Al-Uqud: Journal of Islamic Economics
E-ISSN 2548-3544, P-ISSN 2549-0850
Accredited No. 28/E/KPT/2019

Volume 5 Issue 2, July 2021
DOI:10.26740/al-uqud.v5n2.p234-249
Page 234-249

Islamic Banking Efficiency in Indonesia and Malaysia: Two Stages Data Envelopment Window Analysis

Pribawa E Pantas[1*], Agus Susetyohadi [2], Laurin Azwita [3]

[1,2,3]Department of Islamic Banking, Faculty of Islamic Studies, Universitas Ahmad Dahlan, Indonesia

Abstract: *This study aimed to evaluate the efficiency of Islamic banks in Indonesia and Malaysia and examine the determinants of their efficiency in 2015-2019 using a two-stage data development window analysis approach. The research involves 13 Indonesian Islamic banks and 16 Malaysian Islamic banks. The first test step using the Data Envelopment Window Analysis (DEWA) approach has shown that the Islamic Bank's efficiency in managing resources is inefficient. The second research process using the Tobit model shows that the Capital Adequacy Ratio (CAR), Return on Asset (ROA), Non-Performing Financing (NPF), and Deposit Ratio Financings (FDR) do not have a significant impact on the efficiency of Indonesian Islamic Banking. Though CAR has significant positive effects on banking efficiency in Malaysia, NPF has a significant impact on Malaysian Islamic banks' efficiency. This study implies that the banking industry players increase their efficiency, mainly to enhance the amount of finance directed more towards the production sector, to increase the Islamic banking industry's market share in both countries.*

Keywords: *Efficiency; Islamic Banks; Data Envelopment Window Analysis; Tobit Model.*

Paper type: Research paper

***Corresponding author**: pribawa.pantas@pbs.uad.ac.id

Received: October 20, 2020; Accepted: July 21, 2021; Available online: July 31, 2021; Published regularly: July 2021

Cite this document:
Pantas, P. E., Susetyohadi, A., Azwita, L. (2021). Islamic Banking Efficiency in Indonesia and Malaysia: Two Stages Data Envelopment Window Analysis. *Al-Uqud: Journal of Islamic Economics, 5(2),* p 234-249. DOI: http://dx.doi.org/10.26740/al-uqud.v5n2.p234-249

Abstrak: *Riset ini bertujuan untuk mengukur serta menganalisis determinan efisiensi perbankan syariah di Indonesia dan Malaysia tahun 2015- 2019 dengan pendekatan Dua Tahapan Data Envelopment Window Analysis. Objek dalam riset ini adalah 13 bank syariah Indonesia serta 16 bank syariah Malaysia. Pengujian tahap awal menggunakan Data Envelopment Window Analysis (DEWA) menghasilkan kesimpulan bank syariah masih kurang efisien dalam mengelola sumber yang dimiliki, di sisi lain bank syariah Indonesia mempunyai nilai efisiensi yang lebih besar dibanding bank syariah Malaysia. Pengujian sesi kedua memakai model Tobit menampilkan Capital Adequacy Ratio (CAR), Return on Asset (ROA), Non-Performing Financing (NPF), serta Financing to Deposit Ratio (FDR) tidak berpengaruh secara signifikan terhadap efisiensi perbankan syariah Indonesia. Sebaliknya di Malaysia, CAR memiliki pengaruh positif signifikan terhadap efisiensi bank, serta NPF berpengaruh secara negatif signifikan terhadap efisiensi bank syariah Malaysia. Temuan ini mengimplikasikan kalau industri perbankan perlu meningkatkan efisiensinya secara khusus dengan menaikkan porsi pembiayaan yang mengarah pada zona produktif guna memberikan multiplier effect untuk memperkuat pangsa pasar industri perbankan syariah di kedua negara.*

Kata kunci: *Efisiensi; Perbankan Syariah; Data Envelopment Window Analysis; Model Tobit.*

INTRODUCTION

Islamic banking and finance sectors have greatly strengthened to solve better mainstream global financial structures (Komijani & Taghizadeh-Hesary, 2018; Khan & Bhatti, 2008). Islamic banking activities are now expanding internationally through the Middle East, South Asia, and Southeast Asia (Mokhtar et al., 2008; Yahya et al., 2012). The sector of Islamic banking makes a dominant contribution at the end of 2018, amounting to 1.57 trillion USD or 71.7% of the total global Islamic financial assets, the Islamic capital market amounting to 591.9 billion USD or 7% of the total global Islamic financial assets, while the Islamic insurance industry amounted to 27.7 billion USD or 1.3% of the total global Islamic financial assets (IFSB, 2019).

Southeast Asia is also becoming an essential part of Islamic world finance due to its rapid and sustainable growth. Indonesia and Malaysia are two nations that drive the Islamic banking and finance industries' growth in Southeast Asia (Ghozali et al., 2019). There are similarities in Indonesia and Malaysia's political economy, where both countries attempt to develop a double banking and financial structure (dual banking systems) in the Islamic and conventional sectors that operate simultaneously (Prasetyo et al., 2020).

Malaysia is the fastest-growing country in the industry with a significant market share in Islamic banking, contributing to around 26% of the total national banking assets (Basri et al., 2019; Rama, 2015), while Islamic banking in Indonesia only has a market share of around 6.01% of the total national financial system. Although it seems low, the growth of Indonesia's Islamic banking industry is relatively strong. Based on the Islamic Financial Statistic data in April 2019, as stated by The Financial Services Authority (OJK, 2019), the number of Islamic banks reached 13 Commercial Banks, 21 Business Units, and 168 Islamic Rural Banks across Indonesia as many as 2.460 offices.

In the Islamic Financial Country Index (IFCI) centred on the Global Islamic Finance Report (2019), Indonesia's Islamic finance industry was first positioned above other Islamic countries in 2019, as stated in Table 1 (Appendix 1). Indonesia is ranked number one with 81.93; from 2011 to 2018, Malaysia's overtaking held the top index ranking. IFCI is the latest index ranked by different countries on the national and internationally benchmarked Islamic banking finance state and each country's governmental role in the industry. IFCI was developed to capture the industry's growth and immediately assess Islamic finance and banking in individual countries.

Nowadays, Islamic banks face more diversified capital markets and fierce competition (Ahmad & Rahman, 2012). Efficiency is the key to the banking industry's desired market structure (Mala et al., 2018). Consequently, Islamic banking needs to maintain its efficiency because it can positively boost financial stability (Abbas et al., 2016; Ismail et al., 2013). Indonesia and Malaysia are required to keep competitive. Hence, efficiency measurement can also be an essential indicator to assess a bank's ability to survive. Evaluation of bank efficiency is needed so that banks can act rationally in minimizing the level of risk in their operational activities, increase their competitiveness and expand their market share (Hidayati et al., 2017; Pambuko, 2016).

Financial institutions' efficiency literature has multiplied by many researchers, both with parametric and non-parametric techniques. Data Envelopment Analysis (DEA) is a non-parametric technique that defines a relative output ratio for each input unit (Cvetkoska & Savić, 2017). One of the problems with DEA is that it can be defined as 100% significant by too many DMUs if there are also a few observations concerning the number of inputs and outputs calculated (Phan et al., 2018). Also, Sathye (2003) showed that DEA has some weaknesses such as its findings can not be interpreted with confidence when data integrity has been violated. To boost the precision of the predicted efficiency scores, Shawtari et al. (2015) follow the Data Envelopment Window Analysis (DEWA) suggested by Charnes et al. (1984) instead of the standard DEA to consider dynamic results. Data envelopment window analysis (DEWA) was proposed to assess cross-sectional and time-varying data efficiency.

This research investigates and compares Islamic banking's efficiency dynamics in Indonesia and Malaysia. Bank efficiency research continues to grow, to name a research method, a two-stage data development analysis (Firdaus & Hosen, 2013; Pambuko, 2016). In the first stage of this research, a measurement of efficiency will use the DEWA method. Meanwhile, in the second stage, the research will analyze the factors influencing the efficiency of Islamic banking in Indonesia and Malaysia using the Tobit model.

Several studies overseas have analyzed the efficiency of the Islamic banking sector. Most studies have used standard DEA to evaluate the bank's efficiency in different countries; The results usually suggest that Islamic banks do not perform efficiently (Wahab & Haron, 2017; Ahmad & Rahman, 2012; Hidayati et al., 2017; Rusydiana, 2018).

As for comparative efficiency between Islamic banks and conventional banks, some studies have shown that Islamic banking is still less effective in different

countries than conventional banks (Abbas et al., 2016; Al-Khasawneh et al., 2012; Rozzani & Rahman, 2013). In contrast, Sakti & Mohamad (2018) showed that from 2008 to 2012, Islamic banks are more efficient in Indonesia than conventional banks. Similar findings are also shown by Ahmad & Luo (2010), a comparative analysis of Islamic and conventional banks and their determinants using standard DEA, which analyzed banks' efficiency in Europe. Its findings suggested that Islamic banks are more efficient technology than conventional banks. Though Islamic banks hold fewer assets than conventional banks, these banks remain productive and cost-effective. Islamic banks usually manage costs better than conventional banks.

As for the present study, it emphasizes data envelopment window analysis (DEWA). Other studies have utilized DEWA to examine banks' efficiency indicators (Cvetkoska & Savić, 2017; Nguyen et al., 2014; Phan et al., 2018; Shawtari et al., 2015). Shawtari et al. (2018) have reported that pure technical efficiency is higher than Islamic banks in Yemen for conventional banks. The DEA window analysis also showed that a large bank in the Czech banking industry was less efficient than other banks (Řepková, 2014).

Several studies have extended their research to examine the key factors that affect the bank's efficiency. Firdaus & Hossen (2013) determined the adverse and significant effects on bank efficiency of the number of branches, non-performing financial resources (NPF), and the capital adequacy ratio (CAR). In the meantime, the variable asset, asset return (ROA), and equity return (ROE) have a positive and significant impact. Other research used determiners of efficiency factors such as the capital adequacy ratio, operating efficiency ratio, return on assets, return on equity, inability to finance and deposit funding ratio (Hidayati et al., 2017; Solihin et al., 2016; Sufian, 2009).

In the two-stage data analysis approach, Pambuko (2016) analyzed the determinants of Islamic banks' efficiency in Indonesia from 2010–2013. The second phase of the research using the Tobit model revealed a substantial positive impact on the efficiency of Islamic banks, including Capital Adequacy Ratio (CAR), Return on Assets (ROA), Non-Performing Financing (NPF), Funding to Deposit Ratio (FDR), and Net Interest Margin (NIM). In comparison, Fathony (2012) showed many findings when CAR did not affect efficiency; in assessing the efficiency of Islamic banks in Indonesia, ROA is not statistically meaningful (Shah & Jan, 2014; Socol & Dănulețiu, 2013); FDR and NPF do not influence efficiency level (Lutfiana & Yulianto, 2015; Setiawan et al., 2017).

Studies on the efficiency of the Islamic banking sector have also been an essential part of banking literature. Although various studies have analyzed the banking sector's performance and efficiency, no studies compared to the best of our knowledge the efficiency of Indonesia and Malaysia's Islamic banks for a significant time. Besides, this was the first research to use a specific tool, Data Envelopment Window Analysis (DEWA), to estimate Indonesia and Malaysia's efficiency scores. Bankers and policymakers in both countries should also be concerned with an overview of changing banking sector efficiency. This finding is consistent with previous Firdaus & Hosen (2013) research.

RESEARCH METHODS

Data and Variable

This study includes 13 Indonesian Islamic banks and 16 Malaysian Islamic banks in the period 2015-2019. The data used is secondary data in the form of annual financial reports of the individual institutions.

The efficiency examination of Islamic banks in Indonesia and Malaysia in this study was performed in two phases. The first step, Data Envelopment Window Analysis (DEWA), utilizes an efficiency measurement approach for intermediation. The input variable (I) used in this study includes a third party's fund (I1), labour cost or personnel expenses (I2), and fixed asset (I3). Meanwhile, the output (O) variable used is total financing (O1) and financial investment in securities (O2). In the second step, The DEWA measurement score will be used as the dependent variable to evaluate the determinants of Islamic banks' efficiency in Indonesia and Malaysia using the Tobit model. The capital adequacy ratio (CAR), financing to deposit ratio (FDR), return on asset (ROA), and non-performing financing (NPF) are the independent variables that will be tested for impact.

Data Envelopment Window Analysis (DEWA)

In order to estimate the efficiency of decision-making units (DMUs), DEA is a non-parametric method. The description of the functional form or the assumption of the distribution of the term inefficiency does not require the DEA process (Phan et al., 2018). DEA identifies a peer bank or banks then calculates its efficiency for the best-practice bank, given an efficiency score of 100 percent or 1, where perfect efficiency is indicated by the number one (1).

The appropriate theory for bank development must be formulated to determine the inputs and outputs to find the best efficiency testing approach. According to Řepková (2014), four main approaches (intermediation, development, assets, and benefits approach) have been established to determine the financial institutions' input-output relationship. This study assumes that intermediation is a typically used approach that assumes banks are intermediaries for financial services. According to Hadad et al. in Pambuko (2016), the banking institutions' real function is intermediary institutions. The intermediation approach suggests that banks combine deposits, labour, and capital to establish loans and other investments (Webb, 2003). In Islamic banking, the intermediation approach describes banking activities as transforming funds held from *wadiah* current accounts, *mudharabah* savings and deposits, and placement of third party funds into funds used for financing by *mudharib* or borrowers (Solihin et al., 2016).

One of the problems with DEA is that if too little observation occurs concerning the number of calculated inputs and outputs, too many DMU can be counted as 100 percent perfectly efficient. If the sample consists, compared to the number of inputs and outputs chosen, of a small number of the DMUs, many of the DMUs form the efficiency frontier to reduce the power of discrimination. The Window Analysis (DEWA) technique can solve this problem (Cvetkoska & Savić, 2017). Charnes et al. (1984) introduced the windows analysis. Considers a DMU treated as a separate DMU at different levels, thereby raising the number of freedom degrees (Asmild et al., 2004) by decreasing the number of DMUs identified as

100% efficient. Using window analysis, the number of DMUs can be increased, and efficiency analysis can also provide the time dimensions (Charnes et al., 1978). The EMS 1.3 software tool is used for resolving the intermediation method for the output-oriented DEWA model.

Tobit Model

At this stage, the Tobit model analyzes the determinants of Islamic banks' efficiency in Indonesia and Malaysia. By first obtaining the efficiency value in the first stage using the DEWA method, this value is evaluated with several independent variables to determine the impact on the integrated management variables' efficiency. According to Endri (2008), the Tobit method assumes that independent variables are not limited in value (non-censored); only dependent variables were censored; all variables (both independent and dependent) are measured correctly; no autocorrelation; no heteroscedasticity; there is no perfect multicollinearity, and the mathematical model used is correct. Data structures like this are called censored data.

The Tobit procedure is used when the data used in the analysis are censored data, namely the values of the dependent variable (EF), which is limited to 0 and 100. If this data is used for the Ordinary Least Square (OLS) method, regression results would be biased and inconsistent (Fathony, 2012). The Tobit regression equation in this study is as follows:

$$EF_{it} = \beta_0 + \beta_1(CAR)_{it} + \beta_2(FDR)_{it} + \beta_3(ROA)_{it} + \beta_4(NPF)_{it} + u_{it} \quad (1)$$

RESULTS AND DISCUSSION

First Stage: Efficiency Measurement

The result of measuring the efficiency of 13 Indonesian Islamic banks and 16 Malaysian Islamic banks through the Data Envelopment Window Analysis (DEWA) approach in the 2015 - 2019 period can be seen in Appendix 2 and Appendix 3.

The efficiency result shows that 13 Indonesian Islamic banks' efficiency levels in the 2015-2019 period showed a fluctuating trend ranging from 34,50 - 100. There were no banks that experienced efficient conditions during the observation period. Only two banks show near-perfect efficiency, namely Bank Syariah Mandiri, with an average value of 0.9979, and Bank Muamalat Indonesia at 0.9936, where both are Islamic banks with the most extensive asset holdings in Indonesia.

Not much different from Indonesia, based on efficiency results, 16 Malaysian Islamic banks also have a fluctuating trend ranging from 40,04 - 100. Only one bank experienced an efficient condition during the observation period, namely the MBSB Bank. Overall, Indonesia's Islamic banking industry has a higher efficiency level, with an average 85,05 percent score. Meanwhile, Malaysian Islamic banking recorded an average efficiency level of 75,74 percent.

Second Stage: Determinants of Efficiency

The results of testing the determinants of Islamic banking for 2015-2019 using the Tobit regression, the determinations formed by internal Islamic banks in Indonesia-Malaysia, can be seen in Appendix 4 and Appendix 5.

Based on the measurement results, it is known that CAR, FDR, ROA, and NPF as internal variables of Indonesian Islamic banks have no significant or no real impact on efficiency. Different results are shown in the calculation of Malaysian Islamic banks, where CAR has a positive and significant impact at the 5 percent level. At the 10 percent significance level, NPF has a positive and significant impact. FDR and ROA, meanwhile, do not have a significant impact. Based on what has been mentioned, it can be inferred that Islamic banks in Indonesia and Malaysia are still categorized as inefficient or not optimal in managing their resources. This finding is in line with Wahab & Haron (2017), Ahmad & Rahman (2012), Hidayati et al. (2017), Rusydiana (2018), which state that Islamic banks have not been able to operate optimally.

In evaluating Islamic banks' efficiency in Indonesia, the capital adequacy ratio (CAR) is not statistically significant, which corroborates Fathony (2012) findings. Capital adequacy alone is not significant in determining bank efficiency because banks are regulated organizations. Adequate capital creates the bank's efficient operation; capital adequacy is the starting point of business activity. It means the capital adequacy builds the base to formulate a strategy for efficiency by combining several other variables that management controls.

Conversely, the CAR has a positive and significant impact on Malaysian Islamic banks' level of efficiency. In other words, the greater the capacity of bank capital to cover the risk, the more efficient the bank is in managing its resources. These results support the findings of Firdaus & Hosen (2013), Hidayati et al. (2017), Pambuko (2016), which confirms that CAR has a positive and significant impact on bank efficiency.

The findings also showed that the probability value of the financing to deposit ratio (FDR) was 0.4396 and 0.2658, which explains that Islamic banks' efficacy in Indonesia and Malaysia was not significantly affected by the FDR. This study's results align with the findings of Lutfiana & Yulianto's (2015), which show that an improvement in the FDR variable does not increase efficiency and shows that FDR does not affect efficiency by one factor.

ROA is another interesting finding. The overall indicator shows a negative relationship between ROA and efficiency, although the level of efficiency of Islamic banks in Indonesia and Malaysia is not significant. This result is in line with the findings of Shah & Jan (2014) and Socol & Dănuleţiu (2013).

The results revealed that the NPF is positive, but the efficiency of Islamic banking in Indonesia is not significantly affected. This research's findings are consistent with previous studies conducted by Endri (2008), Lutfiana & Yulianto (2015), Setiawan et al. (2017), that the efficiency of Islamic Commercial Banks is not affected by NPF. Apart from Indonesia, the NPF has a negative and significant impact on Malaysian Islamic banks' efficiency. In other words, the more it decreases, the more Islamic banks will be more efficient.

CONCLUSION

This study was conducted to assess the level of efficiency and analyze the determinants of the efficiency of Islamic banking in Indonesia and Malaysia in the 2015–2019 period using a Two-Stage Data Envelopment Window Analysis

approach. The first step is using the DEWA approach, and the next step using the Tobit regression model.

The first stage of testing showed that the level of efficiency of Islamic banks in Indonesia and Malaysia shows a fluctuating trend and that the average value of the Indonesian Islamic banking industry of 0,7574 and the Malaysian Islamic banking industry of 0,8508 is still included in the inefficient category or not optimal in its resources. Despite having a lower asset value, the Indonesian Islamic banking industry achieved a higher efficiency performance than Malaysia. The result shows that Islamic banking is more efficient in managing its output in Indonesia.

The second stage of the study revealed some critical results. There is no significant impact on Indonesian Islamic banking's efficiency by CAR, FDR, ROA, and NPF. While it is known in Malaysia that the CAR has a positive and significant impact on bank efficiency, the NPF has a negative and significant impact on Islamic banks' efficiency in Malaysia. Conversely, the two variables, namely FDR and ROA, do not significantly impact the efficiency of Islamic banks.

The findings in this study produce several policy implications, especially for Indonesian Islamic banking under the auspices of the Financial Services Authority (OJK). The inefficient condition of Islamic banking in the observation period can be one of the causes of the fluctuating target market share to date. Therefore, OJK needs to pay extra attention to achieving the efficiency level of Islamic banking so that the targets to be achieved can be well realized. On the other hand, Islamic banks were expected to continually develop the organizational structure, management dimensions, facilities, and quality of the services to face competition in the banking world. Furthermore, increasing the amount of public financing to increase efficiency is expected to focus on the productive sector to have a multiplier effect of increasing the Islamic banking industry's market share in the two nations.

The limitation of this research is that it only uses the internal financial aspects of Islamic banks as independent variables, so that further research should involve external or macroeconomic variables.

REFERENCES

Abbas, M., Azid, T., & Hj Besar, M. H. A. (2016). Efficiency, effectiveness and performance profile of Islamic and conventional banks in Pakistan. *Humanomics*, *32*(1), 2–18. https://doi.org/10.1108/H-09-2015-0058

Ahmad, S., & Rahman, A. R. A. (2012). The efficiency of Islamic and conventional commercial banks in Malaysia. *International Journal of Islamic and Middle Eastern Finance and Management*, *5*(3), 241–263. https://doi.org/10.1108/17538391211255223

Ahmad, W., & Luo, R. H. (2010). *Comparison of banking efficiency in Europe: Islamic versus conventional banks* (pp. 361–389). https://doi.org/10.1108/S1569-3767(2010)0000011016

Al-Khasawneh, J. A., Bassedat, K., Aktan, B., & Darshini Pun Thapa, P. (2012). Efficiency of Islamic Banks: Case of North African Arab Countries. *Qualitative Research in Financial Markets*, *4*(2/3), 228–239. https://doi.org/10.1108/17554171211252547

Asmild, M., Paradi, J. C., Aggarwall, V., & Schaffnit, C. (2004). Combining DEA Window Analysis with the Malmquist Index Approach in a Study of the Canadian Banking Industry. *Journal of Productivity Analysis*, *21*(1), 67–89. https://doi.org/10.1023/B:PROD.0000012453.91326.ec

Basri, M. F., Muhamat, A. A., & Jaafar, M. N. (2019). A Descriptive Study on Bank Performance in Malaysia: Domestic vs. Foreign Islamic Banks. *International Journal of Academic Research in Business and Social Sciences*, *9*(1). https://doi.org/10.6007/IJARBSS/v9-i1/5507

Cambridge Institute of Islamic Finance. (2019). *Global Islamic Finance Report (GIFR) 2019*.

Charnes, A., Clark, C. T., Cooper, W. W., & Golany, B. (1984). A developmental study of data envelopment analysis in measuring the efficiency of maintenance units in the US air forces. *Annals of Operations Research*, *2*(1), 95–112. https://doi.org/10.1007/BF01874734

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the Efficiency of Decision Making Units. *European Journal of Operational Research*, *2*(6), 429–444. https://doi.org/10.1016/0377-2217(78)90138-8

Cvetkoska, V., & Savić, G. (2017). Efficiency of bank branches: empirical evidence from a two-phase research approach. *Economic Research-Ekonomska Istraživanja*, *30*(1), 318–333. https://doi.org/10.1080/1331677X.2017.1305775

Endri. (2008). Efisiensi Teknis Perbankan Syariah di Indonesia. *Finance and Banking Journal*, *10*(2). http://journal.perbanas.id/index.php/jkp/article/view/148

Fathony, M. (2012). Estimasi dan Faktor-faktor yang Memengaruhi Efisiensi Bank Domestik dan Asing di Indonesia. *Jurnal Keuangan Dan Perbankan*, *16*(2), 223–237. http://jurnal.unmer.ac.id/index.php/jkdp/article/view/1063

Firdaus, M. F., & Hosen, M. N. (2013). Efisiensi Bank Umum Syariah Menggunakan Pendekatan Two-Stage Data Envelopment Analysis. *Buletin Ekonomi Moneter Dan Perbankan*, *16*(2), 167–188. https://doi.org/10.21098/bemp.v16i2.31

Ghozali, M., Azmi, M. U., & Nugroho, W. (2019). Perkembangan Bank Syariah di Asia Tenggara: Sebuah Kajian Historis. *Falah: Jurnal Ekonomi Syariah*, *4*(1), 44. https://doi.org/10.15408/thd.v1i2.8430

Hidayati, N., Siregar, H., & Pasaribu, S. H. (2017). Determinant of Efficiency of The Islamic Banking in Indonesia. *Buletin Ekonomi Moneter Dan Perbankan*, *20*(1), 29–48. https://doi.org/10.21098/bemp.v20i1.723

IFSB. (2019). *Islamic Financial Services Industry Stability Report 2019*.

Ismail, F., Shabri Abd. Majid, M., & Rahim, R. A. (2013). Efficiency of Islamic and conventional banks in Malaysia. *Journal of Financial Reporting and Accounting*, *11*(1), 92–107. https://doi.org/10.1108/JFRA-03-2013-0011

Komijani, A., & Taghizadeh-Hesary, F. (2018). *Routledge Handbook of Banking and Finance in Asia* (U. Volz, P. J. Morgan, & N. Yoshino (eds.)). Routledge. https://doi.org/10.4324/9781315543222

Lutfiana, R. H., & Yulianto, A. (2015). Determinan Tingkat Efisiensi Bank Umum Syaria di Indonesia (Pendekatan Two Stage DEA). *Accounting Analysis Journal*, *4*(3). https://doi.org/10.15294/aaj.v4i3.8313

Mala, C. M. F., Rodoni, A., & Yaman, B. (2018). Market Power and Efficiency of Islamic Banking and Conventional Banking in Indonesia. *Global Review of Islamic Economics and Business*, *6*(2), 131. https://doi.org/10.14421/grieb.2018.062-05

Khan, M. M., & Bhatti, I. M. (2008). Islamic Banking and Finance: on Its Way to Globalization. *Managerial Finance*, *34*(10), 708–725. https://doi.org/10.1108/03074350810891029

Mokhtar, H. S. A., Abdullah, N., & Alhabshi, S. M. (2008). Efficiency and competition of Islamic banking in Malaysia. *Humanomics*, *24*(1), 28–48. https://doi.org/10.1108/08288660810851450

Nguyen, T. P. T., Roca, E., & Sharma, P. (2014). How efficient is the banking system of Asia's next economic dragon? Evidence from rolling DEA windows. *Applied Economics*, *46*(22), 2665–2684. https://doi.org/10.1080/00036846.2014.909578

OJK. (2019). *Laporan Tahunan Otoritas Jasa Keuangan*.

Pambuko, Z. B. (2016). Determinan Tingkat Efisiensi Perbankan Syariah Di Indonesia: Two Stages Data Envelopment Analysis. *Cakrawala: Jurnal Studi Islam*, *11*(2), 178–194. https://doi.org/10.31603/cakrawala.v11i2.249

Phan, H. T., Anwar, S., & Alexander, W. R. J. (2018). The determinants of banking efficiency in Hong Kong 2004-2014. *Applied Economics Letters*, *25*(18), 1323–1326. https://doi.org/10.1080/13504851.2017.1420870

Prasetyo, P. P., Pantas, P. E., Ashar, N. J., & Pertiwi, F. R. (2020). Performance Comparison of Islamic Banking in Indonesia and Malaysia: Islamicity Performance Index Approach. *Journal of Islamic Economics Perspectives*, *2*(1), 92–103. http://jurnalfebi.iain-jember.ac.id/index.php/JIEP/article/view/30

Rama, A. (2015). Analisis Deskriptif Perkembangan Perbankan Syariah di Malaysia. *The Journal of Tauhidinomics*, *1*(2), 105–123. https://doi.org/10.15408/thd.v1i2.8430

Řepková, I. (2014). Efficiency of the Czech Banking Sector Employing the DEA Window Analysis Approach. *Procedia Economics and Finance*, *12*, 587–596. https://doi.org/10.1016/S2212-5671(14)00383-9

Rozzani, N., & Rahman, R. A. (2013). Determinants of Bank Efficiency: Conventional versus Islamic. *International Journal of Business and Management*, *8*(14). https://doi.org/10.5539/ijbm.v8n14p98

Rusydiana, A. S. (2018). Efisiensi dan Stabilitas Bank Umum Syariah di Indonesia. *Akuntabilitas*, *11*(2). https://doi.org/10.15408/akt.v11i2.7033

Sakti, M. R. P., & Mohamad, A. (2018). Efficiency, stability and asset quality of Islamic vis-à-vis conventional banks. *Journal of Islamic Accounting and Business Research*, *9*(3), 378–400. https://doi.org/10.1108/JIABR-07-2015-0031

Sathye, M. (2003). Efficiency of banks in a developing economy: The case of India. *European Journal of Operational Research*, *148*(3), 662–671. https://doi.org/10.1016/S0377-2217(02)00471-X

Setiawan, C., Hasan, T., & Hassan, M. K. (2017). Non-Performing Loans and Bank Efficiency of Conventional and Islamic Banks in the Organization of Islamic Cooperation (OIC) Countries. *Journal of Islamic Economics Banking and Finance*, *13*(4), 18–43. https://doi.org/10.12816/0051000

Shah, S. Q., & Jan, R. (2014). Analysis of Financial Performance of Private Banks in Pakistan. *Procedia - Social and Behavioral Sciences*, *109*, 1021–1025. https://doi.org/10.1016/j.sbspro.2013.12.583

Shawtari, F. A., Abdelnabi Salem, M., & Bakhit, I. (2018). Decomposition of efficiency using DEA window analysis. *Benchmarking: An International Journal*, *25*(6), 1681–1705. https://doi.org/10.1108/BIJ-12-2016-0183

Shawtari, F. A., Ariff, M., & Abdul Razak, S. H. (2015). Efficiency assessment of banking sector in Yemen using data envelopment window analysis. *Benchmarking: An International Journal*, *22*(6), 1115–1140. https://doi.org/10.1108/BIJ-10-2014-0097

Socol, A., & Dănuleţiu, A. E. (2013). Analysis Of The Romanian Banks' Performance Through Roa, Roe And Non-Performing Loans Models. *Annales Universitatis Apulensis Series Oeconomica*, *15*(2), 594–604. https://ideas.repec.org/a/alu/journl/v2y2013i15p24.html

Solihin, S., Achsani, N. A., & Saptono, I. T. (2016). The Islamic Banking and The Economic Integration in ASEAN. *Buletin Ekonomi Moneter Dan Perbankan*, *19*(1), 81–106. https://doi.org/10.21098/bemp.v19i1.601

Sufian, F. (2009). Determinants of bank efficiency during unstable macroeconomic environment: Empirical evidence from Malaysia. *Research in International Business and Finance*, *23*(1), 54–77. https://doi.org/10.1016/j.ribaf.2008.07.002

Wahab, A. H. A., & Haron, R. (2017). Efficiency of Qatari banking industry: an empirical investigation. *International Journal of Bank Marketing*, *35*(2), 298–318. https://doi.org/10.1108/IJBM-07-2016-0090

Webb, R. (2003). Levels of efficiency in UK retail banks: a DEA window analysis. *International Journal of the Economics of Business*, *10*(3), 305–322. https://doi.org/10.1080/1357151032000126256

Yahya, M. H., Muhammad, J., & Hadi, A. R. A. (2012). A Comparative Study on The Level of Efficiency Between Islamic and Conventional Banking Systems in Malaysia. *International Journal of Islamic and Middle Eastern Finance and Management*, *5*(1), 48–62. https://doi.org/10.1108/17538391211216820

Appendix 1:

Table 1. Score and Rank IFCI 2019

Countries	2019 Score	2018 Score	Change in Score	2019 Rank	2018 Rank	Changes in Rank
Indonesia	81,93	24,13	+57,80	1	6	+5
Malaysia	81,05	81,01	+0,04	2	1	-1
Iran	79,03	79,01	+0,02	3	2	-1
Saudi Arabia	60,65	66,66	-6,01	4	3	-1
Sudan	55,71	17,09	+38,62	5	11	+6
Brunei Darussalam	49,99	10,11	+39,88	6	14	+8
UAE	45,31	39,78	+5,53	7	4	-3
Bangladesh	43,01	17,78	+25,23	8	10	+2
Kuwait	40,90	37,67	+3,23	9	5	-4

Source: Global Islamic Finance Report (2019)

Appendix 2:

Table 2. Efficiency Level of Indonesian Islamic Banks for the Period 2015-2019

Banks	2015	2016	2017	2018	2019
PT. Bank Syariah Mandiri	1	0,9895	1	1	1
PT. Bank Muamalat Indonesia	0,9678	1	1	1	1
PT. Bank BNI Syariah	0,9973	1	0,9962	0,9669	0,8599
PT. Bank BRISyariah	0,9607	1	0,8991	1	1
PT. Bank Aceh Syariah	0,8529	0,8587	0,9395	0,8115	0,7682
PT. BTPN Syariah	0,3810	0,4587	0,5228	0,9444	1
PT. Bank Panin Dubai Syariah	1	1	0,8799	0,9010	1
PT. Bank Mega Syariah	0,5997	0,7175	0,8437	0,7906	0,8364
PT. BCA Syariah	0,7324	0,6880	0,6974	0,8685	0,9267
PT. Bank Jabar Banten Syariah	0,8604	0,8197	0,7327	0,6697	0,5580
PT. Bank Syariah Bukopin	0,7726	0,7664	0,3450	0,3170	0,3687
PT. Bank Victoria Syariah	1	1	0,9459	0,9177	1
PT. Maybank Syariah Indonesia	1	0,8498	0,8132	0,9088	1
Mean	**0,8558**	**0,8576**	**0,8166**	**0,8535**	**0,8706**

Source: Output of EMS 1.3 (data processed by the author)

Appendix 3:

Table 2. Efficiency Level of Malaysian Islamic Banks for the Period 2015-2019

Banks	2015	2016	2017	2018	2019
Maybank Islamic Berhad	0,9892	1	1	1	1
CIMB Islamic Berhad	0,5955	0,5911	0,6140	0,6506	0,6476
RHB Islamic Bank Berhad	0,6455	0,8223	0,8646	0,9493	1
Bank Islam Malaysia Berhad	0,7796	0,9546	1	0,9705	0,9784
Public Islamic Bank Berhad	0,5842	0,5859	0,5829	0,8660	0,9019
AmBank Islamic Berhad	1	1	0,9383	0,9906	0,9915
Malaysia Building Society Berhad	1	1	1	1	1
Hong Leong Islamic Bank Berhad	0,4004	0,4153	0,3528	0,5776	0,8248
Affin Islamic Bank Berhad	0,8227	0,6940	0,8265	0,8656	0,9102
Bank Muamalat Malaysia Berhad	0,4244	0,5078	0,4760	0,4035	0,4279
HSBC Amanah Malaysia Berhad	0,6092	0,5814	0,6361	0,6416	0,5623
OCBC Al-Amin Bank Berhad	0,5232	0,5328	0,5885	0,6162	0,5374
Kuwait Finance House Berhad	0,7135	0,7404	1	0,8582	0,8070
Standard Chartered Saadiq Berhad	0,8511	0,6738	0,8332	1	1
Ar-Rajhi Banking and Investment	1	1	0,7925	0,7292	0,8851
Alliance Islamic Bank Berhad	0,5629	0,5175	0,4380	0,5186	0,4214
Mean	**0,719**	**0,726**	**0,746**	**0,790**	**0,806**

Source: Output of EMS 1.3 (data processed by the author)

Appendix 4:

Table 4. Results of the Indonesian Islamic Banks Tobit Regression Analysis

Variable	Coefficient	Std. Error	z-Statistic	Prob
C	0.850730	0.071004	11.98138	0.0000
CAR	0.240328	0.233276	1.030229	0.3029
FDR	-0.000888	0.001149	-0.772915	0.4396
ROA	-0.005733	0.005791	-0.990093	0.3221
NPF	0.011925	0.016555	0.720316	0.4713

Source: Output of EViews 9 (data processed by the author)

Appendix 5:

Table 5. Results of the Malaysian Islamic Banks Tobit Regression Analysis

Variable	Coefficient	Std. Error	z-Statistic	Prob
C	0.497894	0.109267	4.556657	0.0000
CAR	0.015654	0.005103	3.067262	0.0022*
FDR	0.000711	0.000639	1.112701	0.2658
ROA	-0.022455	0.041561	-0.540275	0.5890
NPF	-0.052044	0.031177	-1.669327	0.0951**

Source: Output of EViews 9 (data processed by the author)