

PROCEEDINGS OF THE 13th
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INNOVATION AND MANAGEMENT

November 28-30, 2016

Chief Editors

Rubiyah Yusof, Ken Kaminishi, Wang Aimin

Associate Editor

Ma Ying, Geert Duysters, Arnolde de Hoyos, Josu Takala

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【Summary】

The proceedings include Organizational Innovation, Institutional Innovation and Management Integration Innovation; University-Industry Cooperation and Strategic Alliances; Product Innovation, Technological Innovation, Industrial Innovation and Regional Innovation; Environmental Innovation and Sustainable Development; Systems Engineering, Financial Engineering and Industrial Engineering; Operation Innovation and Modern Manufacturing Innovation; Risk Management and Innovation; Technological Economy, S&T Policy, Intellectual Property and Knowledge Management; Miscellaneous.

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Cost Efficiency and Its Determinants in the Eight Islamic Public Banks in Indonesia

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Abstract: The present study was conducted to estimate cost efficiency of Islamic Public banks in Indonesia by using data envelopment analysis (DEA); rank the banks according to their highest and lowest cost efficiency, and to determine the cost efficiency determinants by defining bank specific and macroeconomics factors. It covers quarterly data of 2011.1 – 2014.4 periods from Indonesian central bank website of the eight Islamic public banks that were selected as the sample of observation. The results revealed that Bank Victoria Syariah performs the best with the average score of 59.7%, while Bank BRI Syariah performance was lowest with an average score of 11.1%, in term of cost efficiency among all the Islamic public banks in this study. Net operating income, size, and GDP growth rate were found negatively impact and are statistically significant to cost efficiency, while capital adequacy ratio has a positive impact and are statistically significant to cost efficiency.

Key words: Cost efficiency; Bank specific; Macroeconomics; Data envelopment analysis; Islamic public banks

1 Introduction

The functioning of Islamic banks is similar to conventional banks that mediate and handle the money of customer. The two banking types differ in sharing profit and loss between the Islamic banks and the depositors, while conventional banks practice the interest rate system. The mutuality of ownership is introduced by the Islamic banking system that the customers of Islamic banking as the depositors have the right of ownership (Dar & Presley 2000). The transactions in Islamic banks that are administered without involving elements of *riba* that makes the main dissimilarity from conventional banks, it is mentioned in Quran, the Muslim's holy book, regarding the prohibition of *riba*. *Ribaisury* or excessive interest that insisted the debtors during the maturity date on imposing failure of payments and wants to roll it over (Kamarudin et al. 2014). Typically, fixed price that added the margin of its profit in advance is commonly known as Islamic banks basis, namely buying and selling principles (Khir et al. 2008)

During the past twenty years, the performance of Islamic banks in Indonesia has shown good performance rather than conventional banking as one of national financial system (Zuhroh et al. 2015). The total assets growth of Islamic banking in Indonesia from 2010 to 2014 is 100 trillion IDR to 279 trillion IDR or with its compound annual growth rate (CAGR) as 29.2%. Comparing to other Islamic banking systems in other countries, it indicates higher significant growth recorded since Islamic banking in Indonesia started with low capital in the beginning of the period. However, the total asset growth of conventional banks is even lower with CAGR for 16.9% on the same period (2010-2014). Explicitly, the Islamic financial industry in Indonesia is left behind of its counterpart, conventional banks, as the market share is only 4.7% from the overall total assets of banking industry in Indonesia. Indonesia financial services authority developed and launches the roadmap of the coming five years, in 2023, to boost up Indonesian Islamic banking market share to 15%. Indonesian government support the target to be the center of Islamic banking globally and prevent from the negative impacts of unstable economic situations (Schaar 2015).

Hence, the operational efficiency for Islamic banking is needed since the improvement of bank efficiency will improve the ability of bank to provide higher return to depositor. Moreover, customers would rely on an efficient bank because the more efficient bank tend to have lower service expense with better service to the customer (Fries & Taci 2005). During the last decade, it has been becoming focus of the study to ensure the future sustainability, especially in competition era by assessing the efficiency of banking sector as the most important thing (Zuhroh et al. 2015). As the banks improve their competitive advantage, the banks will be more efficient. Besides the role as financial intermediary, cost efficiency has its crucial role in understanding the environment of its market in which the foreign banks and the other financial intermediaries may become more competitive by fulfilling its cost efficiency (Allen & Rai 1996). Although there have been many researches done before, the study of Islamic bank efficiency is

still in infancy, particularly in Indonesia. Additionally, it is rare to find the rank of Islamic public banks in Indonesia based on the level of efficiency. To fill the gap of the literatures, this study therefore examine the case of Islamic public banks in Indonesia to provide new contribution as an evidence by using a non-parametric approach based on data envelopment analysis (DEA) in measuring cost efficiency and its determinants by using panel data regression.

2 Literature Review

The study of bank efficiency by utilizing frontier analysis approaches of Islamic banks have been researched many years ago in different countries (Havidz & Setiawan 2015; Sufian 2007; Yudistira 2004; Hassan 2006; Sufian et al. 2008; Rahman & Rosman 2013; Zuhroh et al. 2015). The techniques of frontier efficiency represent the best practice to measure performance evaluation as well as its inefficient strategy. Non-parametric approach is employed in this study, known as data envelopment analysis (hereafter is shorten as DEA). An effective tool to identify the frontiers had been proved for efficiency evaluation is firstly introduced by Charnes et al. (1978) which commonly used among the researchers (Zhu 2009).

Yudistira (2004) performed a research on technical, pure technical, and scale efficiencies by utilizing DEA. The results suggest that the inefficiency is just lower at 10% across 18 Islamic banks indicating when it is compared to conventional counterparts. The scores of efficiency are taken to be regressed on its environmental variables by focusing on overall technical efficiency on the second stage. It reveals that an encouragement of M&A should be taken since the Islamic banks of small up to medium class were dealing with inappropriate scale economies. Rahman & Rosman (2013) measured the efficiency scores using DEA based on intermediation approach of 63 Islamic banks. The technical inefficiency is driven by inappropriate scale operations among the Islamic banks. On the other words, pure technical efficiency scores are higher than scale efficiency which indicates a controllable of banks' management in controlling the costs as well as maximize outputs in a given inputs. Furthermore, the researchers used bank specifics ratio (profitability, capitalization, and size) and macroeconomic factor (GDP per capita) to find its determinants by applying ordinary least square of panel regression. The economic condition of a country determined as the main factor of Islamic banks efficiency. A positive impact of capitalization on efficiency is proved. Meanwhile, Islamic banks size indicated negative and significant impact on scale efficiency as well as negative impact of profitability on efficiency. Havidz & Setiawan (2015) estimated the three efficiency measures of overall technical, pure technical, and scale efficiencies in the fourth Indonesian Islamic banks. Bank Muamalat Indonesia, Bank Mega Syariah, and Bank Syariah Mandiri deal with scale inefficiency as overall technical inefficiency main source, while Bank BNI Syariah may deal with inappropriate management as the dominant source of overall technical inefficiency. The second stage of regression indicates significant impacts proved by operational efficiency ratio (OER), return on assets (ROA), and inflation rates on efficiency.

Isik & Hassan (2002) further analyzes the measurement addressing cost efficiency investigates input and output efficiency in the Turkish banking industry during 1988-1996. Technical inefficiency dominated the main source of inefficiency as compare to allocate inefficiency. The impact of bank size to efficiency is negative as the relationship is analyzed on the second stage. Bader et al. (2008) measures and compares the cost, profit, and revenue efficiencies in the 43 Islamic and 37 conventional banks started from 1990 to 2005. It is suggested that the overall efficiency results have no significant difference when it is compared between conventional and Islamic banks. Kumar (2010) analyzed the cost efficiency trends from 1992/93 until 2007/08 as it is known as the period of post deregulation in the public sector of Indian banks by defining the components as well. The findings indicate that technical inefficiency mainly drives the cost inefficiency. The regression model is estimated and found that there is no statistical significant impact of banks size in all models of regression and only two regression models of profitability indicating statistical significant and positive. Zuhroh et al. (2015) aims in several objectives of study that applying stochastic frontier approach to estimate cost efficiency of Islamic banks, determine the source of cost inefficiency, and analyze the influence of the competency of managers and several variables on cost efficiency. It is conducted in full-fledged Islamic banks of Indonesia, totally 3 and listed conventional banks on the Indonesia Stock Exchange (IDX), totally 19 from 2004.03 – 2010.4. It is revealed that allocate inefficiency dominantly caused the cost inefficiency and the average cost of conventional banks is higher than Islamic banks. Asset has negative impact and significant on efficiency as well as negative impact and statistically significant of NPL on efficiency. It proves that LDR has positive impact and significant on particular frontier.

Based on the literature above, it shows there are several studies about efficiency measurement in the banking industry and variously applying technical, pure technical, scale, cost, profit, and revenue efficiency. This study focuses on cost efficiency as it measures how close the bank's cost to its best practice of bank's cost to produce the same output by the same conditions. The range score of cost efficiency over 0 to 1, in which firm's best practice equals to one within the observed data (Berger & Mester 1997). In order to determine the cost efficiency, regression is conducted on the second stage by measuring bank specifics and macroeconomics environment. The efficiency studies have been researched world widely. However, there are still few studies in the banking industry of Indonesia especially Islamic banking as it is needed in-depth and ongoing study on Islamic banking literature that related to the efficiency frontier. This study may contribute in giving the ranks of Islamic public banks in Indonesia that provided as a reference.

3 Research Methodology

3.1 Data collection method

The evaluation of efficiency of Islamic Public Banks in Indonesia is based on secondary data that is published quarterly on the website of the central bank in Indonesia, named *Bank Indonesia* which consists of foreign exchange and non-foreign exchange banks. The data compiled from balance sheet, income statement, off balance sheet and financial ratio calculation in the period of observation 2011.1 – 2014.4. There are four foreign exchange banks and all the data are complied with the objective of the study. However, there are only four out of six non-foreign exchange banks that fit the required data in this study. Hence, the overall samples are eight Islamic public banks in Indonesia.

3.2 Model of the study

This study employs intermediation approach by using input-oriented. Zhu (2009) has developed the DEA Excel Solver to solve the cost efficiency model with the range score within 0 and 1, that summarized by Zhu as:

$$\begin{aligned} & \min \sum_{i=1}^m p_i^o \tilde{x}_{io} \\ & \text{Subject to} \\ & \text{CRS} = \begin{aligned} & \sum_{j=1}^n \lambda_j x_{ij} \leq \tilde{x}_{io} & i = 1, 2, \dots, m; \\ & \sum_{j=1}^n \lambda_j y_{rj} \geq y_{ro} & r = 1, 2, \dots, s; \\ & \lambda_j, \tilde{x}_{io} \geq 0 \end{aligned} \end{aligned} \tag{1}$$

Where p_i^o is the unit price of the input i of DMU_o . The DMU may vary one another based of the price data. The cost efficiency of DMU_o is defined as:

$$\frac{\sum_{i=1}^m p_i^o \tilde{x}_{io}^*}{\sum_{i=1}^m p_i^o x_{io}} \tag{2}$$

After obtaining the cost efficiency scores, the second stage of analysis is held by regressed the determinants of efficiency with the equation as follows:

$$CE = \alpha_{it} + \beta_1 NOI_{it} + \beta_2 CAR_{it} + \beta_3 SIZE_{it} + \beta_4 OER_{it} + \beta_5 GDP_{growth_{it}} + \beta_6 INF_{rate_{it}} + \epsilon_{it} \tag{3}$$

- CE : Cost Efficiency
- β : coefficient of independent variable
- NOI : Net Operational Income
- CAR : Capital Adequacy Ratio
- SIZE : Total assets of a bank (Log TA)
- OER : Operational Efficiency Ratio
- GDP growth : Gross Domestic Product growth rate
- INF rate : Inflation rate
- ϵ : error terms
- i : number banks in total
- t : number observations for each bank in total

4 Empirical Results and Discussions

4.1 Cost efficiency of Islamic Public Banks in Indonesia

There are three variables of input employed; labor, total funds, and fixed assets, with three variables of output; total financing, off-balance sheet items, and other earning assets. Further, input prices are required to conduct the cost efficiency, such as; labor price, funds price, and fixed assets price. As the cost efficiency scores are obtained, we further give the bank's rank by defining the average scores of its efficiency from the whole periods, as below:

Table 1 Average Rank of Cost Efficiency

Ranking	Islamic Public Banks	Mean
1	Bank Victoria Syariah	0.597
2	Bank BNI Syariah	0.548
3	Bank Jabar Banten Syariah	0.436
4	Bank Muamalat Indonesia	0.421
5	Bank Syariah Bukopin	0.256
6	Bank Syariah Mandiri	0.228
7	Bank Mega Syariah	0.226
8	Bank BRI Syariah	0.111

Based on table 1, it reveals the rank of Islamic public banks in Indonesia based on the average cost efficiency score. Bank Victoria Syariah performs the best among other banks in this study, in which the results show that it achieves as highest rank in the eight quarter with the average score 59.7%. By utilizing the 59.7% of resources employment, it is expected to produce outputs in the same level of inputs when it is not producing on the current location other than its frontiers. More resources are needed for 40.3% since more cost is spent to produce efficiently the same outputs averagely. On the other hand, Bank BRI Syariah indicates as the least efficient among all banks in this study with the average score of cost efficiency only 11.1%.

4.2 The determinants of cost efficiency

Dependent variable is obtained from the scores of cost efficiency to find its determinants by employing panel regression. The result of Hausman test reveals that the p-value is bigger than 5 percent hence the study used random effect. Prior to the regression, it is found that there is no multicollinearity issue among the independent variables thus the regression could be further studied.

Table 2 Determinants of Cost Efficiency

Variable	Coefficient	Std. Error	t-Statistic	Prob.	R-squared	0.3785
C	6.9966	2.0067	3.4867	0.0007	Adjusted R-squared	0.3477
NOI	-0.0066	0.0024	-2.7135	0.0076	S.E. of regression	0.1769
CAR	0.0045	0.0011	3.8838	0.0002	F-statistic	12.2819
SIZE	-0.0754	0.0362	-2.0836	0.0393	Prob(F-statistic)	0.0000
OER	-0.0034	0.0027	-1.2285	0.2216		
GDP	-1.0012	0.3546	-2.8232	0.0056		
INF	-0.0064	0.0058	-1.1068	0.2706		

Based on table 2, it indicates that out of six, there are four independent variables have significant impact on cost efficiency. Net operating income (NOI) is significant on one percent level with negative impact on cost efficiency; capital adequacy ratio (CAR) is significant on one percent level with positive impact on cost efficiency, banks size is significant on five percent level with negative impact on cost efficiency, and GDP growth rate is significant on one percent level with negative impact on cost efficiency. It indicates that this study supports the results of Rahman & Rosman (2013) that capitalization has positive impact, while size and profitability have negative impact on cost efficiency. Additionally, GDP growth rate is the main determinants of bank efficiency. Adjusted R-squared is 0.3477 that indicates 34.77% the variation of independent variables could explain the dependent variable; meanwhile the remaining 65.23% may be determined through other factors which excluded in this study. F-statistic and p-value indicate as good model for analysis, hence the results are reliable.

5 Conclusions

There are eight Islamic public banks in Indonesia, which were taken as the sample of this study with quarterly data from 2011.1 to 2014.4. It employs non-parametric and its efficiency scores are regressed to find its determinants. Data envelopment analysis is used as non-parametric approach by assuming cost efficiency in measuring the best practice of the cost of banks by maintaining the same condition in producing the same outputs. The Islamic public banks are expected to minimize the cost in order to achieve higher profit. The average score of Bank Victoria Syariah as the most efficient banks among other Islamic banks in term of cost efficiency is 59.7%, while Bank BRI Syariah which is the most inefficient bank with the average score 11.1%.

There are three determinants that indicate negative impacts on cost efficiency, such as net operating income (NOI), size and GDP growth rate, while capital adequacy ratio has positive impact on cost

efficiency. Due to time limitation and specific scope of case in Indonesia, the authors may recommend for further research to broaden the study as comparative study among countries as well as among Islamic and conventional banks. Bank efficiency study may also measure the profit and revenue efficiency to capture better understanding from various measurements of efficiency. The determinants of bank efficiency may find the impacts from other bank specifics and corporate governance aspects as well.

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