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Analysis of The Efficiency of Sharia Commercial Banks in Indonesia Using a Two-Stage Data Envelopment Analysis Approach

Analisis Efisiensi Bank Umum Syariah di Indonesia Dengan Pendekatan *Two-Stage Data Envelopment Analysis*

Marhamah[1], Sarbullah[2], Dewi Sri Handayani[3]
[1,2,3] *(STIE Semarang, Semarang, Indonesia)*
marhamahberliana@gmail.com
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Abstract - This research aims to analyze the efficiency of 10 Islamic banks in Indonesia, as well as analyze the influence of bank size, ROA, NPF, FDR and inflation on the efficiency level of Sharia Commercial Banks. The samples in this research is 10 Sharia Commercial Banks that met the criteria. The research observation period is 2019-2023. The analysis technique for this research uses DEAP 2.1 in the first stage and tobit regression in the second stage. The research results show that the sharia commercial banks assuming an intermediation approach during 2019-2023 is still categorized as inefficient, because the average efficiency value of sharia commercial banks is around 80% or still below 1. The results of the tobit regression analysis show size bank, ROA and FDR have a positive and significant effect on the efficiency level of Sharia Commercial Banks, while NPF and Inflation do not have a significant effect on the efficiency level of Sharia Commercial Banks. The research implications be used by regulators to develop effective policies in supporting the growth and stability of the sharia banking sector. In addition, these findings also provide investors with insight into the relative performance of Islamic banks, and making more informed investment decisions.

Keywords: Data Envelopment Analysis (DEA), Efficiency, Sharia Commercial Bank, Tobit Regression.

Abstrak *- Penelitian ini bertujuan untuk menganalisis efisiensi 10 perbankan syariah di Indonesia 2019-2023, serta menganalisis pengaruh ukuran bank, ROA, NPF, FDR dan inflasi terhadap tingkat efisiensi Bank Umum Syariah. Sampel dalam penelitian ini adalah 10 Bank Umum Syariah yang memenuhi kriteria. Periode observasi penelitian adalah tahun 2019-2023. Teknik analisis penelitian ini menggunakan DEAP 2.1 ditahap pertama dan regresi tobit ditahap kedua. Hasil penelitian menunjukkan bahwa efisiensi Bank Umum Syariah dengan asumsi pendekatan intermediasi selama 2019-2023 masih dikategorikan inefisien, dikarenakan rata-rata nilai efisiensi Bank Umum Syariah berkisar diangka 80% atau masih dibawah angka 1. Hasil analisis regresi tobit menunjukkan ukuran bank, ROA dan FDR berpengaruh positif dan signifikan terhadap tingkat efisiensi Bank Umum Syariah, sedangkan NPF dan inflasi tidak berpengaruh signifikan terhadap tingkat efisiensi Bank Umum Syariah. Implikasi penelitian digunakan oleh regulator untuk menyusun kebijakan yang efektif dalam mendukung pertumbuhan dan stabilitas sektor perbankan syariah. Selain itu, temuan ini juga memberikan wawasan bagi investor tentang kinerja relatif bank syariah, membuat keputusan investasi yang lebih terinformasi.*

Kata Kunci*: Bank Umum Syariah, Data Envelopment Analysis (DEA), Efficiency, Tobit Regression.*

INTRODUCTION

Sharia banking, like commercial banks, is a financial intermediary institution, namely an institution that carries out its operations to collect funds from the public in the form of deposits and then pass them on to people who need them in the form of credit or financing (Asnaini and Yustati, 2017). The existence of Sharia Banks shows a new era in the national banking legal system, through law no. 21 of 2008 where the government made new rules to specifically regulate sharia banking.

Analysis of banking efficiency is fundamental because the mobilization and distribution of finances which are carried out openly do not show efficiency factors which greatly influence the profitability of the bank concerned (Edward, et.al 2015; Awaluddin, et.al 2019). Regarding bank efficiency, it will focus on the total output of inputs as they are available. When measuring efficiency, financial institutions face questions about how to achieve a good level of output with existing inputs and how to achieve a minimum level of input given the level of output (Wahab, 2016). Likewise, Indonesian banking is becoming more efficient in both savings and loans. This means banks can offer more competitive return rates, allowing for customers to earn more profits. Meanwhile, the more efficient a bank is, the more valuable it is and the more people will trust the bank itself (Wahyudi and Soemitra, 2022; Anwar, 2016; Bombang, 2018).

According to Berger and Mester (1997), banking sector efficiency can be seen from two points of view: micro and macro. From a micro perspective, competition between banks will increase, banks will become less efficient, and they will easily be eliminated from the banking sector. On the other hand, from a macroeconomic point of view, increasing the efficiency of the banking sector will affect financial accumulation and the stability of the global financial system in terms of banking efficiency.

Research related to banking efficiency analysis has been carried out by many previous researchers but still produces varied findings, such as research conducted by Cahya (2015); Candra and Yulianto (2015); Permana and Adityawarman (2015); Ramly and Hakim (2017); Dewi et.al (2020). The general conclusion from several studies is that there are many factors that influence the efficiency of Islamic banking in Indonesia using various methods such as the data envelopment analysis (DEA) method, the stochastic frontier approach (SFA) method and panel data regression analysis. However, all previous research was generally researched before the merger occurred between three sharia banks (Mandiri Syariah, BNI Syariah and BRI Syariah).

At the beginning of 2021, three sharia commercial banks merged: Bank Syariah BRI, Bank Syariah BNI, and Bank Mandiri Syariah. The three companies united to establish a new bank name: Bank Syariah Indonesia. One of the objectives of this merger is to expand the operational scope of sharia commercial banks with BUMN status. Scaling up your business may be related to economies of scale and cost efficiency. The existence of this merger increases research attention to the efficiency of Islamic commercial banks. The new coronavirus pandemic that hit Indonesia in early 2020 had a major impact on economic activity. Many economic activities have slowed or stopped due to bans on gatherings in public places and calls for people to work from home. Not only is the real sector a partner of sharia banking, the financial sector is also affected. Several macro indicators show unfavorable figures, including: contraction and deflation caused by aggregate pressure from the supply and demand sides.

During the pandemic, macroeconomic indicators also had a significant impact on the profitability of Islamic banks (Saputri & Hanase, 2023). Efficiency analysis is one of the parameters commonly used to measure the performance of an organization. The analytical tool for measuring efficiency is data envelopment analysis (DEA). The aim of this research is to analyze the efficiency of 10 Islamic banks in Indonesia for the 2019-2023 period.

LITERATURE REVIEW

Sharia Banking

The first Islamic bank was established in Indonesia in 1991. It all started with a workshop on bank interest rates and banking operations in August 1990 (Indonesian Bankers Association, 2014). The introduction of Islamic banking is part of a response to public demands for financial institutions to operate free from usury, fraud, cruelty and other fraudulent practices. In other words, it is the practice of financial institutions that adhere to sharia principles in mu'amara practices.

The development of sharia banking faces internal and external challenges. Internally, this is in the form of understanding of sharia banking practitioners who are still influenced by the traditional banking paradigm, while external challenges arise from banking market conditions and national and global economic conditions. However, the sharia financial institution system is a relatively stable system compared to traditional financial institutions (Ugi Suharto, 2017).

Efficiency

The concept of efficiency comes from microeconomic concepts, namely consumer theory and producer theory. The consumer theory perspective aims to optimize individual utility or satisfaction, while the producer theory perspective aims to maximize profits or minimize costs (Ascarya and Yumanita 2009). Pareto-Kopmans efficiency theory (1950) states that efficiency refers to the ability to produce more output with the same amount of input, or the ability to use less input to produce the same output. The Pareto optimization approach is often called dual programming. This means two approaches aimed at increasing efficiency. Kumhaker and Lovell (2000) in Abidin and Endri (2009) found that technical efficiency is included in the macroeconomic efficiency component. However, to be economically efficient, a company must be technically efficient. Therefore, to maximize profits, a company can produce the optimal level of output using certain inputs (technical efficiency) and produce the right mix of output at a certain price level (allocative efficiency).

There are two types of efficiency: technical efficiency and economic efficiency. From a microeconomic perspective, technical efficiency describes the relationship between input and output in a production process. A process is said to be efficient if the process uses a limited number of inputs to produce maximum output, or if the process uses a minimum number of inputs to produce limited output. On the other hand, economic efficiency is seen from a macroeconomic point of view and is a broader concept than economic efficiency.

In an efficient economy, companies can determine the level of input and output and the combination of both, so that the optimal economic goal is usually to minimize costs or maximize profits (Bauer et. Al, 1998). From an economic point of view, efficiency is the achievement of optimal input utilization conditions. Based on pareto coordination, a company is said to be efficient if the company is no longer able to increase one of its inputs or outputs without reducing other inputs or outputs. This is called pareto optimality (Koronakos, 2019). On the other hand, inefficiency occurs when a firm can produce a certain level of output with fewer inputs, or when it can produce a higher level of output using the same amount of input.

Many studies have been conducted regarding data cover analysis using bank branches as decision-making units (DMU). Based on Paradi et al. (2018), one of the main uses of DEA in the financial services industry is to measure the efficiency of bank branches. DEA can measure the relative efficiency level of a branch, providing a ranking of all units examined. This ranking shows how efficient (or inefficient) a branch is compared to other branches. Efficiency is basically a technical concept used to evaluate an institution's performance and resource utilization. Basically, it is measured as an output value for a fixed amount of input. In other words, efficiency is the best use of available inputs to achieve an optimal output mix. Various efficiency measures have been proposed in the literature to evaluate bank performance, including reach efficiency, scale efficiency, allocative efficiency, technical efficiency, etc.

Historically, investors, regulators, management and banking sector analysts have typically relied on accounting metrics to assess bank efficiency. According to Purnomo (2006), the general indicator for measuring bank performance is the bank's economic performance. Apart from measuring through comparison of bank performance indicators and financial ratios, there is another method, namely the use of a non-parametric data envelope analysis (DEA) approach. The characteristics of measuring efficiency using the DEA method have a different concept from efficiency in general. First, the efficiency measured is technical, not economic. In other words, DEA analysis only considers the absolute value of a variable. It does not take into account the

basic units that reflect the economic value of each variable, such as price, weight, length, and content. Therefore, it is possible to calculate different combinations of variables in different units. Second, the resulting efficiency values are relative or only apply within the set of decision-making units (DMU) being compared.

The DEA approach uses two models: the CRS model and the VRS model. In the Constant returns to scale model, the model assumes that each DMU operates at its optimal scale and proportional changes in inputs result in equal proportional changes in output levels. The VRS model is a further development of the CRS model. The return to scale variable assumes that the DMU is not yet in an optimal state, so that not all additional input is the same as additional output. The model used in this research uses data envelopment analysis (DEA) techniques with the constant return to scale (CRS) assumption regarding the role of banks as intermediaries to measure the level of efficiency. We refer to the model created by Faza and Hosen (2013). Input variables used in this research include third party financing or DPK (I1), total assets (I2), and labor costs (I3). Researchers use financing (O1) and operating profit (O2) as initial variables.

Hypothesis

The hypothesis of this research is :

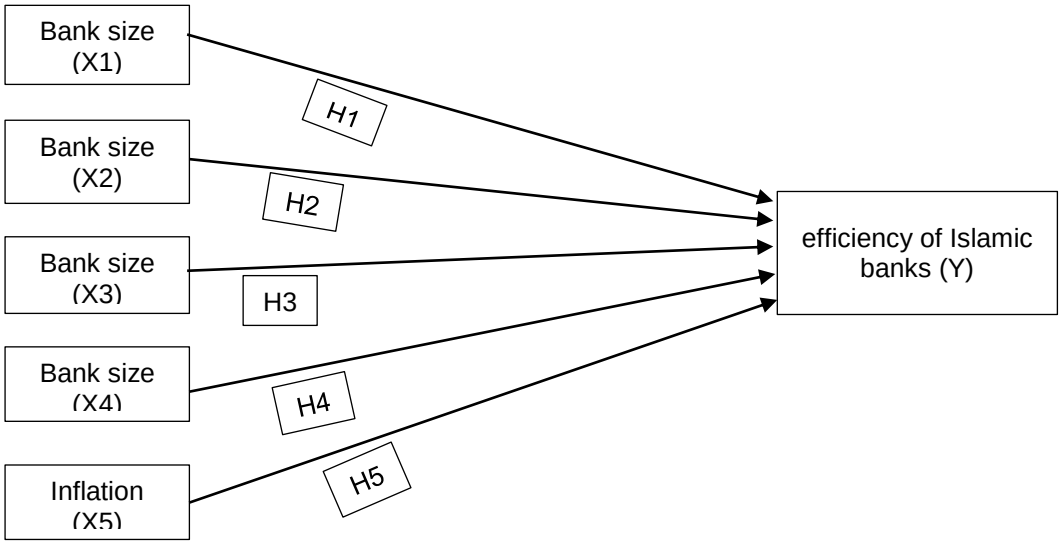
H1: Bank size have a significant effect on the level of efficiency of Islamic banks in Indonesia.

H2: Return on asset (ROA) have a significant effect on the level of efficiency of Islamic banks in Indonesia.

H3: Non-performing financing (NPF) have a significant effect on the level of efficiency of Islamic banks in Indonesia.

H4: Funds-to-deposit ratio (FDR) have a significant effect on the level of efficiency of Islamic banks in Indonesia.

H5: Inflation have a significant effect on the level of efficiency of Islamic banks in Indonesia.



RESEARCH METHOD

A quantitative approach was used in this research. Sugiyono (2017) states that a quantitative approach is an approach that primarily focuses on testing hypotheses, and the data analyzed can basically be measured and provide generalizable conclusions. To answer the problem formulation and test the hypothesis, the efficiency value from the DEA measurement is used as the dependent variable. The input variables for measuring the level of efficiency using the DEA technique in the first stage of the mediation approach are third party funds (I1), total assets (I2), and energy costs (I3), and the output variable is procurement funds (O1). Operating profit (O2). The independent variables used to analyze factors that influence sharia trading efficiency are

bank size (X1), return on assets (X2), non-performing financing (X3), funds-to-deposit ratio (X4), and inflation (X5). Bank size can be measured by total assets owned, total deposits from customers, number of loans given, and bank equity. These indicators provide an overview of the bank's capacity to serve customers, manage risks and support economic growth. Return on assets (ROA) in the banking context refers to a financial ratio that measures a bank's ability to generate profits from the total assets it owns. ROA is calculated by dividing a bank's net profit by its total assets, then multiplying the result by 100% to get a percentage. Non-performing financing (NPF) in the context of sharia banking refers to the ratio of non-performing financing to total financing provided by the bank. NPF is calculated by dividing the amount of non-current or non-performing financing (financing that has matured but has not been paid or is experiencing late payment) by the total financing, then the result is multiplied by 100% to get a percentage. Financing to deposit ratio (FDR) dalam konteks perbankan syariah merujuk pada rasio antara total pembiayaan yang diberikan oleh bank dengan total dana pihak ketiga yang dihimpun, termasuk simpanan nasabah. FDR dihitung dengan membagi total pembiayaan dengan total simpanan, kemudian hasilnya dikalikan 100% untuk mendapatkan persentase. Inflation refers to the general percentage increase in the prices of goods and services in an economy over a certain period, usually measured on an annual basis. Inflation is calculated using the consumer price index (CPI) or producer price index (PPI), which track changes in the prices of a representative basket of goods and services.

The type of data used in this research is secondary data. This data was not obtained directly from research subjects, but was obtained by researchers from the financial reports of Sharia Commercial Banks for the 2019-2023 period published by Bank Indonesia. The next step is to collect literature by searching for literature books, magazines, essays and the internet to obtain a theoretical basis and examine how sharia commercial banks have developed to support research.This study targets sharia commercial banks registered with Bank Indonesia from 2019 to the end of 2023. The total population before purposive sampling was carried out was 363 banks, after purposive sampling was carried out there were 78 banks.

The sampling method in this research is a purposive sampling method, and the sample used in this research is Sharia Commercial Banks registered with Bank Indonesia in the 2019-2023 period. During the audit period, complete financial reports submitted by banks from 2019 to 2023 have been published. Based on these criteria, ten Islamic commercial banks were identified as research samples. The data analysis method in this research uses Data envelope analysis (DEA) using a mediation approach and tobit model regression analysis. In the first stage, a non-parametric statistical DEA test was used with the input-oriented constant return to scale (CRS) assumption. The next step to analyze the factors that influence the level of efficiency of sharia commercial banks is to use Tobit regression. At this stage, the efficiency score of sharia commercial banks resulting from the DEA process is regressed on the independent variables mentioned above. Calculating the tobit model using eviews 12 software the tobit regression equation for this research is:

$$Y = \beta + \beta 1\,(Size) + \beta 2\,(ROA) + \beta 3\,(NPF) + \beta 4\,(FDR) + \beta 5\,(Inflation) + \varepsilon i \quad (1)$$

Y is the dependent variable which is the level of efficiency of Sharia Commercial Banks in Indonesia as a result of DEA measurements.

FINDINGS AND DISCUSSION

The results of calculating the level of efficiency in the DEA method have a score of zero to one. Sharia Commercial Banks that have a score of one are declared efficient, which means that Sharia Commercial Banks have the ability to optimize all the resources they have, conversely if Sharia Commercial Banks have a score of zero to less than one, Sharia Commercial Banks are declared inefficient in optimizing the resources they have and has not been able to carry out its

role as an intermediation institution optimally. Measuring the efficiency value of Sharia Commercial Banks owned by Sharia Commercial Banks in Indonesia involves 10 sample DMUs. Table 2 shows that almost all Sharia Commercial Banks during the 2019-2023 period experienced fluctuations in efficiency levels due to the Covid-19 pandemic which had a negative impact on the economy, resulting in a decline in banking efficiency. However, in 2023, after the pandemic begins to disappear, the level of efficiency of sharia banking will begin to gradually improve.

Table 2. Efficiency Results for Sharia Commercial Banks 2019-2023

DMU	Efficiency Level				
	2019	2020	2021	2022	2023
Bank Syariah Indonesia	1.000	0.837	0.726	0.626	1.000
BCA Syariah	1.000	0.738	0.712	0.641	1.000
Bank Muamalat Indonesia	0.637	0.536	0.528	0.462	0.826
Bank Mega Syariah	0.862	0.738	0.625	0.691	0.862
Bank Bukopin Syariah	1.000	0.936	0.726	0.526	0.962
Bank Victoria Syariah	0.726	0.537	0.523	0.415	0.827
Bank Jabar Banten Syariah	0.972	0.736	0.621	0.572	0.810
Bank Panin Dubai Syariah tbk	1.000	0.863	0.626	0.571	0.788
Bank BTPN Syariah tbk	0.728	0.527	0.514	0.506	0.892
Bank Aladin Syariah tbk	1.000	0.837	0.725	0.571	0.912
Average	0.892	0.728	0.632	0.558	0.887
Highest	1.000	0.936	0.726	0.691	1.000
Lowest	0.637	0.527	0.523	0.415	0.826

Source: DEA data processing results.

In this table it can be explained that the efficiency of Sharia Commercial Banks in Indonesia for the 2019-2023 period is still in the inefficient category because the average for all banks is still below number 1. During the research period, the highest average efficiency score for Sharia Commercial Banks was achieved in 2019, which was equal to 0.892. There were 5 banks that experienced the highest level of efficiency in 2019, namely Bank Syariah Indonesia, BCA Syariah, Bank Bukopin Syariah, Bank Penin Dubai Syariah tbk, and Bank Aladin Syariah tbk. The results of measuring the level of efficiency indicate that Sharia Commercial Banks have not been able to manage their resources optimally. This is in line with the results of research conducted by Rabbani (2014), Fadhlullah (2015) and Ramly (2015) which stated that Sharia Commercial Banks have not been able to operate optimally.

The next stage of this research is to analyze the factors that influence the level of efficiency of Sharia Commercial Banks in Indonesia for the 2019-2023 period using the tobit model. The results of tobit analysis using eviews 12 software can be seen in table 3 which shows that several variables such as bank size, return on assets (ROA) and financing to deposit ratio (FDR) are positive and have a p-value smaller than the α (p-value <0.05) thus making these variables have a significant effect on the efficiency level of Sharia Commercial Banks. The non-performing financing variable has a positive relationship with the level of efficiency of Sharia Commercial Banks, while the Inflation variable has a negative influence, but both variables have a p-value that is greater than the α value used by researchers, so these two variables do not have a significant influence. significant to the level of efficiency of Sharia Commercial Banks in this research.

Based on the results of the tobit model in table 3, it can be explained that the bank size variable has a regression coefficient of 0.0561, which means that if the bank size variable increases by one percent (1%) it will increase the efficiency of Sharia Commercial Banks by 0.0561 percent.

Table 3 Results of Tobit Regression Analysis

Variables	Coefficient	Std. Error	z-Statistics	Prob.
Bank Size	0.0561	0.0425	2.1527	0.0241
ROA	0.0426	0.0162	4.2671	0.0000
NPF	0.0076	0.0052	1.6282	0.0716
FDR	0.0051	0.0057	4.7831	0.0000
Inflation	-0.0047	0.0076	-0.8172	0.2357
C	-0.1768	0.3652	-0.5278	0.7251

Source: Eview 12 Data Processing Results.

The return on asset variable has a regression coefficient value of 0.0426, this indicates that if the ROA variable increases by one percent (1%) it will increase efficiency by 0.0426 percent. The non performing financing (NPF) variable has a regression coefficient of 0.0076, this indicates that if the NPF variable increases by one percent (1%) it will increase the efficiency of Sharia Commercial Banks by 0.0076 percent. The financing to deposit ratio variable has a regression coefficient of 0.0051, this indicates that if the FDR variable increases by one percent (1%) it will increase the efficiency of Sharia Commercial Banks by 0.0051 percent. The inflation variable has a regression coefficient of -0.0047, this indicates that if the inflation variable increases by one percent (1%) it will reduce the efficiency of Sharia Commercial Banks by 0.0047 percent.

Discussion

The results of the research using the tobit model obtained a p-value for the bank size variable of 0.0241 (0.0241 < 0.05), so that the first hypothesis (H1) was accepted. The bank size variable has a positive and significant influence, so it can be explained that the bank size variable has a real influence on the level of efficiency of Sharia Commercial Banks in Indonesia for the 2019-2023 period. Banks that have a large number of assets will make the bank more efficient because the large number of total assets owned will help the bank's operational activities run smoothly. The greater the number of assets owned will also expand the market share of Sharia Commercial Banks. The results of this research are in accordance with previous research conducted by Firdaus and Hosen (2013).

In general, larger banks tend to have greater access to financial and technological resources, which can improve their operational efficiency. With greater scale, banks can spread their fixed costs over a larger number of transactions, reducing their cost-to-income ratio. Additionally, larger banks also tend to have more specialization in different areas, allowing them to optimize their internal processes. However, in some cases, too large a size can also result in challenges in risk management and complex internal bureaucracy, which in turn can affect efficiency. Therefore, while the size of an Islamic commercial bank can provide advantages in terms of efficiency, careful management is still required to ensure that these advantages are balanced with appropriate risk management and continuous innovation.

The results of the research on the return on asset variable obtained a p-value of 0.0000 (0.0000<0.05), so the second hypothesis (H2) was accepted. The ROA variable has a positive sign, this explains that the ROA variable has a real influence on the level of efficiency of Sharia Commercial Banks in Indonesia for the 2019-2023 period. Return on assets is the ability of capital invested in all company assets to generate profits (Pambuko, 2016). The higher the ROA ratio, the Sharia Commercial Bank is able to generate large levels of profit, so that the Sharia Commercial Bank will be categorized as an efficient Sharia Commercial Bank. The results of this research are in accordance with research conducted by Yudistira (2004), and Firdaus and Hosen (2013).

ROA measures how efficient a bank is in generating profits from the assets it owns. In the context of Islamic commercial banks, a high level of ROA indicates that the bank is able to generate significant profits from the assets owned, which is an indication of operational efficiency and good asset management. Banks with high ROA tend to be more efficient in

allocating their assets to generate income, both through channeling funds to the real sector and profitable investments. However, a high ROA level can also be influenced by external factors such as interest rates and market conditions. Therefore, while ROA can be an important indicator for evaluating the efficiency of Islamic commercial banks, it is also important to consider the overall economic context and other factors that influence the bank's financial performance.

Based on the results of the tobit model analysis test, it shows that the non-performing financing variable has a positive relationship with a p-value greater than 0.05. (0.0716>0.05), so the third hypothesis (H3) is rejected. The results of this research do not support the results of research from Firdaus and Hosen (2013) which revealed that NPF has a significant negative effect on the level of efficiency, because the greater the non-performing financing ratio will disrupt bank operations. Different results were presented by Pambuko (2016) who revealed that NPF had a positive and significant effect (<0.05) on the efficiency of sharia banking. Research conducted by Ramly (2015) also said the same thing by revealing that NPF had a significant positive effect, and stated that an increase in the NPF ratio would increase the efficiency level of conventional banks. This positive relationship can be explained by the theory put forward by Berger and Humphrey (1997) in Fathony (2012) called the skimping hypothesis, with the assumption that banks implement a spending limitation policy to carry out analysis of financing applications.

NPF consists of financing that borrowers fail to repay and experience late payments or even the possibility of default. A high NPF level can indicate problems in the bank's credit risk management, which in turn can affect the bank's operational efficiency. Sharia commercial banks must allocate significant resources to handle problematic financing portfolios, including restructuring, settlement or asset takeover. This can reduce banks' operational efficiency and burden their financial performance.

The results of research on the FDR variable obtained a p-value of 0.0000 (0.0000<0.05), so the fourth hypothesis (H4) was accepted. The coefficient value on the FDR variable also has a positive sign and it can be explained that the FDR variable has a real influence on the level of efficiency of Sharia Commercial Banks in Indonesia for the 2019-2023 period. This is because the greater portion of third party funds channeled by the sharia business unit for financing will make Sharia Commercial Banks more efficient in managing their resources. The results of this research are in accordance with previous research conducted by Sufian and Noor (2009) and Pambuko (2016).

FDR measures how much the bank uses funds from customer deposits to distribute financing to borrowers. A balanced FDR shows that the bank is able to manage funds received from customers well, allocating them efficiently between financing and profitable investments. However, an FDR that is too high can indicate that the bank is too dependent on funds from deposits to channel financing, which can be a source of liquidity risk. On the other hand, an FDR that is too low may indicate that banks are not making full use of available funds to channel financing, which may reduce the efficiency of their use of resources. Therefore, Islamic commercial banks need to maintain the right balance in their FDR, paying attention to healthy financing growth while ensuring adequate liquidity. Thus, careful management of FDR can help sharia commercial banks achieve optimal levels of efficiency in managing customer funds and channeling them into productive financing.

The results of research on the inflation variable obtained a p-value of 0.2357 (0.2357>0.05), so the fifth hypothesis (H5) was rejected. The coefficient value on the inflation variable also has a negative sign, and it can be explained that the inflation variable does not have a real influence on the level of efficiency of Sharia Commercial Banks in Indonesia for the 2019-2023 period. These results are in accordance with research conducted by Sufian and Habibullah (2010), and Pambuko (2016).

Directly, inflation can affect bank operational costs through increasing capital costs, human resource costs and risk management costs. As inflation increases, Islamic commercial banks may need to pay higher interest to obtain funds, which may lead to an increase in their funding costs. Apart from that, bank operational costs can also increase due to increased prices of goods and services. On the other hand, inflation can also affect the performance of bank financing portfolios. Rising inflation could mean that bank customers face greater financial stress, which could increase credit risk and ultimately increase the bank's non-performing financing (NPF) (Zuhri & Khairunnisa, 2023). Indirectly, inflation can also affect overall economic activity, which in turn can affect the level of availability and demand for funds, as well as investment performance.

CONCLUTION

Based on DEA measurement results, it shows that the efficiency of Sharia Commercial Banks assuming an intermediation approach during the research period is still categorized as inefficient, this is because the average efficiency value of Sharia Commercial Banks is around 80 percent or still below 1. Bank size variables, return on assets (ROA) and financing to deposit ratio (FDR) have a significant effect and have a positive relationship on the level of efficiency of Sharia Commercial Banks during the 2019-2023 period. The non performing financing (NPF) variable has no effect at a significant level of 5% and has a positive relationship with the efficiency level of Sharia Commercial Banks during the 2019-2023 period. The Inflation variable does not affect the efficiency level of Sharia Commercial Banks during the 2019-2023 period. Research on "efficiency analysis of Sharia Commercial Banks in Indonesia Using a two-stage data envelopment analysis approach" has significant implications for the Islamic banking industry in Indonesia. Using the two-stage DEA approach, this research identifies the factors that influence the operational efficiency of Islamic banks, thereby enabling bank management to optimize their performance and resources. The results of this research can be used by regulators to develop more effective policies in supporting the growth and stability of the Islamic banking sector. In addition, these findings also provide investors with insight into the relative performance of Islamic banks, helping them make more informed investment decisions. This research has limitations, namely that the data used may be limited to a certain time period, so it does not reflect dynamic changes in economic conditions or policies. For further research, it is recommended to expand the study time period and consider additional relevant variables.

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