

Comparative Analysis of Islamic Bank's Productivity and Conventional Bank's in Indonesia Period 2008-2016

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Abstract: The purpose of this research is to analyze the productivity differences between Islamic bank's and conventional banks in Indonesia during the period 2008 - 2016. In the first stage, bootstrapped Malmquist index of Islamic bank's and five conventional banks operates in Indonesia during the period 2008-2016. In the second stage, the data panel models are used to Investigate the determinants of productivity change. The results of the first stage show both Islamic bank's and conventional banks are experiencing decreasing productivity from 2008 to 2016. The results of the second stage show that Conventional banks are not influenced by specific banking factors compared to the Islamic bank. This paper provides relevant recommendations for improving the Islamic bank's productivity in Indonesia. This research is aim to expanding the literature on the productivity measurement in Islamic banks to conventional banks. The productivity measurement analysis technique using Malmquist Index is still limited in Indonesian banking studies.

1 INTRODUCTION

In Indonesia, the economic development of Islamic finance began in 1992 and pioneered with the establishment of the first Islamic bank, Bank Muamalat Indonesia.

At this time, based on statistical data of Islamic banking of the Financial Services Authority (FSA) (2017) per May 2017, the number of Islamic banking has reached 13 Islamic Bank's, 21 Islamic Office Channelling and 167 Bank of Islamic Financing with whole office network as much as 458 offices throughout Indonesia.

DEA (Data Envelopment Analysis) indicates the inefficiency specifications of the service unit. Since the DEA method was first introduced by Charnes, Cooper, and Rhodes in 1978, researchers in some areas recognize that DEA is an excellent methodology and relatively easy to use in the operational modeling process for performance evaluation (Charnes, et. al, 1978). In this study, DEA is used as a tool to measure and compare the performance of Islamic and conventional banking, in this case, all Islamic bank in Indonesia period 2008 – 2016.

Besides, to measure the productivity of Islamic and conventional banks that was observed, this study uses analysis of Malmquist Productivity Index (MPI). The Malmquist index is a part of the DEA method that specifically looks at the level of productivity of each business unit so that it will see a change in the efficiency and technology levels used based on predetermined inputs and outputs. The Malmquist index is also used to analyze performance changes over time.

Determination of the limiting factor into a benchmark whether a company has worked efficiently and productively is a separate problem. Not necessarily the factor is chosen as a variable to measure the level of efficiency it represents the whole aspect of the company, in this case, the bank. For that, we need a measurement formulation of the level of efficiency and productivity that can involve multi-variable.

2 LITERATURE REVIEW

Efficiency and productivity are the concept that shows the ratio of the result of comparison between

input and output. An activity might be called efficient if the effort has done to provide maximum output, both quantity, and quality. An activity might also be said to be efficient if the minimum effort can achieve a specific output. Ozcan (2008) divided into several parts namely efficiency: technical efficiency, scale efficiency, cost efficiency and allocative efficiency.

The concept of productivity is fundamentally a relationship between output and input in a production process. Productivity measurement is the most widely used method of Total Factor Productivity (TFP). This method is used to overcome the weakness of efficiency calculation more than one input and one output. TFP is measured using index numbers that could measure changes in price and quantity over time. Also, TFP also measures comparisons and differences between entities.

The Malmquist Index has become a standard approach in measuring productivity levels, especially when using nonparametric specs on microdata. This index first introduced by Caves, Christensen and Diewert (1982). The first generation model developed by Caves et.al (1982), there are 2 (two) Malmquist productivity index models (Bjurek, 1996). The first is 'Malmquist input quantity index' and the second is 'Malmquist output quantity index'.

Some research that applied banking productivity measurement with TFP change value, for example, was done by Yaumidin (2007), Saad et al. (2010), Raphael (2013), Bahrini (2015) and Yildirim (2015). Yaumidin (2007) attempted to compare the efficiency of Islamic banks in the Middle East and Southeast Asia. That research based on the failure of the bank which then affects the occurrence of financial crisis, both domestic and international. Overall, the result shows that Islamic banks in Southeast Asia are slightly more efficient than Islamic banks in the Middle East. One of the causes was tragedy 9/11 in 2001 and the Iraq war of 2002. Likewise, the value of TFP change.

Saad et al. (2010) examined the efficiency of the selected company conventional and Islamic unit trusts in Malaysia during the period 2002-2005. Overall efficiency Islamic unit trust company comparable to a conventional unit trust, and at any given time some Islamic unit trust was found to be above average in TFP. During the analysis period, the average unit trust Malaysia suffered a setback TFP and the main thing caused by a decrease in technical efficiency. However, the change in efficiency contributes positively to TFP. The change in efficiency is mostly due to pure efficiency, not scale efficiency. That shows the larger the size of the unit

trust will hurt the performance of TFP. The substantial setback in the technical components and the efficiency of positive growth, implying that the decline of TFP in the unit trust industry in Malaysia caused by a lack of innovation in technical components.

3 METHODOLOGY

TFP growth estimation, as well as the components of this study, refers to the Malmquist Index and DEA method application-Dual Programming. Malmquist Index This productivity is measured by DEAP 2.1 software developed by Coelli (1996). Nevertheless, to see the effect of several variables both micro and macro banking to the level of TFP change is done by panel data regression.

The data used in this study was 5 Islamic Bank and 5 Conventional Bank from 2008 to 2016. The input and output variables obtained from the balance sheet and profit and loss of each bank. Meanwhile for phase two, the variables used to determine the TFP effect of Islamic and Conventional banking is; the Capital Adequacy Ratio (CAR), Bank Size, Bank Management Quality, Business Diversification, Credit Risk (NPF/NPL), Return on Equity (ROE), Loan to Deposit Ratio (LDR), and Cash Ratio compared to Total Bank Assets.

4 RESULTS AND DISCUSSION

4.1 Data and Variables

This study using the intermediation approach. The input and output variables used listed in the below Table. The first input is labor costs (X1). The second input is fixed assets (X2). The third input is Total Third Parties Funds (X3). Then the first output variable used is total loan/financing provided by conventional and Islamic bank's (Y1). This variable is the primary output in the intermediation approach. Then the second output is the bank's investment portfolio (Y2), and the third output is the net operating income (Y3). Input and output variables have represented the intermediation of a commercial bank.

Table 1: Statistics of Input-Output Variables.

Year/ Statistics	Total Loans (Y1)	Investment Portofolio (Y2)	Net Operating Income (Y3)	Labor (X1)	Fixed Asset (X2)	Total Deposits (X3)
<i>2008</i>						
Mean	58,248,737	25,161,863	7,542,465	1,782,606	1,357,759	92,859,404
SD	64,334,197	36,446,069	9,516,178	2,259,419	1,643,426	110,475,248
<i>2009</i>						
Mean	69,246,417	30,470,427	8,276,847	1,925,670	1,447,973	107,705,759
SD	76,932,114	45,790,956	10,537,050	2,368,365	1,651,086	124,790,944
<i>2010</i>						
Mean	85,244,680	34,749,007	14,527,246	2,235,668	1,551,390	114,742,903
SD	94,757,905	56,280,572	23,021,176	2,784,458	1,796,465	132,545,495
<i>2011</i>						
Mean	105,287,758	40,026,850	13,370,536	2,470,822	1,765,733	136,194,466
SD	113,460,229	59,773,345	18,312,052	2,869,359	2,010,805	151,916,050
<i>2012</i>						
Mean	132,139,043	45,723,451	15,141,007	2,828,442	2,230,811	167,034,256
SD	139,373,691	58,400,975	20,045,770	3,254,269	2,545,973	185,362,823
<i>2013</i>						
Mean	162,761,724	48,022,560	17,944,682	3,312,096	2,675,966	188,517,140
SD	171,205,889	59,999,151	23,583,550	3,927,108	2,909,030	208,232,329
<i>2014</i>						
Mean	182,443,439	58,334,955	21,028,719	3,836,230	3,344,325	216,252,876
SD	194,626,377	75,616,342	28,636,704	4,524,523	3,422,294	243,043,578
<i>2015</i>						
Mean	206,297,111	50,416,417	24,123,640	4,313,027	5,198,562	233,616,643
SD	221,766,342	62,665,995	33,151,898	5,320,659	6,504,022	260,698,911
<i>2016</i>						
Mean	231,247,543	78,596,738	27,167,525	4,792,993	10,519,982	263,883,725
SD	249,859,621	108,601,266	37,317,203	5,926,098	12,577,413	294,404,626

4.2 Productivity Change of Indonesian Bank's

Analysis of growth rate of productivity Commercial Banks in Indonesia using Malmquist Total Factor Productivity Index (MTFPI) approach. Malmquist Index can be decomposed into two components, namely the Technical Efficiency Change (EFFCH) and Technological Change (TECHCH). According to Avenzora (2008), this is very useful because the analysis can be done more specifically by component. EFFCH positive (positive efficiency change) is evidence that changes in efficiency been approaching

the frontier, while TECHCH positive (positive technological change) note that changes in technology as innovation (innovation). Then EFFCH can be decomposed into two components, namely the Pure Technical Efficiency Change (PECH) and Scale Efficiency Change (Sech) (Fare et al., 1994).

On table 2 the estimated value or Malmquist Productivity Index Malmquist Productivity Index (MPI) of the overall banks in Indonesia included in the observation:

Table 2: Results of MPI Overall Banks.

Overall Banks	EFFCH	TECHCH	PECH	SECH	TFPCH
2008-2009	1.008	0.753	0.995	1.013	0.759
2009-2010	0.957	0.966	1.001	0.956	0.924
2010-2011	1.030	1.001	1.003	1.026	1.031
2011-2012	0.998	0.953	0.989	1.008	0.950
2012-2013	1.012	0.754	1.007	1.004	0.763
2013-2014	0.983	0.950	1.003	0.980	0.934

2014-2015	1.005	0.756	0.982	1.023	0.759
2015-2016	1.010	1.093	1.007	1.003	1.104
<i>Geometric Mean</i>	1.000	0.895	0.999	1.001	0.895

On table 2, it appears that from 2008 through 2016 study, commercial banks in Indonesia shows a decline in productivity growth. The lowest productivity decrease occurred in 2008-2009 and 2014-2015 with the value of TFPCH 0.759. As we

know, in 2008 and early 2009 there was a financial crisis in Europe that bring impacts to Indonesia.

4.3 Productivity Change of Conventional vs Islamic Banks

Table 3: Results of MPI Conventional Bank's Observed.

ConventionalBanks	EFFCH	TECHCH	PECH	SECH	TFPCH
2008-2009	1.027	1.076	1.000	1.027	1.106
2009-2010	0.997	0.908	1.000	0.997	0.905
2010-2011	0.999	0.913	1.000	0.998	0.912
2011-2012	0.998	1.097	0.994	1.004	1.095
2012-2013	0.985	0.792	1.006	0.979	0.780
2013-2014	1.022	1.119	1.000	1.022	1.143
2014-2015	0.996	0.734	1.000	0.996	0.732
2015-2016	1.001	1.111	1.000	1.001	1.113
<i>Geometric Mean</i>	1.003	0.958	1.000	1.003	0.961

Table 4: Results of MPI of Islamic Bank's Observed.

IslamicBanks	EFFCH	TECHCH	PECH	SECH	TFPCH
2008-2009	1.014	1.019	1.000	1.014	1.033
2009-2010	0.981	0.915	1.000	0.981	0.897
2010-2011	0.970	0.702	1.000	0.970	0.681
2011-2012	1.051	0.683	1.000	1.051	0.717
2012-2013	0.987	0.974	1.000	0.987	0.962
2013-2014	0.977	0.703	1.000	0.977	0.687
2014-2015	1.037	0.842	1.000	1.037	0.874
2015-2016	0.991	1.878	0.995	0.996	1.861
<i>Geometric Mean</i>	1.001	0.913	0.999	1.001	0.914

Based on the value of table 3 and 4 TFPCH, Conventional Bank and Islamic Bank's during period 2008-2016 has declined. Impairment TFPCH Islamic Banks were higher than conventional commercial bank occurred because the components that affect the Islamic Bank TFPCH more downward than conventional commercial bank rather component stagnant.

Based on the value of table 3 and 4 EFFCH, Conventional Bank and Islamic Bank's between 2008 and 2016 has increased. Impairment TECHCH higher in Islamic Bank's caused by low technological innovation in creating new quality products.

Based on the value of table 3 and 4 PECH, Conventional Bank's during the period 2008 to 2016 has stagnated while Islamic Bank's has declined

4.4 The Determinants of Indonesian Banks' Productivity Changes

For examining the relationship between financial and non-financial response to the rate of productivity growth of commercial banks in Indonesia, using ordinary least squares (OLS) regressions simple method. OLS is used as the dependent variable (Y) in this case the level of productivity is a rational number, considering the value of MPI is less than or greater than 1. Here is a regression model for the variable relationship of financial and non-financial to productivity growth for commercial banks in Indonesia:

$$\begin{aligned}
 \text{MPI}_i = & 1 + 2\text{CAR}_i + 3\text{BD}_i + 4\text{BMQ}_i + 5\text{CR}_i \\
 & + 6\text{CRISK}_i + 7\text{LDR}_i + 8\text{ROE}_i + \\
 & 9\text{SIZE}_i + i \quad (4)
 \end{aligned}$$

(Business Diversification); BMQ (Bank Management Quality); CR (Cash ratio); CRISK (Credit risk); LDR (Loan to Deposit Ratio); ROE (Return on Equity); SIZE (Bank size)

Information:
 MPI (Level Productivity Growth Commercial Bank's); CAR (Capital Adequacy Ratio); BD

In table 5 are the estimated results of independent variables of the growth productivity as (MPI) of overall banks in Indonesia:

Table 5: Results of OLS for Two Stages MPI Overall Bank's.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.276952	0.806302	2.823944	0.0062
CAR	0.018828	0.017973	1.047614	0.2984
BD	0.985789	4.469228	0.220572	0.8261
BMQ	-0.183430	0.227332	-0.806882	0.4224
CR	-0.005321	0.086796	-0.061300	0.9513
CRISK	-0.037874	0.058534	-0.647040	0.5197
LDR	-0.001446	0.004624	-0.312715	0.7554
ROE	-0.001495	0.003599	-0.415401	0.6791
SIZE	-0.075695	0.037041	-2.043546	0.0447
R-squared	0.086215	Mean dependent var		0.959375
Adjusted R-squared	-0.016746	S.D. dependent var		0.371107
S.E. of regression	0.374201	Akaike info criterion		0.977608
Sum squared resid	9.941896	Schwarz criterion		1.245586
Log likelihood	-30.10433	Hannan-Quinn criter.		1.085048
F-statistic	0.837354	Durbin-Watson stat		2.356349
Prob(F-statistic)	0.572973			

Results were processing OLS model with Eviews 6 shown in Table 5. Processing results showed that among all independent variables in the model, only

the bank size variable (SIZE) that significantly influence the level of productivity of commercial banks in Indonesia.

Table 6: Results of Two Stages MPI OLS for Islamic Bank's.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BD	2.245865	4.908790	0.457519	0.6504
BMQ	0.055926	0.229465	0.243726	0.8090
CAR	0.022708	0.023548	0.964357	0.3421
CR	-0.153624	0.138096	-1.112445	0.2742
CRISK	-0.097788	0.074025	-1.321002	0.1959
LDR	-0.006091	0.006551	-0.929801	0.3594
ROE	-0.003753	0.004347	-0.863189	0.3945
SIZE	0.108939	0.051408	2.119106	0.0419
R-squared	0.123149	Mean dependent var		1.056725
Adjusted R-squared	-0.068662	S.D. dependent var		0.354579
S.E. of regression	0.366550	Akaike info criterion		1.007492
Sum squared resid	4.299482	Schwarz criterion		1.345268
Log likelihood	-12.14984	Hannan-Quinn criter.		1.129621
Durbin-Watson stat	2.229184			

Table 7: OLS Results for Two Stages MPI Conventional Bank's.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BD	-11.41301	14.62457	-0.780400	0.4409
BMQ	-1.314508	1.008639	-1.303249	0.2018
CAR	0.017308	0.030365	0.570003	0.5727
CR	0.052357	0.169496	0.308898	0.7594
CRISK	-0.031536	0.182023	-0.173250	0.8635

LDR	0.004082	0.008136	0.501734	0.6193
ROE	0.006542	0.012932	0.505865	0.6164
SIZE	0.004021	0.054004	0.074452	0.9411
R-squared	0.082181	Mean dependent var		0.862025
Adjusted R-squared	-0.118592	S.D. dependent var		0.365795
S.E. of regression	0.386877	Akaike info criterion		1.115438
Sum squared resid	4.789568	Schwarz criterion		1.453214
Log likelihood	-14.30876	Hannan-Quinn criter.		1.237567
Durbin-Watson stat	2.188528			

The results of OLS model processing with Eviews 6 shown in table 6 and 7 are those factors tested for the effect on the productivity value of Islamic banks and conventional banks. The processing result shows that the size of bank's (SIZE) has a significant effect on the productivity of Islamic Banks in Indonesia. While in Conventional Bank's SIZE variable does not affect.

5 CONCLUSION

The results of the test in the first stage are the general level of MPI of commercial banks in Indonesia has decreased productivity level which marked by the value of changes in Total Factor Productivity (TFPCH) below than 1. The external factors that cause is a financial crisis that occurred in the interval of research. The internal factors that cause this to happen is the low level of technological innovation in banking and stagnation of changes in the level of efficiency. On the other hand, the results of the MPI of Islamic Commercial Banks in Indonesia also showed a decline in productivity growth, the reason for the decline was also caused by the level of technological innovation of banking and stagnation of changes in the level of efficiency.

The second stage test result is to measure the effect of the whole variable to the bank indicates that only variable size of the bank (SIZE) has a significant adverse effect on productivity level of the whole commercial bank and Islamic bank in Indonesia. It is because the bigger the size of a bank tends to make become less productive. The bank is not flexible in facing the challenges of competition, so it relatively become less agile in determining strategic decisions.

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