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The determinant factors of efficiency on Islamic banking and conventional banking in Indonesia

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Abstract

As intermediary institutions, conventional banks have larger amount of loans to third party funds than of Sharia banks. Thus, the bank needs a performance appraisal to measure banking operations through efficiency. We examine the efficiency of Islamic banks and conventional banks in Indonesia and analyzes the factors that influence the level of efficiency known as the Two-Stage Data Envelopment Analysis method. We found that there are significant efficiency differences between Islamic banking and conventional banking in the 1st quarter 2014- 4th quarter 2017. On the other hand, NPF and NPL results affected negatively towards Islamic and conventional banks efficiency. Asset and CAR affected positively significant toward Islamic banks efficiency. Asset and ROA had affected positively significantly toward conventional banks efficiency but CAR had affected positively insignificantly toward conventional banks. Lastly, ROA had affected positively insignificantly toward Islamic banks efficiency

Abstrak

Bank sebagai lembaga keuangan memiliki peran penting bagi pertumbuhan ekonomi Indonesia. Peran penting tersebut terlihat dari fungsi bank sebagai lembaga perantara, yaitu sebagai penghubung antara pihak kelebihan dan kekurangan dana. Agar fungsi perantara optimal, bank harus memberikan kinerja terbaik untuk meningkatkan kesejahteraan masyarakat. Pengukuran efisiensi adalah salah satu indikator kinerja perbankan yang membutuhkan perhatian, dimana hasil pengukuran ini digunakan sebagai bahan evaluasi untuk terus meningkatkan kinerja perbankan. Tujuan kajian ini mengukur efisiensi Bank Syariah dan Bank konvensional di Indonesia serta menganalisa faktor yang memengaruhi tingkat efisiensi yang dikenal dengan metode Two-Stage Data Envelopment Analysis. Hasil kajian menunjukkan bahwa ada perbedaan efisiensi yang signifikan antara perbankan Syariah dan perbankan konvensional pada Triwulan 1 2014- Triwulan 4 2017. Variabel Aset berpengaruh positif signifikan pada kedua efisiensi bank, sedangkan NPF/NPL berpengaruh negatif tidak signifikan terhadap dua efisiensi bank. Variabel ROA berpengaruh positif signifikan pada efisiensi bank konvensional dan berpengaruh positif tidak signifikan pada efisiensi bank syariah. Untuk variabel CAR berpengaruh positif signifikan pada efisiensi bank syariah dan berpengaruh positif tidak signifikan pada bank konvensional.

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1. Introduction

As financial institution, banks play significant role on the economic growth of Indonesia. Primarily functioning as an intermediary institution, it allows banks to connect those with excess funds and those with lack of funds. Therefore banks must provide the best performance for optimum intermediary function in order to continually improve community welfare, especially for Islamic banking's that promote economic growth, not only profit-oriented goal (El Ayyubi, Anggraeni, & Mahiswari, 2017).

One indicator to measure banking intermediary function is a comparison between the growth of lending growth and the growth of third party funds (TPF).

Based on Table 1 and 2, both Islamic banks and conventional banks demonstrate good growth. Their assets increase every year along with the increase rate in TPF and asset-based lending. In addition to fund raising and lending, banks as intermediary institutions measure loan to deposit ratio (LDR), demonstrating the performance of loan ratio toward bank deposits (Pradiknas & Faturohman, 2015). Banking need to consider risks of credit repayment by debtors which can be observed from non-performing loan (NPL) ratio.

Table 3. The development of sharia banking performance in Indonesia period of 2014-2017

	2014	2015	2016	2017
FDR	86.66	88.03	85.99	81.76
NPF	4.95	4.84	4.42	4.70

Source: Indonesian Banking Statistics, 2017.

Table 4. Development of conventional banking performance in Indonesia 2014-2017

	2014	2015	2016	2017
LDR	89.42	92.11	90.70	90.55
NPL	2.88	2.48	2.59	2.47

Source: Indonesian Banking Statistics, 2017

Based on Table 3 and 4, LDR ratio performance in conventional banks is higher than FDR of Islamic banks. As intermediary institutions, conventional banks has larger amount of loans to third party funds than of Sharia banks. Based on ratio of non-performing loan in the Table 4, the non-performing loans of Islamic banks are higher than those of conventional banks, suggesting the increasing number of non-performing loans leading to potential losses and lower performance of Islamic banking. Thus, bank needs performance appraisal to measure banking operations with few exceptions of prediction of either they fail or successful. Since banks are intermediary institution with a lot of inputs and outputs,

Table 1. Development of assets, third party funds, Sharia banking financing in Indonesia during period of 2014-2017 (in billions of Rupiah)

Performance indicator	2014	2015	2016	2017
Asset	204,961	213,423	254,184	267,33
TPF	11,730	15,476	18,543	19,743
Financing	147,944	153,968	177,482	182,318

Source: Indonesian Banking Statistics, 2017

Table 2. Development of assets, third party funds, conventional banking loans in Indonesia during period of 2014-2017 (in billions of Rupiah)

	2014	2015	2016	2017
Asset	5.615.150	6.095.908	6.729.799	6.998.275
TPF	4.114.420	4.413.056	4.863.758	5.289.209
Credit	3.706.601	4.092.104	4.413.414	5.529.207

Source: Indonesian Banking Statistics, 2017.

the measure of financial ratios cannot explain overall performance of banking as for managers require adequate information to decide further steps for achieving optimal growth and improvement (Tanjung & Devi, 2018).

In the management theory, either organizational performance or bank performance is measured through their ability in reducing costs and improving profits. The ability of bank in utilizing resources at the lowest cost and earning profits as much as possible generate the concept of efficiency that can be used as a measure of banking performance criteria. Measuring banking performance through financial ratio and efficiency is possible, however both outputs and inputs in the financial ratios provide limited information about whether resources can be increased or reduced in order to improve banking performance. Therefore to address these shortcomings, Data Envelopment Analysis (DEA) was carried out (Hussain and Brightman 2005). Based on some previous data, Islamic banking industries are still far left behind compared to conventional banking's because they are in the stage of development, which is contrast to more advanced system of conventional banking's. Thus, Islamic banks are required to improve their performance in distributing customer funds; whereas Conventional banks are required to both maintain and improve their performance as well. Therefore, both banks should measure their performance through efficiency, for a benchmark to address any shortcomings in banking system and as an evaluation material for market share improvement, particularly in Islamic banks

This study employs Data Envelopment Analysis (DEA) to measure banking efficiency. This analysis tool is a development of linear programming mathematical systems. The primary advantage of this analysis tool is to allow users manage diverse inputs. DEA is the core analysis used by the Frontier Analysis with a range of extra features, for example regression analysis to provide convenience in studying efficiency and to act as a comprehensive

efficiency analysis tool (Hussain et al., 2016). A previous study about the bank efficiency by Miah & Uddin (2017) was carried out on 48 conventional banks and 28 Islamic banks of the Gulf Cooperative Council member countries (GCC) in the period of 2005 to 2014. The research finding shows that conventional banks are more efficient in managing costs than Islamic banks. However some facts that Islamic banks come with stronger ability of solvency and have no long-term stability should be taken into account.

A study by the OECD (2010) reveals that banks strongly rely on wholesale funds such as funding from other banks and money markets which have been severely affected by the financial crisis. On the contrary, banks that heavily rely on deposit funds are very resistant against financial crisis and are expectedly more stable. In this case, Islamic banks are considered as more stable than their conventional counterparts due to its priority on raising funds through two categories of savings-deposit and investment-deposit. In Sharia banks, the demand deposit system almost reaches 100% of deposits that expectedly keeps Sharia banks to be more stable than other Conventional banks. Yet, the bank stability can be achieved with their cost efficiency. The efficiency reflects the ability of banks to turn their resources into revenues. Banks become more efficient when they can produce a certain level of output using a minimum level of resources. Since Islamic banks use a larger amount of demand deposits, they require a higher level of mandatory supply. Therefore this group of banks has a minimum funding's for investment. Consequently, Islamic banks becomes more stable yet less efficient than other Conventional counterparts (Shahid et al., 2010).

A study by Alqahtani, Mayes, & Brown (2017) revealed that before financial crisis stroke, some Islamic banks in the GCG region had spent less money and operate more cost-efficiently than conventional banks. However after financial crisis, conventional banks turned to be more cost-efficient than

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Sharia banks. According to Sugema (2007), some important factors of banking performance, for example institutional capacity (leverage power) is measured using CAR indicators; chance to gain huge profits (big ticket) is measured through ROA indicators; and risk managements is measured through NPL indicators. Rosman, Wahab, & Zainol (2014) argued that profitability and capitalization are primary determinant factors of efficiency, mostly in Islamic banking. The level of profitability of banks in this study is proxied by return on assets (ROA). This ratio measures the profit capacity of banks from the total assets which is measured as a percentage of net profit after tax of total assets. It is necessary to measure efficiency in order to provide information about the extent of which the asset generating profits.

One proxy of banking financial health is the capital adequacy ratio. The capital adequacy ratio can accommodate the risk of loss which banks may encounter in the future. As the low capital ratio leads to low efficiency value, the financial health of banks consequently influence technical efficiency (Pancurova & Lyocsa, 2013). In conventional banking, the ratio of bad credits toward total loans is referred as Non-performing loans (NPL); whereas in Sharia banking, it is known as Non Performing funds (NPF). NPL / NPF reflects credit risk, the smaller the NPL the smaller the credit risk of banks. Bank Indonesia sets a maximum NPL and NPF value of 5%, if the bank exceeds the limit, it becomes unhealthy. NPF/NPL occurs when a contraction in output exists on one party and the increase in debt of bank occurs due to the increase in interest rate and the decrease in bank performance when making credit payments. Thus NPL/NPF becomes an important factor on the banking performance (Berger & DeYoung, 1997), which is confirmed by previous research from Saeed & Izzeldin (2014) on both Islamic banks and conventional banks among GCG countries and three non-GCG member countries during the period 2002-2010. There exists a relationship among earnings efficiency, stability, and credit

risk, in which the indicators of banks can be measured from provision efficiency and credit risks of banks.

Based on discussion above, this study aims at analyzing the level of efficiency of Islamic banks and conventional banks in Indonesia during the period of the 1st quarter of 2014 - the 4th quarter of 2017. This research findings expectedly contribute to the existing knowledge about Islamic banking and conventional banking, particularly for the regulator (Bank Indonesia) to make good policies that improves synergy between Islamic banks and conventional banks as part of an attempt to facilitate the intermediation process to the real sector. For decision makers of banking management, this study is beneficial to address some factors that influence the level of bank efficiency as one indicator of bank performance, to improve the level of bank efficiency as well as to continually attract more depositors to invest their funds into banks.

2. Hypotheses Development

According to Miah & Uddin (2017), the efficiency indicates an ability of banks to manage resources into profitable earnings. A bank is more efficient when it can produce a certain level of output using a minimum level of resources. According to Sufian, Noor, & Abdul-Majid (2008), Sharia banking industry has various institutions that generate profits from investment, trade, and consumer services. The Sharia banking undoubtedly has a higher risk than conventional banks, yet Islamic banking has a more stable structure but low in efficiency. Another study by Pradiknas & Faturohman (2015) reveal that Sharia banks in Indonesia are more efficient than conventional banks. This remark is strengthened by another research by Prasetyia & Diendtara (2011) that some differences exist in efficiency between Islamic banks and conventional banks in Indonesia, This is also supported by research conducted by Prasetyia & Diendtara (2011) who found that there are differences in efficiency

between Islamic banks and conventional banks in Indonesia, Thus, the proposed hypotheses based on the above discussion as follow:

H₁: there exists a difference in the level of efficiency between Islamic banks and conventional banks

According to Kadioglu, Telceken, & Ocal (2017), asset is an important aspect that have significant influence on the banking performance as well as permanent banking operation process, appropriate financial system and national economics. It is confirmed by a study by Garza-García (2012) on some banks in Mexico as well as Defung (2018) on some banks in Indonesia. That bank size has a positive influence on the level of bank efficiency. In this study, assets act as a proxy of bank size which is formulated in the proposed hypothesis based on the discussion above as follow:

H₂: assets have a positive effect on bank efficiency

Bank capital influence bank profitability, as for large capital will generate large profitability, thus the level of bank profitability influence the level of bank efficiency as well. The higher the bank profitability, the larger net profit generated from banks assets. It indicates that bank performance is getting better (Aladwan, 2015). This statement is confirmed by previous studies by Mohd-Zamil (2007) that profitability has a positive effect on the level of banking efficiency. In this study, ROA acts as a proxy of profitability that can be observed from bank efficiency level. From the discussion above, the proposed hypothesis goes as follow:

H₃: ROA has a positive effect on bank efficiency

According to Latumerissa (2017), the capital adequacy ratio (CAR) allows banks to manage any potential losses as a consequence of bank activities. Like other companies, bank capitals act as a buffer of any potential losses. A study by Haryanto (2018)

on the relationship between CAR and bank efficiency level reveal that CAR has a positive and significant effect on efficiency level, thus the proposed hypothesis is:

H₄: CAR has a positive effect on bank efficiency

Berger & DeYoung (1997) reveal that low efficiency is associated with poor management, which can be assessed from poor credit supervision affecting credit quality and increasing the number of bad credits. The increase in non-performing loans will bring an impact on the decrease in bank efficiency level. Thus there exists a relationship between NPL and bank efficiency level. It is supported by previous study from Ramli & Hakim (2017) that non-significant negative relationship occurs between NPL and efficiency. Thus the proposed hypothesis is:

H₅: NPF has a negative effect on bank efficiency level

3. Method, Data, and Analysis

The research population is Sharia commercial banks and conventional commercial banks registered at Bank Indonesia during the period of the 1st quarter 2014- 4th quarter 2017. The sampling method is purposive sampling that allows researchers to select samples based on judgment (judgment sampling) which is non-randomly selection on basis of particular considerations. The sample criteria used in this study are as follows: (1) the conventional commercial banks and Sharia commercial banks are operating in Indonesia on national scale during the observation period of first quarter of 2014 - fourth quarter of 2017. (2) Sampling banks from both conventional banks and Sharia banks are categorized as commercial banks with the largest assets from BUKU 4, BUKU 3 and BUKU 2 with core capital referring to the largest capital in Islamic commercial Banks at intervals of IDR 5 trillion - IDR 70 trillion. (3) Providing financial reports during 2014-2017 observation period which have been published by Bank Indonesia.

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Based on the above criteria, the sample of banks in this study are enlisted on Table 4.

Table 4. Bank samples

Islamic Commercial Banks	Conventional Commercial Banks
Sharia Mandiri Bank	Mega Bank
Sharia BRI Bank	HSBC Bank
Sharia BNI Bank	Victoria Bank
Sharia Mega Bank	Agroniaga Bank
Sharia Panin Bank	Ganesha Bank
Sharia May Bank	Maspion Bank
Sharia Bukopin Bank	Bumi Arta Bank

The stages of research are elaborated in the following: (1) some researchers measure the level of Islamic bank efficiency and conventional bank efficiency by selecting input and output variables using Data Envelopment Analysis (DEA), whereas in the first stage using an intermediation approach. (2) After measuring the efficiency level of both types of commercial banks, a difference test is conducted to measure the difference in efficiency between the Islamic commercial bank and the conventional commercial bank using the Mann Whitney U Difference Test. (3) The next step is to analyze some factors that influence the efficiency of Islamic commercial banks and conventional commercial banks using the Tobit Model. The dependent variable is the scores of DEA testing results. The independent variables in this study are assets, ROA, CAR and NPF. (4) Analyze and discuss the findings.

In this study, the first stage of measurement on efficiency will be measured with DEA. This method provides a sharp comparison that can be used to identify both high-performing and under-performing operational area (business unit) for further used as a benchmark and role model. This information allows further action to decide whether certain operational area to be either maintained or disposed according to comparison of output and input ratios. Since DEA provides sharp comparisons, this method generates a benchmark for inefficient

target achievement (Tanjung & Devi, 2018). DEA specifically functions as the development of linear programming techniques that come with built-in features of objective functions and constraint functions. The following is a general equation in the Data Envelopment Analysis (DEA) method.

$$h_s = \frac{\sum_{i=1}^m u_{is} Y_{is}}{\sum_{j=1}^n u_{js} Y_{js}} \quad (1)$$

Where: h_s represents the technical efficiency of banks; s ; u_{is} indicates the produced output weights; u_{is} is the produced input weight; is is the input weight j ; and x_{js} = a number of inputs j given by bank S . In this case, it is possible to identify values of u and v , as a measure of maximum h_s efficiency. The efficiency of both commercial banks in this study is measured using an intermediation approach, with the specifications of input variables i.e. assets, third party funds and labor costs (personnel), and for output variables i.e. bank revenues and bank financing.

In the second stage, some factors that influence efficiency level of banks are measured using Tobit regression model which was initially used by Tobin (1958) to discuss about probit analysis. Therefore the model is famously known as Tobit model (Tobin Probit). In this study, the Tobit regression model is generally formulated as follow:

$$Y = \alpha + \beta_1 Aset + \beta_2 ROA + \beta_3 CAR + \beta_4 NPF/NPL + \varepsilon \quad (2)$$

To test the difference in efficiency between Islamic Commercial Banks and Conventional Commercial Banks, U Mann-Whitney testing is employed to find out any evidences of differences between both average populations of equal distributions, through two independent samples from both populations. The testing is used to measure two independent samples in ordinal data.

The procedure of the Mann-Whitney test includes: (1) stating hypothesis with significance level

α , (2) arranging data ranking by overlooking sample categories, (3) summing up ranks according to each sample category and computing U statistics with the following formula:

$$\begin{aligned}
 U &= n_1 n_2 + [n_1(n_1+1)/2] - R_1, \text{ or } U \\
 &= n_1 n_2 + [n_2(n_2+1)/2] - R_2
 \end{aligned}
 \tag{3}$$

The last stage is drawing statistical conclusion on basis of null hypothesis. Based on the above discussion, what makes this study apart from previous studies are research object, methods, as well as some dependent factors that affect the level of bank efficiency. The research objects are Islamic commercial banks and conventional commercial banks. Two stages of Data Envelopment Analysis are simultaneously employed in the study in which the first stage uses DEA method and second stage uses the

Tobit model which is different from any previous studies that only implement DEA for one type only, either Islamic commercial banks or conventional commercial banks.

4. Results

Based on Table 5, Islamic commercial banks have an average asset of IDR 20.4 trillion, while conventional commercial banks has an average asset of IDR 27.2 trillion, indicating higher average asset of conventional banks than of Islamic commercial banks. The average TPF value of Islamic commercial banks is IDR 2.72 trillion. While the average TPF value of conventional commercial banks is IDR 18.3 trillion. In other words, TPF of conventional commercial banks is larger than that of Islamic commercial banks. The average labor costs incurred by Is-

Table 5. Statistical testing of input variables and output variables (in millions Rupiah)

Variable	Islamic Commercial Banks		Conventional Commercial Banks	
	Mean	Std. Dev.	Mean	Std. Dev
Asset	2.04	2.34	2.72	32.1
TPF	2.72	3.02	18.3	19.8
Labor cost	308.5	420.8	237.7	320.9
Revenue	1.43	1.796	2.27	3.2
Financing	4.36	4.67	14.9	17.3

Table 6. Overall efficiency results in seven Islamic commercial banks from 1st quarter of 2014 to 4th quarter of 2017

Year	Quarter	CRS	VRS	Scale
2014	Quarter 1	0.94	0.95	0.988
	Quarter 2	0.94	0.95	0.993
	Quarter 3	0.96	0.96	0.997
	Quarter 4	0.97	0.97	0.997
2015	Quarter 1	0.94	0.95	0.992
	Quarter 2	0.95	0.96	0.996
	Quarter 3	0.98	0.98	0.998
	Quarter 4	0.98	0.98	0.998
2016	Quarter 1	0.95	0.96	0.988
	Quarter 2	0.95	0.96	0.986
	Quarter 3	0.96	0.97	0.989
	Quarter 4	0.97	0.98	0.992
2017	Quarter 1	0.96	0.96	0.993
	Quarter 2	0.96	0.97	0.992
	Quarter 3	0.97	0.97	0.991
	Quarter 4	0.98	0.98	0.933

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Islamic commercial Banks is IDR 308.5 billion and the average labor costs incurred by conventional commercial banks is IDR 237.7 billion.

The average revenue of Islamic commercial banks is IDR 1.43 trillion while the average revenue of conventional commercial banks is IDR 2.27 trillion. The average financing of Islamic commercial banks is IDR. 4.36 trillion. While average financing of conventional commercial banks is IDR 14.9 trillion.

The results of efficiency at Islamic commercial banks

The bank efficiency is estimated from the input and output variables through DEA equation in STATA. Similar with previous chapter, the efficiency level of two commercial banks is estimated through an intermediation approach with the output and input variable specifications such as assets, third party funds and labor costs (personnel); whereas other output variables such as bank revenues and bank financing.

The estimate result of Efficiency level range from 0-1 if the score of efficiency level reaches 1, the bank is regarded as efficient. However if the

score is less than 1 or almost closer to 0 (zero), the bank is considered inefficient. In the following table, the estimate result of efficiency using constant return to scale (CRS) model, variable return to scale (VRS) and scale are demonstrated. The efficiency scale value is derived from VRS score divided by CRS score.

Based on Table 6, we can obtain information about the overall efficiency value of seven Islamic commercial banks using CRS, VRS and Scale models during the research period. Based on the value of efficiency level using CRS and VRS models, the Islamic commercial banks are inefficient because their score is lower than a perfect score of 1. The values of efficiency scale are obtained from CRS scores divided by VRS scores. From the overall scale of efficiency value, Islamic commercial banks are regarded as efficient, particularly at 2nd quarter of 2017 which fell to 0,986 and 3rd quarter of 2017 which fell to 0.991.

The efficiency results of conventional commercial banks

The similar measure of efficiency is applied to the conventional commercial bank using the In-

Table 7. The efficiency results of all conventional commercial banks in 1st quarter of 2014 to 4th quarter of 2017

		CRS	VRS	Scale
2014	Quarter 1	0.99	0.99	0.997
	Quarter 2	0.99	0.99	0.996
	Quarter 3	0.99	0.99	0.996
	Quarter 4	0.99	0.99	0.997
2015	Quarter 1	0.99	0.99	0.997
	Quarter 2	0.99	0.99	0.997
	Quarter 3	0.99	0.99	0.997
	Quarter 4	0.99	0.99	0.997
2016	Quarter 1	0.99	0.99	0.998
	Quarter 2	0.99	0.98	0.998
	Quarter 3	0.99	0.98	0.998
	Quarter 4	0.99	0.98	0.997
2017	Quarter 1	0.99	0.98	0.999
	Quarter 2	0.99	0.99	0.999
	Quarter 3	0.99	0,98	0.999
	Quarter 4	0.99	0.99	0.998

intermediation approach with similar input variables such as assets, third party funds and labor costs (personnel); whereas output variables include income banks and bank financing.

The measure of efficiency is similarly employed to the conventional commercial bank using the intermediation approach with similar input variables such as assets, third party funds and labor costs (personnel) and output variables such as bank revenues and bank financing. Similar to Islamic commercial banks, in the following table, the overall efficiency results of conventional commercial banks using CRS, VRS, and scale models are presented.

Based on Table 7, we can analyze the value of efficiency among seven conventional commercial banks using CRS, VRS and scale models. From the efficiency values using CRS and VRS models, the conventional commercial banks are not considered efficient as they have lower score than perfect 1. The scores of efficiency level are derived from CRS score divided by VRS scores. From the scale of overall efficiency values, it can be concluded that conventional commercial banks does not have efficient

performance. From both efficiency results on the Islamic commercial banks and conventional commercial banks, there exist some differences between both types of bank for each model. Both indicate similarly fluctuating trending. From the overall results of efficiency scores using three models i.e., CRS, VRS, and scale efficiency, the conventional commercial banks tend to perform better with a scoring result of 0.99 for every model.

The difference test of efficiency at sharia commercial banks and conventional commercial banks

In contrast with the results of efficiency level between two types of banks, the overall average results are consistent with previous data on Table 3 and 4. Therefore, the means of Sharia commercial bank are 0.9924152 and the means of conventional commercial banks is 0.99754, meaning that the conventional commercial banks are more efficient than Islamic commercial banks, even though both have not yet achieved perfect efficiency score of 1.

Table 8. Descriptive statistic variations in Tobit Regression at Islamic commercial bank

Variable	Obs.	Mean	Std.Dev.	Min	Max
Efficiency	112	0.9924152	0.0118	0.931	1
Asset	112	2.04	2.34	1166085	8.79
ROA	112	0.23	3.74	20.13	8.18
CAR	112	22.34	14.19	10.74	75.83
NPF	112	5.6	7.4	0	46.55

Table 9. Descriptive statistic variations in Tobit Regression at conventional commercial bank

Variable	Obs.	Mean	Std.Dev.	Min	Max
Efficiency	112	0.9975387	0.00385	0.9832	1
Asset	112	2.72	3.21	1959918	1.06
ROA	112	1.504	0.75	0.03	3.7
CAR	112	23.216	10.29	13.8	76.3
NPL	112	4.99	15.88	0.22	1

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Table 10. Results of the Mann Whitney U Test

Bank	Z Score	Probability Value
Islamic Commercial Banks and Conventional Commercial banks	3.170	0.0015

The difference in efficiency results between Islamic commercial banks and conventional commercial banks is derived from the difference test of Mann Whitney U Test which is displayed in Table 10. Based on the estimate score, z-value is 3.17 with a p-value of 0.0015, in which p-value is < 0.05 , therefore first hypothesis (H_1) is accepted, meaning that the difference in efficiency level between conventional banks (group 1) and Islamic banks (group 2) exist.

Based on Table 11, the asset variable has influence on the efficiency level of the bank with significance value of $0.000 < 0.05$ therefore it accepts hypothesis 2 (H_2), meaning that assets can influence the efficiency of Sharia bank. This research finding corresponds with some previous studies by Firdaus & Hosen (2013), Itumo (2013), and Ramli & Hakim (2017). The positive values of parameter between assets and efficiency mean the higher assets, the higher efficiency, on the contrary the lower assets mean lower efficiency. It is supported by Hauner (2005) that large amount of assets in a company provides more opportunities to company in running their operational performance and optimally utilize the accessible resources. Moreover, banks with large assets are definitely easy to adopt new technologies that can increase profits and reduce management costs.

ROA variable indicates no significant relationship, since the significance value of ROA is $0.313 > 0.05$ and its parameter is positive, thus hypothesis 3 (H_3) is rejected, meaning that ROA does not significantly influence the efficiency of Islamic banks. It is consistent with previous studies by Fathony (2012), Ramli & Hakim (2017), and Setiawan, & Kodratillah (2017). Its positive parameter means that the higher the ROA the higher the efficiency, on the contrary the lower ROA the lower its efficiency.

CAR has significant relationship on the efficiency level because its significant value is $0.03 > 0.05$. Therefore it accepts hypothesis 4 (H_4), indicating that CAR has positive and significant relationship with the efficiency of Islamic banks. CAR is the ratio of capital adequacy. When Islamic commercial banks has a sufficient capital, they will be more sustainable against some risks in the future and subsequently have more efficient performance. This finding corresponds with some previous studies by Ramli & Hakin (2017) and Karimah, Novianti, & Effendi (2016).

NPF has non-significant negative relationship on efficiency level because the significance value of NPF is $0.204 > 0.05$ therefore hypothesis 5 (H_5) is accepted, that is NPF has a negative effect on the efficiency of Islamic banks. It corresponds with previous studies by Firdaus & Hosen (2013) and Ramli & Hakim (2017). The negative parameter between NPF and efficiency indicates the existence of negative relationship between NPF and efficiency. It is due to higher bad financing ratio at certain banks which obviously disrupt bank operations, particularly bank liquidity. It will reduce the inefficiency

Table 11. The significance test of Tobit Regression

Hypothesis	Variable	Value	t-statistics	Sig	Significance	Decision
H_2	Asset	0.014	4.82	0.000	Significant	H_2 is accepted
H_3	ROA	0.003	1.01	0.313	Insignificant	H_3 is rejected
H_4	CAR	0.002	2.19	0.03	Significant	H_4 is accepted
H_5	NPF	-0.002	-1.28	0.204	Insignificant	H_5 is rejected
	Constanta	0.892	40.77	0.000		

of banks in utilizing their resources. Therefore the Tobit Regression equation as follow:

$$Efficiency = 0,892 + 0.00 Asset + 0.313 ROA + 0.03 CAR - 0.2014 NPL \quad (4)$$

Based on Table 12, the variable of asset has a significant influence on the efficiency due to its significant value laid between $0.000 < 0.05$, therefore it accepts H₂, indicating that Asset has positive and significant relationship with the efficiency of conventional banks. It is similar with some previous studies by Firdaus & Hosen (2013) and Ramli & Hakim (2017). The positive value of parameter between Asset and efficiency indicates that the higher asset, the higher efficiency; whereas the lower asset, the lower efficiency. When companies have a large amount of assets, they can make better operational activities and optimally utilize the resources. On top of that, with large assets, banks can easily adopt new technologies that increase profits and reduce management costs. ROA variable indicates non-significant positive effect on efficiency level because its significance value is $0.313 > 0.05$. Thus, it rejects H₃, indicating that ROA has non-significant positive influence on the efficiency of conventional commercial banks. It corresponds with some previous studies by Ramli & Hakim (2017) and Wahab (2015).

CAR shows non-significant relationship due to its significance value of $0.29 > 0.05$, therefore it rejects H₄, meaning that CAR has insignificant positive relationship with the efficiency of conventional banks. It is similar with some previous studies by Wahab (2015) and Ramli & Hakim (2017).

NPL demonstrates non-significant negative relationship because its significance value is $0.204 > 0.05$ therefore it confirms the acceptance of H₅ that NPL has insignificant negative relationship with the efficiency of Islamic banks. It confirms previous studies by Ramli & Hakim (2017). The negative parameter value between NPL and efficiency indicate a negative relationships between both variables. Therefore the higher the NPL, the lower the efficiency; whereas the higher the NPL the lower the efficiency. It happens due to high ratio of bad financing at certain banks will inevitably disrupt bank operations, notably bank liquidity. It will lead to inefficiency of banks in utilizing all resources.

Therefore the Tobit Regression equation is in the following:

$$Efficiency = 0.975 + 0.001 Asset + 0.019 ROA + 0.769 CAR - 0.739 NPL \quad (5)$$

5. Discussion

Based on the analysis, there exists the differences between Islamic commercial banks and conventional commercial banks. The average level of efficiency between conventional commercial banks and Islamic commercial banks showcases fluctuating trend during research period, even though some sampling banks indicate inefficiency of bank performance.

Moreover, the first indicator of inefficiencies between commercial banks and Islamic banks is the use of inputs seen from deposit inputs which are larger than the targets. Therefore the role of input cannot optimally yield optimum result. It appears as well in the result of efficiency scale that confirms

Table 12. Test the significance test of Tobit regression

Hypotheses	Variable	Value	T statistics	Sig.	Significance	Decision
H ₂	Asset	0.002	3.50	0.001	Significant	H ₂ is accepted
H ₃	ROA	0.003	2.39	0.019	Insignificant	H ₃ is accepted
H ₄	CAR	0.000	0.29	0.769	Insignificant	H ₄ is rejected
H ₅	NPL	-0.000	-0.33	0.739	Insignificant	H ₅ is accepted
	Constanta	0.975	174.07	0.000		

The determinant factors of efficiency on Islamic banking and conventional banking in Indonesia

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its inefficiency, the tendency of technical efficiency to be higher than scale efficiency reveal good performance of both conventional and Islamic banks in fund raising and fund distributions. Coelli et al. (2005) stated that imperfect market competition, government regulation, financial constraints may lead to inefficiency of firms and prevent optimum performance.

The second indicator of inefficiency is excessive use of assets that are surpassing the required targets. Thus the increase in amount of financing is necessary to facilitate the intermediation process of both Islamic commercial banks and conventional commercial banks, for example additional operating income from fund distribution.

The third indicator is labor costs which are greater than actual need of workforce. In other words, the additional of manpower which is not compensated with sufficient skills will reduce the productivity of commercial banks since the performance achievement is related to the employee productivity. It means that the higher the productivity of bank employees, the greater the chance of banks to yield optimum performance and vice versa (Suliyanto & Purnomo, 2014).

Two output variables that indicate inefficiencies are revenues and financing. The first indicator is the amount of financing that is smaller than its targets due to precautionary principle of banks when lending which is obviously seen from the way Islamic Commercial Banks act more cautiously in lending due to the increase in NPF. The second indicator is the low revenue of the target set. The higher the revenue earned by banks, the higher the volume of financing distribution. It happens because banks act as an intermediary institution that provide credits and services in both payment traffic and money supply. Some significant benefits of the process of distributing funds for economics is to improve the usability of money and to function as an instrument of economic stability (Latumerissa, 2017).

The conventional commercial banks are still more dominant than Sharia commercial banks. In

terms of assets, deposit amounts and labor, the conventional commercial banks demonstrate more domineering position than Islamic commercial banks. Therefore Islamic commercial banks need to improve their financial performance for promoting an increase in assets and total deposits, so that Islamic commercial banks can be an adequate competitor for conventional commercial banks and even can attract more customers.

There is a slight difference among factors influencing the efficiency between Islamic commercial banks and conventional commercial banks. The Asset variable for both commercial banks have positive significant influence on efficiency level. The larger the assets of banks, the more effortless the bank in carrying out operational activities for optimum use of bank resources (Hauner, 2005). Large assets of banks provide more protection, becomes more resistant against any risks and encourage more profitable investment projects. ROA has significant influence on both commercial banks with non-significant positive effect on Islamic banks and significant positive effect on commercial banks instead. Conventional commercial banks, in this case, appear more profitable due to their efficiency. The research finding is similar with a research from Itumo (2013), stating that a wide array of research findings do not necessarily suggest that efficient banks always come with higher average value of ROA than those of inefficient banks. Moreover, fairly large standard deviation of efficient bank groups indicate the existence of extreme values within. Therefore it is necessary to verify the statistical significance of difference test in efficiency level, particularly ROA.

Meanwhile CAR has different effects on both commercial banks. The effect of CAR exists only on Islamic commercial banks, not the conventional one instead. It suggests that Islamic banks will make effortless adjustment to CAR that has been regulated by Bank of Indonesia (Central Bank) due to large portion of bank portfolio assets which are financed from their capital. However, conventional

banks that have experienced explosive growth will find intricacy in adjusting to the minimum regulation of CAR because of two reasons. The first reason is some risks of excessive loan expansions of conventional banking can lead to provisions of non-performing loans (NPLs) which are larger than Islamic banking. It suggests that the risk of weighted assets and classified asset provisions are higher. Thus, the required capital should be greater for meeting the standards. The second reason is their ability to increase capital is interfered by tightening liquidity condition and high interest rates, resulting in lower interest rate margins, profits as well as provisions of NPL (Sugema, 2003).

It further suggests when Sharia commercial banks have sufficient capital, they will be more resistant against any risks in the future and gain more efficient performance. Yet, the non-significant relationship of conventional commercial banks indicate a bank health condition of at least 8% as regulated by Bank of Indonesia which does not really bring impact on the efficiency of banks due to tendency of a majority of people to choose banks with lower risks yet more productive or risk-return trade-offs than those of higher risks (Dang, 2011).

NPF and NPL have similar results that suggest negative effect on bank efficiency. It also reveals that the higher the level of credit risks, the higher the level of problem loans which necessitate managements in order to resolve large amount of NPL. Therefore, banks shall provide Provision for Loan Losses which in turn can aggravate the banking position (Sugema, 2003).

6. Conclusion, Limitations, and Suggestions

Conclusion

There exists a difference in efficiency between Sharia commercial banks and conventional commercial banks with z-value of 3.17 and p-value of 0.0015, suggesting that conventional commercial banks are more efficient than Sharia commercial banks. Some

factors that have positive and significant effect on the efficiency of Islamic commercial banks are asset and CAR, meanwhile ROA has insignificant positive effect and NPF has insignificant negative effect. In addition some factors that have positive effect on the efficiency of conventional commercial banks are asset and ROA. CAR has insignificant positive effect on the efficiency of bank, whereas NPL has insignificant negative effect on the efficiency of bank.

Limitations and suggestions

Both Islamic commercial banks and conventional commercial banks are regarded as inefficient due to lower scores of efficiency below 1. Several internal policies for addressing inefficiency include allocating savings as input variable to total assets, productive assets, which can be accomplished by continually increase the amount of financing of Islamic commercial banks and credit of conventional commercial banks. In addition Islamic banks can increase productive credit and trade credit in *Mudharabah, isthisna, and ijarah* financing.

Another strategy is by reducing banking revenues from fluctuating trading activities and the ratio of customer assets that could directly reduce banking operational costs. For banking management, it is necessary to put some concerns on the increase in efficiency level by attending some factors that have positive and negative effects on bank efficiency. Bank management needs to increase the total assets which have positive and significant effect on efficiency because asset size significantly affect the state of financial banking. One solution is to increase the asset size by increasing lending of banks. Bank management needs to control the level of problem loans in order to prevent high ratio and a decrease in CAR, because when NPL decreases, as a majority of banks mostly do, there is decrease in equity as well. Therefore it is necessary to control credit risks for preventing inefficient performance, particularly in bad economic situations.

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