

Productivity Determinants of Islamic Banks in Indonesia: Two-Stage Malmquist Productivity Index

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Productivity Determinants of Islamic Banks in Indonesia: Two-Stage Malmquist Productivity Index

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ABSTRACT

Keywords:
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Islamic Banks in Indonesia experienced a general increase in productivity during the observation period influenced by factors of technological change. This study aims to measure Islamic Banks' productivity level and productivity determinants in Indonesia. This study was quantitatively using Malmquist Productivity Index to measure the level of productivity of Islamic banks. Meanwhile, panel data regression was used to analyze the determinants of productivity. The result found that Return on Assets (ROA) and Financing to Deposit Ratio (FDR) has significantly affect productivity changes, while Capital Adequacy Ratio (CAR) has a significant negative effect. The result provides a valuable contribution for consideration regarding managing existing resources to produce optimal output. Bank management can invest in technology and innovation in distributing banking products and services. Islamic bank management also needs to pay attention to the determinants which affect productivity growth.

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INTRODUCTION

Islamic banking in the world began to develop in the 1970s, while in Indonesia, Islamic banking has started to expand since 1992, which the establishment of Bank Muamalat Indonesia spearheaded (Ismail, 2011). The development of Islamic banking in Indonesia has been getting more intense since the Law of the Republic of Indonesia Number 21 of 2008 concerning Islamic banking was officially declared (Rusydia, 2018).

The development in terms of quantity must also be accompanied by the growth in the performance of Islamic banking (Darsono, 2017). Islamic banks must also be able to compete with conventional banks. Islamic banks need to operate efficiently to achieve optimal profit and productivity and increase their competitiveness (Rodoni et al., 2017). Measuring the performance of Islamic banking was very necessary because the development of the Islamic banking industry is one of the leading indicators in the development of the Islamic financial economy in Indonesia and to find out how efficient the performance of a sharia bank to other banks (Rusydia, 2018).

The level of productivity can be used as a benchmark for evaluating the performance of Islamic banking. Otaviya & Rani (2020) emphasized that productivity refers to the optimal use of company resources to achieve effective and efficient targets within the agreed value framework. Productivity involves using and integrating the available resources effectively as an essential step in the growth and development of a company. Productivity is assessed as a need for economic development and an opportunity to gain a competitive advantage. Hutabarat & Huseini (Pitaloka et al., 2018) revealed that productivity was an essential factor in a company's success and can be an indicator in assessing a company's competitive ability.

The Malmquist index was used to measure the level of productivity of Islamic Commercial Banks during the years 2011-2018. Rusydia (2018) explains that the Malmquist index was part of the Data Envelopment Analysis (DEA). The Malmquist index used to measure the level of productivity of each business unit so that it will show changes in the level of efficiency and technology used based on the predetermined input and output. In addition, the Malmquist index is also used to analyze changes in intertemporal performance (Rani et al., 2017). Control variables are used because the influence of other variables that affect the dependent variable is broken, and the analysis results will have higher statistical power (Widhiarso, 2011).

Kamarudin et al., (2017) found a significant relationship between bank size and changes in the productivity of Islamic banks. It indicates that larger banks tend to be more productive than medium or small banks because of the benefits they receive from the company. These benefits can be in the form of increased profit margins and better service quality. Additionally, Firdaus & Hosen (2013) revealed a significant relationship between ROA and changes in bank productivity. Pambuko (2016) discovered a significant relationship between FDR and changes in the productivity of Islamic banks. According to Jreisat, Hassan, & Shankar (2018) and Wahyu (2016) a high FDR shows that the bank

has been doing productively in the financial intermediation process. A high CAR ratio indicates a bank's ability to finance operating activities well and impact bank profitability. Therefore, CAR was the one of the crucial factors in the banking industries. Further, Firdaus & Hosen (2013); Pitaloka et al. (2018) and Nurfikasari & Utami (2019) also found a significant relationship between CAR and the productivity of Islamic banks.

Rani et al. (2017) and Rusydiana (2018) found that Islamic banks' productivity level and the determinants that influence several researchers have carried it out using the Malmquist Productivity Index and panel data regression. However, it has no different results. In Rani et al. (2017), CAR and FDR do not affect productivity, whereas, in the research of Pitaloka et al. (2018), CAR has a significant negative effect, while FDR has no significant impact on productivity. The risk of using credit as an independent variable in the study conducted by (Kamarudin, Chiun, et al., 2017; Rani et al., 2017). Both explain that credit risk does not affect productivity. Otayiya & Rani (2020) the productivity of Islamic commercial banks in Indonesia using are labour costs, fixed assets, and third-party funds. The output variables consist of financing, portfolio investment, and total operating income. This study aims to measure Islamic Banks' productivity level and productivity determinants in Indonesia by using Malmquist Productivity Index to measure the level of productivity of Islamic banks.

RESEARCH METHOD

This study was quantitaf by using two statistical models, namely non-parametric and parametric models. The non-parametric model used was the Malmquist Productivity Index. The Malmquist Index served to test the productivity level of Islamic Commercial Banks in Indonesia. In trying the Malmquist index, the output orientation assumed that the bank intended to get a lot of output with a fixed input. In addition, the output orientation is more suitable for banking in developing countries such as Indonesia. The intermediation approach was also employed because this approach is seen as more appropriate to describe the function of banking institutions as intermediaries between excess and deficit fund parties (Putri & Sukmaningrum, 2020).

The parametric model in this study used the panel data regression method. This method functioned to test the determinants of changes in the productivity of Islamic Commercial Banks in Indonesia and was considered capable of minimizing the number of errors in research. Panel data consisted of cross-section data from eight Islamic Commercial Banks in Indonesia year 2011-2018.

Data and Samples

Secondary data were used in this study, and they were obtained from the annual financial reports of every Islamic Commercial Bank in Indonesia in 2011-2018. This study applied a purposive sampling technique because not all populations met the criteria set by the researcher to support the research. Table I depicts the list of research samples.

Table 1. List of Research Samples

No.	Name of Sharia Commercial Bank
1.	PT. BCA Syariah
2.	PT. Bank BNI Syariah
3.	PT. Bank BRI Syariah
4.	PT. Bank Syariah Bukopin
5.	PT. Bank Syariah Mandiri
6.	PT. Bank Mega Syariah
7.	PT. Bank Muamalat Syariah
8.	PT. Bank Panin Dubai Syariah

Data analysis technique

Decision-Making Units (DMU)

Kamarudin et al., (2017) explained that there are calculations in determining the number of input and output variables that affect the sample. The number of samples tested must follow the requirements before being measured by the Malmquist index,

$$n \geq \max \{m \times s, 3 (m + s)\} \tag{1}$$

where:

n = the sum of DMU

m = the sum of input

s = the sum of the output

The sum of DMU must be greater than the sum of input and output variables. In this study, the sum of DMU was 64, which meant it was bigger than the input and output variables which were only $15 = \{3 \times 2, 3 (3 + 2)\}$. Therefore, the determination of the variables has met the requirements so that the Malmquist index can measure the DMU.

Malmquist Productivity Index (MPI)

The Malmquist index was used to measure the total factor productivity and its components. Sharia Commercial Banks are said to be productive if the TFP is worth more than 1, unproductive if the value is less than one and stagnant if the value is equal to 1. Input variables used are third-party funds (TPF) for labour costs and fixed assets. While the output variables used are total financing and total investment. Fukuyama (1995) and Assaf et al.,(2011) described the factor of productivity as follows:

$$M_o(x^{t+1}, y^{t+1}, x^t, y^t) = \frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)} X \left[\left(\frac{D_o^t(x^{t+1}, y^{t+1})}{D_o^{t+1}(x^{t+1}, y^{t+1})} X \frac{D_o^t(x^t, y^t)}{D_o^{t+1}(x^t, y^t)} \right) \right]^{1/2} \tag{2}$$

Where:

M_0 = Malmquist Index (MI)

D_0 = distance function

x^t = Input of the current period technology

x^{t+1} = Input of the next period technology

y^t = Output of the current period technology

y^{t+1} = Output of the next period technology

Panel Data Regression

Panel data regression analysis aimed to test the determinants of the productivity of Islamic Commercial Banks in Indonesia. Panel data regression was used because this study employed several independent variables and had time-series and cross-section data. The regression model in this research could be written as follows:

$$TFPCH_{it} = \beta_i + \beta_1 \ln BankSize_{it} + \beta_2 ROA_{it} + \beta_3 FDR_{it} + \beta_4 CAR_{it} + \beta_5 \ln GDP_{it} + \beta_6 Inflation_{it} + \beta_7 BIRate_{it} + e \quad (3)$$

Where:

TFPCH = Sharia Commercial Bank productivity level

i = cross section

t = time series

e = error variable

RESULT AND DISCUSSION

The Productivity of Islamic Commercial Banks in Indonesia

Productivity measurement can be done by checking the value of Total Factor Productivity Change (TFPCH). It decomposes into two forms: technology change (TECHCH) and efficiency change (EFFCH). A positive TECHCH value indicates a shift in technology or innovation (Otaviya & Rani, 2020). Meanwhile, a positive EFFCH value indicates an efficient use of input. The EFFCH component can be explained by the weight of Pure Technical Change (PTECH) and Scale Efficiency Change (SECH) (Färe et al., 1994). Table 2 show

Table 2. The MPI Results for the 2011-2018 period

YEAR	EFFCH	TECHCH	PECH	SECH	TFPCH
2011 – 2012	1.011	1.050	1.006	1.006	1.062
2012 – 2013	0.989	0.998	1.002	0.986	0.987
2013 – 2014	0.984	0.987	0.997	0.987	0.971

2014 – 2015	1.006	1.052	0.991	1.016	1.059
2015 – 2016	0.992	1.086	1.002	0.990	1.077
2016 – 2017	1.019	0.951	0.999	1.020	0.970
2017 – 2018	0.990	1.064	1.012	0.979	1.053
Mean	0.999	1.026	1.001	0.998	1.025

Table 2 described MPI Results for the 2011-2018 period that in general there had been an increase in productivity at Islamic Commercial Banks in Indonesia, which was indicated by the TFPCH value > 1. The TECHCH factor influences the rise in Islamic Commercial Banks in Indonesia more than EFFCH. It was proven that TECHCH had a positive value of 2.6% (1.026), while the EFFCH value owned a negative value of -0.1% (0.999). The results also revealed that the decrease in EFFCH was caused by a decline in SECH of -0.2% (0.998). Although the value of PECH increased by 0.1% (1.001), SECH influenced EFFCH much more than PECH. Table 3 described the results of MPI in eight Islamic commercial banks in Indonesia.

Table 3. The Results of MPI in the eight Islamic Commercial Banks in Indonesia (2011-2018)

SHARIA COMMERCIAL BANKS	EFFCH	TECHCH	PECH	SECH	TFPCH
BCA Syariah	1.000	0.974	1.000	1.000	0.974
BNI Syariah	1.000	1.000	1.000	1.000	1.000
BRI Syariah	1.000	1.140	1.000	1.000	1.140
Bukopin Syariah	1.005	0.988	1.009	0.996	0.993
Mandiri Syariah	0.994	1.055	1.000	0.994	1.048
Mega Syariah	1.008	1.028	1.000	1.008	1.037
Muamalat	0.982	1.020	1.000	0.982	1.001
Panin Dubai Syariah	1.000	1.012	1.000	1.000	1.012
Mean	0.999	1.026	1.001	0.998	1.025

Table 3 indicated that five Islamic Commercial Banks experienced an increase in productivity, one Islamic Commercial Bank was in a stagnant condition, and two Islamic Commercial Banks experienced a decrease in productivity. Based on Table 3, it was known that Indonesian Islamic Commercial Banks showed a productivity growth of 2.5% (1.025). The increase illustrates that Islamic Commercial Banks can manage and utilize their resources to produce services. An indication of 2.5% growth in the TFPCH value during the observation period was associated with TECHCH value growth of 2.6% (1.026). It implies that the increase in TFPCH value is due to the success of Islamic Commercial Banks in using appropriate technological advances and innovations in the distribution or distribution of their products and services. It supports the finding of Suzuki & Sastrosuwito (2011) which found that technological changes, caused to the productivity of commercial banks in Indonesia. This finding also implied the importance

of developing technology and innovation in achieving banking sector productivity. The results of this study were also in line with [Srairi \(2011\)](#); [Beck, Demirgüç-Kunt, & Merrouche \(2013\)](#) and [Otaviya & Ran \(2020\)](#) which explained that Islamic banks that follow technological developments and innovate could achieve productivity growth.

The Determinants of Productivity

A standard effect model was obtained with a productivity value proxied by the Total Factor Productivity Change (TFPCH) variable as the dependent variable based on the model test, which showed on the table 4 as the result of panel data regression.

Table 4. The Result of Panel Data Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-91.70249	43.15594	-2.124910	0.0380
Ln BANK SIZE	-0.024045	0.026261	-0.915600	0.3638
ROA	0.051869	0.019812	2.618134	0.0114
FDR	0.004956	0.001605	3.087546	0.0031
CAR	-0.013613	0.004700	-2.896742	0.0054
Ln GDP	2.528841	1.165916	2.168973	0.0343
INFLATION	0.042636	0.035484	1.201549	0.2346
BI RATE	0.012275	0.056808	0.216087	0.8297
R-squared	0.503987			
Prob(F-statistic)	0.000001			

The result of panel data regression analysis in table 4 described that the bank size variable displayed results that did not significantly affect the change in productivity was in line with [Rahim et al., \(2013\)](#) and [Pitaloka et al., \(2018\)](#) which found the insignificant effect of bank size on changes in productivity. The size of the bank does not reflect a good reputation for Islamic banking. Thus, it does not have a tangible impact on changes in productivity. However, the ability in managing assets was the main factor the bank able to be more productive. It can be proven by referring to Bank Syariah Mandiri, which still owns total assets of 569 trillion rupiahs, while BRI Syariah only has 184 trillion rupiahs. However, BRI Syariah was the most productive sharia bank during the research observation period and had better productivity capabilities than Bank Syariah Mandiri.

Further, the results of the t-test for the ROA variable in table 4 had a positive and significant effect on changes in productivity. In this study, the ROA value did not describe the managerial productivity of Islamic Commercial Banks in managing their operational activities, but ROA explained the productivity of input assets. This result was in line with [Jreisat et al., \(2018\)](#) which found that the higher the ROA for a given set of input, the more productive the bank was. Further, [Sufian \(2009\)](#); [Firdaus & Hosen \(2013\)](#); [Pambuko \(2016\)](#) and [Pitaloka et al., \(2018\)](#) found that the higher the level of profitability of Islamic

banks, the more efficient the managerial was and the customers would tend to have more trust and choose a bank with a high level of profitability (Sari & Saraswati, 2017).

The results of the t-test for the FDR variable revealed positive results and gave a significant effect on changes in the productivity of Islamic Commercial Banks in Indonesia. This finding was in line with Jreisat, et al., (2018) which stated that banks with a higher ability to transform third party funds into loans would have more benefits so that their productivity would rise. In addition, Pambuko (2016) also claimed that one of the causes of the inefficiency of Islamic banks was the lack of the amount of financing allocated to the public. The results of the FDR test, which have a significant effect on changes in the productivity of Islamic Commercial Banks in Indonesia, show that the banking function as an intermediary institution has been running well Miftahurrohman (2018). In addition, Sufian (2009) found that a high FDR allows Islamic banks to gain a larger market share in the financing segment.

On the other hand, the result of the t-test for the CAR variable showed a negative impact and had a significant effect on changes in the productivity of Islamic Commercial Banks in Indonesia (it had a probability value of 0.0054 with a significance level of 0.05). These findings were in line with Firdaus & Hosen (2013) and Pitaloka et al., (2018), which stated that a low CAR indicates the more efficient Islamic banks are in managing their operations, and vice versa. A significant negative result suggests that the greater the CAR level makes Islamic Commercial Banks even more unproductive. For this reason, the revenue of Islamic Commercial Banks will decrease, so their productivity will decline as well. Meanwhile, according to (Firdaus & Hosen, 2013), the significant negative relationship between CAR and productivity changes reflects the risk-return trade-off theory. When Islamic Commercial Banks want to be safe (have a low risk), the bank will also have low income (Jackson & Fethi, 2000). Moreover, Miftahurrohman (2018) found that the management of Islamic banking in ASEAN countries was generally very careful in managing the risks arising from assets.

7 CONCLUSION

This study aims to analyze the level of productivity and the determinant factors of productivity of Islamic Commercial Banks in Indonesia. Islamic commercial banks experienced an increase in productivity of 2.5% during the observation period, this increase was more influenced by changes in technology than by the level of efficiency. The determinant variables that significantly affected the productivity of Islamic Commercial Banks in Indonesia were ROA and FDR, while the CAR variable had a significant negative effect. Furthermore, bank size did not affect changes in the productivity of Islamic Commercial Banks in Indonesia.

Despite of the compelling results, this study acknowledges a research limitation. Futher research can focus on investing in technology and innovation to distribute banking products and services. Futher research on the productivity of Islamic commercial banks and the factors that influence them are still rarely studied and concentrate only on non-

social reports, this research topic can still be explored more deeply by using other variables and social accounts.

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