiency is the efficiency of a bank compared with other banks in the sample using the input and output types are the same.

Data Envelopment Analysis (DEA) will calculate the value of h_s , where h_s is the value of the efficiency of each period of Islamic banking. Data Envelopment Analysis maximize the value of h_s , where h_s is the sum obtained by multiplying the weight of i output with the number of i output in s period of the Islamic banking.

$$h_s = \frac{\sum_{i=1}^m u_i y_{is}}{\sum_{j=1}^n v_j x_{js}}$$

Note :

h_s = s banking technical efficiency

m = s bank output which is observed

n = s bank input which is observed

y_{is} = the amount of i output produced by the s bank

x_{js} = the amount of the j input used by s bank

u_i = i output weights generated by the s bank

v_j = j input weights given by the s and i banks counted from 1 to m and j count from 1 to n

The above equation points to the use of one variable input and one output. The efficiency ratio (h_s), then, is maximized with the following constraints⁹:

$$h_s = \frac{\sum_{i=1}^m u_i y_{is}}{\sum_{j=1}^n v_j x_{js}}$$

Maximizing the $h_s \leq 1$; $r = 1, \dots, N$.

Where u_i and $v_j \geq 0$

From this equation, where N represents the number of banks in the sample, and r is a type of bank sampled in the study. The first inequality explains that the ratio of the unit of economic activity the other of not more than 1, while the second inequality weighted non-negative (positive). The ratio will vary between 0 and 1. The bank is categorized to be efficient if they have ratios which are close to 1 or 100 percent, on the contrary when they are close to 0 which indicates that the lower the efficiency of the bank. At the DEA, each bank can determine their respective weights and ensure that weight was chosen which will produce the best performance measure². In

analyzing the technical efficiency, it uses the software of Banxia Frontier Analyst 3.

Step Two: Multiple Regression Analysis

At this stage, it will be performed the multiple regression analysis using IBM SPSS ver. 22. to examine the effect of independent variables (CAR, NIM / NOM, NPF, SIZE and Operational Cost) on the dependent variable (ROA). On this analysis, firstly, it will be tested the quality of the data to ensure the data appropriate for testing the regression analysis. Testing is conducted through the classical assumption test consisting of normality test, autocorrelation, heteroscedasticity test and test multikolinieritas.

Here is the regression equation:

$$ROA = a + b_1 CAR + b_2 NIM + b_3 NPF + b_4 SIZE + b_5 OC + e \quad (1)$$

Step Three: Moderated Regression Analysis (MRA)

At this stage, it will be conducted the analysis of efficiency as a moderating variable between the influence of the independent variables (CAR, NIM, NPF, SIZE and Operational Cost) on the dependent variable of ROA. The analysis was performed through the MRA with the interaction test using IBM SPSS ver. 22.

Here is the regression equation:

$$ROA = a + b_1 CAR + b_2 NIM + b_3 NPF + b_4 SIZE + b_5 OC + b_6 EFF + e \quad (2)$$

$$ROA = a + b_1 CAR + b_2 NIM + b_3 NPF + b_4 SIZE + b_5 OC + b_6 EFF + b_7 (CAR*EFF) + b_8 (NIM*EFF) + b_9 (NPF*EFF) + b_{10} (SIZE*EFF) + b_{11} (OC*EFF) + e \quad (3)$$

Where:

ROA = Return On Asset, CAR = Capital Adequacy Ratio, NIM = Net Interest Margin, NPF = Non Performing Finance, SIZE = Ln_Total Assets, OC = Operational Cost, EFF = Technical Efficiency

4. FINDING AND DISCUSSION

4.1. TECHNICAL EFFICIENCY ANALYSIS OF ISLAMIC BANKS

Based on the results of research conducted in 11 Islamic Banks in Indonesia, then to determine the level of efficiency, the data were analyzed using the software Banxia Frontier Analyst 3. The result of the analysis of efficiency scores for each Islamic Banks in 2013 and 2014 in the first quarter to the fourth quarter are presented in figure 2.

From Figure 2 it can be seen that only the Bank Victoria Syariah which has perfectly achieved technical efficiency for 2 years (8 quarters). BRI Syariah and Bank Syariah Mandiri have achieved efficiency in 2013 (during the fourth quarter), but not for 2014. By contrast, BJB Syariah, Bank Muamalat, and Bank Panin Syariah have achieved the efficiency during the year of 2014 (fourth quarter), but not for 2013. While the rest of the bank, namely BCA Syariah, BNI Syariah, Bukopin Syariah and Bank Mega Syariah which have never perfectly achieved the efficiency (for 4 quarters) in 2013 and 2014.

4.2. MULTIPLE REGRESSION ANALYSIS OF ISLAMIC BANKS

Before performing the regression analysis, firstly, it is conducted the test of the data quality to ensure the data whether it is worth or not to conduct the regression analysis. Testing is conducted with the classic assumption test which consists of normality test, autocorrelation, heteroscedasticity test and multikolinieritas test.

Data quality processing results by using IBM SPSS ver. 22 are presented in Table 1. From the table, it can be concluded all data is good.

After the classic assumption test is completed and stated that the quality of the data is good, then it is performed the multiple regression analysis (equation 1), by first testing the accuracy of the model (F-test).

Based on the table 2 showed that significant value of F test is 0.000 so that both the model and the independent variables can be used together to describe dependent variable so that the analysis can be continued on the t-test.

The first variable is capital adequacy ratio (CAR). The result obtained by analysis of the significant value of variable CAR is 0.000 with a positive coefficient, it can be concluded that the CAR-positive effect on profitability. This result is consistent with the research conducted by Mawardi¹¹, Mahardian¹⁰, Mintarti¹² and Akhtar³. Therefore, Islamic banks that have larger capital adequacy ratio will use the funds to the maximum to obtain high profits which will ultimately increase profitability. So the higher CAR ratio will result in a good financial performance.

The second variable is net interest margin (NIM) with significant value is 0.000 and coefficient are positive, it is concluded that NIM positively effects on profitability. This result is consistent with the results of the study conducted by Mawardi¹¹ and Mahardian¹⁰. Thus, if the ratio of NIM grows, it results in profitability of Islamic banks which is getting better. NIM on the Islamic bank called NOM (Net Operational Margin) as it is the ratio of profit per average earning assets which shows that Islamic banks in Indonesia are more profitable because it has high profitability in each of the funds which are channeled, and this has resulted in Islamic banks tend to be more healthy and good financial performance.

The third variable, namely the nonperforming financing (NPF) with significant value i.e. 0.347 and negative coefficient then it is concluded that NPF does not have the effect on profitability. Thus the NPF ratio which indicates the level indicator financing problems is not necessarily caused poor profitability (financial performance). It can be seen from the absence of significant influence between the NPF to ROA. This situation shows that the level of congestion on Islamic banks is not one of the causes of poor financial performance. This can be seen from the average ratio of NPF in the study period is only 3.24%, this ratio is below the maximum limit set by Bank Indonesia (the central bank) is 5%. These results contradict the results of research Akhtar³ conducted in Pakistan. The difference in results can be caused due to differences in the characteristics of countries that affect people who transact through Islamic banks.

The fourth variable is bank size with significant value is 0.000 and the positive coefficient, it can be concluded that the size which is a measure of assets of the Islamic bank positively effects on profitability. This result is consistent with the results of research conducted by Alper and Anbar⁵ which shows that the greater the wealth owned Islamic banks, the more flexible Islamic banks to channel funds to the people who will ultimately generate more profits. That profit acts as the component of the increased profitability. So the greater the wealth owned by the financial performance would be better anyway.

The fifth variable is the operational cost (OC) with a significance value of 0.000 and coefficient is negative, then the operational cost negatively affects the profitability. The results are consistent with the result of the research conducted by San and Heng. It can be concluded that the greater the operational cost incurred for operational purposes, the Islamic bank will make the profitability to decrease. This provides statistical

evidence, too many costs mean banks are not efficient in spending the money because the cost is not a good impact on the profitability of Islamic banks. That is necessary for the evaluation of the expenditure for the right target so that any costs incurred will generate profits.

4.3. MODERATED REGRESSION ANALYSIS OF THE ISLAMIC BANK

This step is to test the technical efficiency as a moderating variable between the independent variables on the dependent variable based on equations 2 and 3.

The test result of the equation 2 is by integrating a variable efficiency in equation 1 and it is obtained the output presented in Table 3:

The testing results of the equation 3 are by adding the variable interactions by multiplying moderation and independent variables (efficiency). Output analysis can be seen in Table 4:

Table 3 and 4 are the summary of the results of the MRA output processed by the interaction method of testing a moderating variable so it can be seen the value of its significance as a result of interaction efficiency predictor variable of moderating variable. Due to the significant value of the variable efficiency (EFF) in equation 2 is not significant, then the conclusion is as follows:

1. If in the equation 3, the value of the significance of the multiplication of independent variables is not significant, then the efficiency is not moderating variable.
2. If in the equation 3, the value of the significance of the multiplication of independent variable is significant, then the efficiency is the pure variable moderation.

The first test is in the relationship between CAR and ROA, the significant value of variable $CAR*EFF$ amounting to 0.014 with a positive coefficient. This value is smaller than 0.05, which means the efficiency moderates the relationship between CAR and ROA. This provides statistical evidence that capital adequacy in affecting the profitability of the Islamic banks is determined by the level of efficiency. In the current Islamic banks which have enough capital to channel financing that Islamic banks do not necessarily maximize the distribution of the capital availability to obtain huge profits but have to see whether the finance portfolio to reduce the level of efficiency or not. This is because the efficiency is a material consideration in the management of distributing the funds. If the condition is efficient that sufficient capital will be distributed and will affect profitability, but if the condition is not efficient then the relationship between the CAR and profitability became weak.

The second test is the relationship between the NIM with the ROA, the significance value of variable $NIM*EFF$ amounting to 0,050 with a positive coefficient. Because this value is 0.05 and it is smaller than 0.1, the technical efficiency moderate the relationship between NIM with ROA at the level of 10%. Therefore it can be concluded that the greater the ratio of NIM Islamic bank profitability will increase, but this condition is determined by the level of efficiency of Islamic bank that time. If Islamic banks in conditions of efficient then the rate of profit (profit margin) were obtained from each product of Islamic banks will raise profitability, and vice versa if the conditions are not efficient it will not necessarily improve the profitability of Islamic banks because the relationship between NIM and ROA is weak.

The third testing that is in the relationship between NPF with ROA, the significance value of variable $NPF*EFF$ amounting to 0.038 with a negative coefficient. Because the significance value is less than 0.05, it can be concluded that the technical efficiency moderate the relationship between NPF with ROA. The coefficient is negative, it means that the technical

efficiency weakens the relationship between NPF with ROA. The linkages with the results of previous analysis that statistically NPF does not affect the profitability, it can be caused by the efficiency factor which weakens their relationship so that if the Islamic banks are more efficient then the relationship between the NPF and ROA would be weaker and vice versa if the conditions of Islamic banks are inefficient then the relationship between NPF and ROA become stronger.

The fourth testing is the relationship between size with ROA, the analysis shows that the significant value of the variable $size*EFF$ amounting to 0,084 with a positive coefficient. Because this value is smaller than 0.1, the technical efficiency moderate the relationship between size with ROA at the level of 10%. It can be concluded that Islamic banks that have a lot of assets would have a better financial performance than the Islamic banks which had small assets if the bank in an efficient condition for technical efficiency strengthens the relationship between bank size to profitability. It is vice versa, if the conditions of Islamic banks is not efficient then the relationship between bank size and profitability will be weak.

The fifth testing is the relationship between OC with the ROA, the significance value of variable $OC*EFF$ amounting to 0.220 with a negative coefficient. Due to the significant value which is greater than 0.05, or 0.1, it can be concluded that the technical efficiency does not moderate the relationship between operational costs and profitability. This provides statistical evidence that the profitability of Islamic banks which are not affected by operational costs due to the current level of efficiency. Islamic banks in both the efficient and the inefficient state of the operational costs are variables that negatively impact the profitability of such analysis has been done previously. Therefore, according to the results of this study if Islamic banks want to increase the profitability of Islamic banks can reduce operational costs directly without seeing the condition of efficiency.

5. CONCLUSION AND NOTES

BASED ON THE ABOVE PRESENTATION, IT CAN BE CONCLUDED THE FOLLOWING RESULTS:

- a. There is only Bank Victoria Syariah which has perfectly achieved technical efficiency for 2 years (8 quarters). Moreover, BRI Syariah and Bank Syariah Mandiri have achieved efficiency in 2013 (during the fourth quarter), but not for 2014. By contrast, Bank BJB Syariah, Bank Muamalat, and Bank Panin Syariah have been streamlined during the year of 2014 (fourth quarter), but not for 2013. Meanwhile, for the rest, BCA Syariah, BNI Syariah, Bukopin Syariah and Bank Mega Syariah have never perfectly achieved the efficiency (for 4 quarters) in 2013 and 2014.
- b. Some factors that affect the profitability of Islamic banks is the capital adequacy ratio (CAR), Net Interest Margin (NIM), bank size (SIZE) and the operational costs (OC). While for the ratio of financing problems/nonperforming finance (NPF) and technical efficiency, they do not affect it.
- c. On testing the role of efficiencies (moderation) to profitability, then it is discovered the role of technical efficiency in strengthening the relationship between the CAR, NIM and the SIZE of the profitability of Islamic banks, and weaken the relationship between NPF with the profitability of Islamic banks, and there is no role of technical efficiency in the relationship between operational cost (OC) with the profitability of Islamic banks.

Some suggestions which be submitted are as follows:

- Efficiency which is measured by the DEA is relative so that if the study period is extended it will produce different efficiency values. Therefore, further researchers can extend the period of research and reexamine the role of efficiency in the relationship between the independent variables on the dependent variable.
- Other research methods are needed to measure the efficiency of such SFA, TFA or DFA so if found differences with the results of this study will be taken into consideration and policy of the stakeholders.
- The further researcher can then add independent variables to determine the factors that affect the profitability of Islamic banks.

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Table 1: Classic Assumption Test

	Classic assumption test		Conclusion		
<i>Kolmogorov-Smirnov Test</i>	<i>Asymp. Sig. (2-tailed)</i>	0,496	Normal (Data are good)		
<i>Durbin-Watson</i>		1,700	Does not occur autocorrelation (data are good)		
<i>Glejser Test</i>	Sig. CAR	0,261	No symptom of heteroskedastisitas (data are good)		
	NIM	0,055			
	NPF	0,483			
	SIZE	0,931			
	OC	0,305			
<i>Collinearity Statistics</i>	VIF. CAR	1,333	TOL. CAR	0,750	Does not occur the multicolinieritas (data are good)
	NIM	1,446	NIM	0,691	
	NPF	1,284	NPF	0,779	
	SIZE	6,483	SIZE	0,154	
	OC	7,417	OC	0,135	

Source: Output IBM SPSS, Processed data

Table 2: The Calculation Results of Equation 1

	F	Sig.
F Testing	29,944	.000
	T	Sig.
T Testing	CAR 8.522	.000
	NIM 5.911	.000

NPF	-0.947	.347
SIZE	5.011	.000
OC	-4.025	.000

Sources: Output IBM SPSS, Processed Data

Table 3: The Result of the Equation 2 Calculation

Variable	T	Sig.
CAR	8.047	.000
NIM	6.018	.000
NPF	-1.011	.315
SIZE	4.944	.000
OC	-4.089	.000
EFF	1.094	.277

Sources: Output of IBM SPSS, Processed Data

Table 4: The Result of the Equation 3 Calculation

Variable	T	Sig.
CAR	2.186	.032
NIM	4.128	.000
NPF	1.207	.231
SIZE	1.027	.308
OC	-1.553	.125
EFF	-1.892	.062**
CAR*EFF	2.506	.014*
NIM*EFF	1.994	.050**
NPF*EFF	-2.116	.038*
SIZE*EFF	1.752	.084**
OC*EFF	-1.238	.220

Note: *) sig on the level 5%, **) sig on the level 10%

Source: Output of IBM SPSS, Processed Data

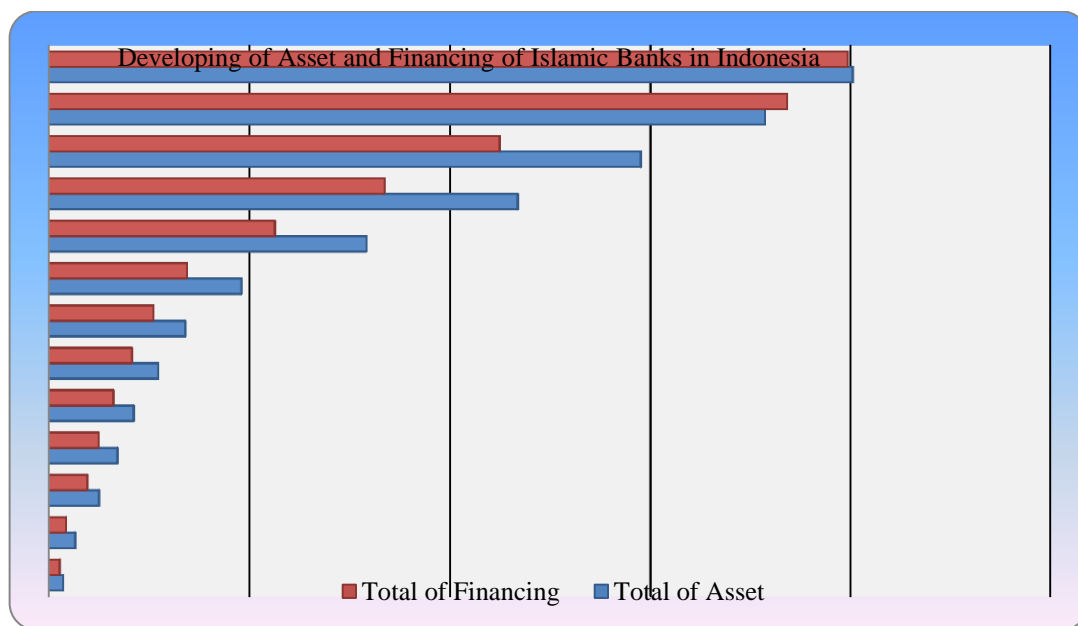


Figure 1: Graph developing of assets and financing of Islamic banks in Indonesia

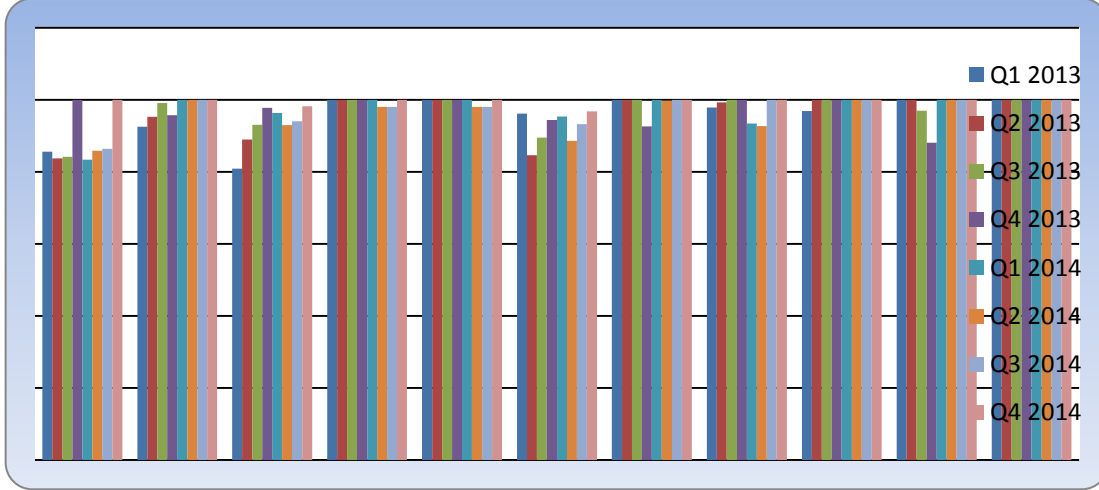


Figure 2: Graph of Technical Efficiency Scores

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