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The Efficiency and Stability of the Islamic-Banking Industry in Indonesia, Malaysia, and the Middle-East

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ABSTRACT

The Indonesian Islamic banking industry has a lot of potentials, yet its market share has not risen above 7%. Comparing the number of total assets, the Indonesian Islamic-banking industry only makes up around 2% of the total global Islamic-banking assets. The Islamic-banking sector plays an important role in helping promote the national economic growth. It is crucial for an industry to be able to maintain this positive trend or momentum in order to increase the market share of the Islamic-banking industry given its enormous potential. Therefore, the efficiency of a bank is very important, thus needs more attention. In addition to measuring efficiency, the finances of Islamic-banking industry also need to be measured to determine its resilience to fluctuations in the market. The aim of this research was to compare the differences between the Islamic-banking industry in Indonesia and industry leaders, namely Malaysia and the countries in Middle-East region. The data used for this research was collected from the yearly financial statements published in the banks' official websites in the period from 2016 to 2020. The collected data was then analyzed using the Stochastic-Frontier Analysis (SFA) and the Z-score technique. Intermediation approach was used in this research. Thus, the total financing was used as output variable, and total fixed assets, total third-party funding, and total staff cost were used as the input variables. The results indicate that the Indonesian Islamic-banking industry is less efficient than that in Malaysia and the Middle-East countries, but it is more stable. The OLS regression showed that all input variables have a positive effect on efficiency, specifically third-party funding is the most significant variable towards the Islamic-banking efficiency.

Keywords: *Technical efficiency, financial stability, Islamic banks, intermediation approach*

1. INTRODUCTION

The Islamic-banking industry has attracted a lot of global attention since the emergence of Islamic-financial institutions in the 1970s. This phenomenon also occurs in Indonesia, this country's Islamic-banking industry has experienced a very rapid development. In Indonesia itself, with the largest Muslim population in the world, has 14 Islamic commercial banks operating as of 2020. However, the market share of Indonesian Islamic banking seems to be stagnant, unable to exceed 6% by the end of 2020 [1]. In addition, although the number of total assets continues to grow, the proportion is still considerably low compared to those in other countries. At the end of 2019, the total assets of the Indonesian Islamic-banking industry reached IDR 520 trillion or around USD 38 billion [2]. However, this figure does not even reach 2% of the total assets of Islamic-banking industry in the world.

To see the position of Islamic-banking industry in Indonesia, it is important to compare it with the market leaders in the same industry. Based on total assets, Iran, Saudi Arabia, and Malaysia are the market leaders in the Islamic-banking industry. Iran and Saudi Arabia are still perched as the Islamic-banking market with the largest total assets, both of which exceed US$ 400 billion. Malaysia's Islamic-banking industry has around 13 times more than the Indonesia's Islamic-banking total assets. Banks have short and long-term objectives, that aim to gain maximum profit for shareholders and to maximize the people's welfare sequentially. The banking industry, including Islamic banking, has a function to raise funds and redistribute them to public. In carrying out its functions, the banking industry also participates in and improves the infrastructure development, economic equity, and the national economy, which improves its long-term objective, namely the standard living of people (OJK, 2016). The Islamic-banking sector plays an important role in helping promote national economic growth. It is crucial for an industry to be able to maintain this positive trend or momentum in order to increase the market share of the Islamic-banking industry given its enormous potential. The efficiency of the Indonesian Islamic-banking industry needs special attention in order to find out if efficiency is one among the factors

causing market growth [3]. Therefore, the efficiency of a bank is very important and, hence, needs more attention [4]. In addition to measuring the efficiency, the finances of Islamic-banking industry also need to be measured to determine its resilience to fluctuations in the market. The 2008 global financial crisis and the Covid-19 pandemic crisis were experienced all over the world, in which Indonesia could not rely on. In the 2008 global financial crisis, the Islamic-banking industry was not too negatively affected, because its activities were not burdened by interest like the conventional banks [5] [6]. Bank bankruptcy can affect the economy as a whole through the government, companies and stakeholders, including employees, managers, shareholders, lenders, and credit lenders [7].

Banks efficiency can be calculated through the ratio approach and the frontier approach. The ratio approach has been widely used by both scholars and practitioners in the banking industry, but its measurement does not put bank's output into consideration [8]. On the other hand, the frontier approach measures the efficiency through a number of different function and methods. The technical efficiency, which is often referred to as operational efficiency, refers to the ability of a company to create a product through a production process maximally using a certain amount of input. Meanwhile, the allocation efficiency describes the company's ability to optimally utilize its inputs to create products according to consumer demand and tastes. The last one is economic efficiency, which is better known as the cost efficiency, which is a combination or result of technical efficiency plus allocation efficiency [9].

The frontier approach method is then divided into two parts, which are the deterministic approach and the stochastic approach. The deterministic approach is often also referred to as the non-parametric approach, while the stochastic approach is generally referred to as the parametric approach. Although they are different, the purpose of the parametric and non-parametric methods is the same, namely to obtain frontier results with a high level of accuracy. To achieve it, the parametric method uses an econometric frontier instead of the production frontier which uses a non-parametric method. Meanwhile, the non-parametric approach uses a technical mathematical programming to measure the level of efficiency.

However, the non-parametric approach has a drawback, namely that one outlier can have an impact on the inefficiency calculations of each of the business entities studied [10]. Because it uses a linear programming technique, the Data Envelopment Analysis (DEA) and Free Disposal Hull (FDH) method cannot catch random errors. The Stochastic Frontier Analysis (SFA) is one of the methods in the parametric approach used to measure the level of efficiency. The SFA approach is often used by researchers to determine the level of banking efficiency, because it has a number of advantages that other efficiency measurement techniques do not. The efficiency assessment according to the SFA method is presented in a ratio, meaning that a bank has operated more efficiently when the calculation result is close to 100%.

A common measurement for financial stability at the institutional level is the Z-score method. It explicitly compares the buffer (capitalization and return) with risk (volatility) to measure the solvency risk of a bank. Z-score presents several advantages, but at the same time also disadvantages. According to Ihák (2007), the main advantage of this measure is represented by the easy calculations for financial institutions or companies. On the other hand, if financial institutions are able to smooth the reported data, then the Z-score can give an overly positive assessment of the stability of financial institutions. The Z-score looks at each financial institution separately, potentially ignoring the risk that a default in one financial institution could cause harm to other financial institutions in the system. In other word, the Z-score does not capture the correlation among financial institutions (contagion relation).

In the fierce competition in global market, the Indonesian Islamic-banking industry must be able to continue develop itself. This study focused on comparing the level of efficiency and stability of the Indonesian Islamic-banking industry and compare it with that in Malaysia and countries in the Middle-East, in order to find out the differences and / or similarities in financial performance of the industry.

1.1. Related Work

Previous research on Islamic-banking efficiency and stability, comparing the Indonesian, Malaysian, and the Middle-Eastern industry using the Stochastic Frontier Model and Z-score approach is still limited. Louati & Boujelbene (2015) compared the efficiency and stability of Islamic banks and conventional banks in the MENA and South-East Asian region during the 2005-2012 period [11]. The results concluded that Islamic banks are relatively stable than conventional banks, and larger conventional banks carry more risk behavior.

Sadalia et al. (2018) [12], Fakhrunnas (2017) [13], and Muttaqin et al. (2020) [14], measured the Islamic-banking efficiency only in Indonesia. Rodoni et al. (2020) calculated the Islamic-banking efficiency and stability among 7 Islamic banks in the ASEAN region, with the result showing that the Islamic banks are sufficiently efficient and stable [15]. Miah & Uddin (2017) measured the efficiency and stability of financial institutions in the Gulf Cooperation Council (GCC) region, but that compared between conventional banks and Islamic banks [6]. The results in general showed that conventional banks were more efficient than Islamic banks, and the size of the bank matters to the level of efficiency. Comparing industry, the Malaysian-Islamic banks are generally more efficient than the Indonesian-Islamic banks. On the other hand, when it comes to stability, Islamic banks are more stable than conventional banks.

1.2. Our Contribution

This paper offered new findings and improvements based on the methods and framework previously stated in Rodoni et al. [15]. Our calculation was to seek the difference or similarities of efficiency and stability of the Indonesian

Islamic-banking industry, compared to market leaders, which are Malaysia and the Middle-East countries.

1.3. Paper Structure

This paper is organized starting with introduction and related work. Then section 2 presents the underlying theoretical framework of this research. Section 3 will present the data used and methods conducted in this research. After that, the results and findings of this research will be revealed in Section 4. Finally, Section 5 concludes the findings of this paper as well as the direction for future research.

2. BACKGROUND

2.1. Islamic Banks

Based on Article 1 of Law Number 21 Year 2008, Sharia principles are the Islamic law in banking activities based on fatwas issued by institutions that have the authority to determine fatwas in the field of Sharia [16]. Based on this understanding, it can be concluded that Islamic Banks also function to collect funds from public, and then distribute them back to the community as regulated according to Islamic law [17]. Islamic banking was launched with the hope of providing a basic alternative in the implementation of banking activities to avoid the interest-bearing system. The main motivation for the growth of Islamic banking came from the oil-boom in the early 1970s, which gave tremendous economic power to Muslim countries in the oil-rich Middle East region. These countries were not satisfied with the "rigid requirements" of conventional banks, which are mainly related to earning interest and do not pay attention to the socio-economic development of the Muslim community.

Islamic banking started with simple profit-sharing accounts, Islamic savings, and investment products, but is now growing rapidly due to Islamic bonds (Sukuk) and hedge funds. The two business arrangements that are most in line with PLS principles, are Musyarakah and Mudarabah, both of which are aimed at transforming the relationship between the parties to a business contract (i.e., financiers and investors) from a lender-borrower equation to business partners who share realized profits and losses. without contractual guarantees. The financial techniques used by Islamic banks are mostly based on equity participation. The main products offered by Islamic banking include: 1. Mudarabah (silent partnership); 2. Muqaradah (debt and equity financing); 3. Murabaha (mark-up); 4. Musharika (limited partnership;) 5. Salam (forward purchase); 6. Muzara (planting sharing) [18].

2.2. Efficiency

Efficiency in economics and business can be interpreted as the ratio of the maximum potential between the outputs and inputs of a product-development process that shows the optimal distribution of available resources that allows the achievement of maximum potential [19]. Broadly speaking, efficiency can be defined as a measure of effectiveness that results in a minimum waste of time, effort, and skills. The comparison of an industry as a whole, as well as individually, when being compared with its competitors, will produce many interpretations, ranging from standards to recommendations for improvement. However, there are various kinds of how the performance is calculated, therefore, it is necessary to determine on the basis of what size / profile the calculation is done. For this analysis, the researcher used two kinds of measurement profiles that are commonly used in the financial world, namely efficiency and stability which will be the focus of this research.

The concept of efficiency stems from the theory of production, especially how the production function is able to explain the technical relationship between the factors of *input* and *output* [20]. One of the models used to explain product functions is the function model of *production frontier*, which also describes the relationship between *input* and *output*. The advantage of production function model *frontier* lies in its ability to analyze the technical efficiency of a production process. There are two commonly-used approaches to measure the technical efficiency, namely the parametric and non-parametric approaches. The parametric approach relies on a specific functional-form and can be further sub-divided into the deterministic and stochastic models. The non-parametric approach does not rely on functional form, and no function is required for estimation. Although being different, the parametric and non-parametric methods have the same goal, namely to obtain the solid and accurate *frontier* results.

2.3. Stability

Human life is very dependent on the existence of financial system, especially the banking industry, such as when receiving salaries, paying bills, buying houses, saving for the future, and getting loans related to the transactions with banks. Business activities also rely on the banking system to complete transactions and meet other financial needs [21]. In another sense, banks also interact with each other in international networks to provide financial services to their customers [22]. This process enables a financial-intermediation process that facilitates the flow of funds between savers and borrowers, which in turn also helps ensure that the allocation of an efficient distribution of financial resources is aimed to the economic growth and development [23]. Therefore, financial stability is very important for economic growth, because transactions in the real economy around the world are mostly carried-out through the banking industry.

A common measure of stability at the individual institutional-level is the Z-score. It explicitly compares the buffer (capitalization and return) with risk (return volatility) to measure the solvency risk of a bank. The Z-score is defined as $z = (k+\mu) / \sigma$, whereas k is equity capital as a percentage of assets, μ is return as a percentage of assets,

and σ is the standard deviation of return-on-assets as a proxy for return volatility.
The Z-score presents several advantages, but at the same time also disadvantages. The main advantage of this measure is represented by the easy calculation for financial institutions or companies [24]. On the other hand, if those institutions are able to smooth the reported data, then the Z-score can give an overly positive assessment of the stability of financial institutions. The Z-score looks at each financial institution separately, potentially ignoring the risk that a default in one financial institution can cause harm to others in the system. In other word, the Z-score does not capture the correlation among financial institutions (contagion relation) [25].

3. DATA AND METHODOLOGY

3.1. Data

The sample for this research is determined by applying the purposive-sampling method. The criteria include full-flagship Islamic-banks that reports financial statement in the BankFocus database or on their official sites, ranging from Q1-2016 to Q4-2020. Thus, the population of this research involves 12 full-flagship Islamic-banks (BUS) from Indonesia, 15 banks from Malaysia, and 83 banks from the Middle-East.

3.2. Efficiency

The methodology used in this research is the parametric method of *Stochastic Frontier Analysis* (SFA) and *Z-score*. The SFA model is used to measure the efficiency level of Islamic banks in Indonesia, Malaysia, and the Middle-East region. Meanwhile, the Z-score model is used to determine the level of stability of the Islamic-banking industry in Indonesia, Malaysia, and the Middle-East region.
Technical efficiency refers to the ability to produce optimal output with certain inputs (output-oriented) or the ability to use minimum inputs to achieve certain outputs (input-oriented) [26]. This study applied a production-oriented measure that measures the value of efficiency versus the costs incurred by banks when they modify the inputs produced. The efficiency scores are compared with best practices that produce similar outputs under similar conditions.
The efficiency value generated by the calculation of the SFA method is in the form of a value ranging from 0 to 1. This value means that when the number is close to 1, the company is more efficient, but on contrary, if the number is close to 0 then the company is increasingly inefficient. This study used the production function to measure the level of technical efficiency by taking into account the maximum level of output that can be achieved with a certain combination of inputs [27]. The efficiency scores are compared with the best practices that produce similar outputs under similar conditions. So, by applying the intermediation approach to determine the input and output variables, and implementing the form of Cobb-Douglas production function model, the following is the general logarithm form that has been modified for this study [28]:

$$\textbf{"Ln (Qn)} = \beta 0 + \beta 1\ \textbf{lnP1} - \beta 2\ \textbf{lnP2} + \beta n\ \textbf{lnP3} + \boldsymbol{En}\textbf{"}$$

This logarithmic model can be read as if total deposits and total fixed-assets increase, and total employee expenses decrease, then the efficiency value of the bank will also increase. The input variables used in this research are P1, P2, and P3 which represent total third-party funds, total employee expenses, and total fixed-assets. The output variable used in this study, namely total financing, is symbolized as Qn.

3.3. Stability

By definition, the Z-score is calculated as the Return-on-Assets (ROA) plus the Capital Adequacy Ratio (CAR), which is then divided by the standard deviation of the ROA. Mathematically, the Z-score is expressed in the following equation:

$$\boldsymbol{Z\ score} = \frac{\boldsymbol{ROA + CAR}}{\boldsymbol{\sigma ROA}}$$

In the most basic case, ROA is calculated as net income after-tax divided by average total assets. For the equity-to-asset ratio, we only used shareholder equity, excluding subordinated debt. A higher Z-score value indicates a stronger level of stability of the bank.

4. RESULT AND ANALYSIS

4.1. Descriptive Statistics

The descriptive statistics can be seen in Table 1. The number of observations used is 550. The variables used in this research are total fixed-assets, total staff-costs, total deposits, and total financing. Total fixed-assets have a mean of 3.888, a minimum value of -3.27, and a maximum value of 9.916. Efficiency was measured using the Stochastic Frontier Approach (SFA) model and calculated using the *Frontier 4.1* software. Total staff-costs have a mean of 3.571, a minimum value of -1.902, and a maximum value of 7.663. Total deposits have a mean of 5.79, a minimum value of -1.12, and a maximum value of 9.99. Total financing has a mean of 5.679, a minimum value of -4.605, and a maximum value of 9.987.

Table 1 The Efficiency & Stability of Islamic Banks in Indonesia, Malaysia, and the Middle East

No	Country	Bank Name	Average Technical Efficiency Value (SFA)		Efficiency Rank	Stability (Z-score)
1	Indonesia	Bank Aceh Syariah	0,5976	59,76%	74	0,640
2		Bank BCA Syariah	0,5560	55,60%	79	7,463
3		Bank Jabar Banten Syariah	0,4506	45,06%	93	0,051
4		Bank Mega Syariah	0,4089	40,89%	96	0,454
5		Bank Muamalat Indonesia	0,6141	61,41%	71	2,689
6		Bank Panin Dubai Syariah	0,7901	79,01%	44	0,035
7		Bank Syariah Bukopin	0,5125	51,25%	86	0,856
8		Bank Victoria Syariah	0,8326	83,26%	31	0,337
9		BNI Syariah	0,7543	75,43%	51	1,366
10		BRI Syariah	0,9136	91,36%	14	1,283
11		BTPN Syariah	0,2646	26,46%	103	0,235
12		Mandiri Syariah	0,9513	95,13%	7	0,425
1	Malaysia	Al Rajhi Berhad	0,5429	54,29%	82	0,378
2		Alliance Islamic Bank Berhad	0,5284	52,84%	84	0,453
3		AmBank Islamic Berhad	0,7810	78,10%	45	0,769
4		Bank Islam Malaysia Berhad	0,6823	68,23%	62	2,131
5		Bank Muamalat Malaysia	0,5746	57,46%	77	2,305
6		CIMB Islamic Bank Berhad	0,8616	86,16%	25	0,918
7		Hong Leong Islamic Bank	0,7276	72,76%	55	1,871
8		HSBC Amanah Malaysia	0,8237	82,37%	33	0,918
9		Kuwait Finance House Berhad	0,6770	67,70%	65	0,727
10		Malaysia Building Society Bank	0,9384	93,84%	10	0,506
11		Maybank Islamic Berhad	0,9607	96,07%	4	1,189
12		OCBC Al-Amin Bank Berhad	0,6541	65,41%	66	0,668
13		Public Islamic Bank Berhad	0,8026	80,26%	40	1,452
14		RHB Islamic Bank Berhad	0,8977	89,77%	17	1,051
15		Standard Chartered Saadiq Berhad	0,9547	95,47%	6	1,243
1	Afghanistan	Azizi Bank	0,8615	86,15%	26	
2		Ghazanfar Bank	0,8214	82,14%	36	0,263
3		Islamic Bank of Afghanistan	0,1653	16,53%	105	
4		Maiwand Bank	0,8216	82,16%	35	0,720
1	Bahrain	Al Baraka Islamic Bank	0,5439	54,39%	81	0,287
2		Al Salam Bank Bahrain	0,7738	77,38%	47	0,772
3		Bahrain Islamic Bank	0,6206	62,06%	70	0,216
4		Ithmaar Bank	0,2283	22,83%	104	0,470
5		Khaleeji Commercial Bank B.S.C.	0,7482	74,82%	52	0,176
6		GFH Financial Group B.S.C.	0,3940	39,40%	98	0,070
7		Kuwait Finance House	0,6876	68,76%	60	0,373
8		Bank Alkhair B.S.C.	0,1571	15,71%	106	-0,014
1	Egypt	Abu Dhabi Islamic Bank (ADIB)	0,4342	43,42%	94	0,485
2		Al Baraka Egypt Bank	0,2771	27,71%	102	0,460
3		Faisal Islamic	0,8439	84,39%	29	0,240
1	Iran	Parsian Bank	0,9145	91,45%	13	0,069
2		Tejarat Bank	0,6867	68,67%	61	0,025
3		Saderat Bank	0,8219	82,19%	34	0,778
4		Bank Mellat	0,9752	97,52%	1	0,033
5		Pars Aryan Investment Company	0,6781	67,81%	64	-
6		Bank Pasargad	0,8160	81,60%	39	0,036
7		Ayandeh Bank Public Share Holding Company	0,8612	86,12%	27	-
8		Bank Keshavarzi	0,8803	88,03%	20	-
9		Eghtesad Novin Bank Pjsc	0,8990	89,90%	15	0,034

10		Saman Bank	0,5620	56,20%	78	0,048
11		Day Bank	0,4204	42,04%	95	-
12		Karafarin Bank	0,7769	77,69%	46	0,052
13		Middle East Bank	0,8894	88,94%	18	0,113
14		Sina Bank	0,7706	77,06%	48	-
15		Resalat Qard Al-Hasan Public Joint Stock Bank	0,6254	62,54%	68	0,046
16		Post Bank Of Iran	0,6887	68,87%	59	-
1	Jordan	Islamic International Arab Bank	0,5453	54,53%	80	0,810
2		Jordan Islamic Bank	0,4917	49,17%	88	2,542
3		Safwa Islamic Bank	0,4626	46,26%	91	3,201
1	Kuwait	Al Ahli United Bank	0,7060	70,60%	56	0,642
2		Boubyan Bank	0,8985	89,85%	16	0,626
3		Kuwait Finance House	0,7444	74,44%	53	0,720
4		Kuwait International Bank	0,8162	81,62%	38	0,472
5		National Bank of Kuwait	0,9564	95,64%	5	0,757
6		Warba Bank	0,9729	97,29%	2	0,967
1	Oman	Al Izz Islamic Bank	0,9459	94,59%	9	0,222
2		Bank Nizwa	0,7979	79,79%	41	0,414
3		Maisarah Islamic Bank	0,8305	83,05%	32	0,314
1	Qatar	Al Rayan Bank	0,9301	93,01%	12	1,189
2		Dukhan Bank	0,6791	67,91%	63	0,447
3		Qatar International Islamic Bank	0,8753	87,53%	23	1,589
4		Qatar Islamic Bank	0,6922	69,22%	58	1,417
5		Qatar First Bank	0,2985	29,85%	101	0,029
1	Saudi Arabia	Al Bilad Bank	0,5383	53,83%	83	0,673
2		Al Inma Bank	0,5950	59,50%	75	0,536
3		Al Rajhi Bank Saudi Arabia	0,4938	49,38%	87	0,336
4		Bank Al-Jazeera	0,5143	51,43%	85	0,419
1	Turkey	Albaraka Turkish Finance House	0,7978	79,78%	42	0,708
2		Kuveyt Turk Katilim Bankasi	0,5932	59,32%	76	2,992
3		Turkiye Finans Katilim Bankasi	0,9339	93,39%	11	1,294
4		Vakif Katilim Bankasi	0,8434	84,34%	30	0,338
5		Ziraat Katilim Bankasi	0,9472	94,72%	8	0,290
1	UAE	Abu Dhabi Islamic Bank	0,7625	76,25%	49	0,582
2		Ajman Bank	0,9728	97,28%	3	0,625
3		Al Hilal Bank	0,8776	87,76%	21	0,029
4		Dubai Islamic Bank	0,8568	85,68%	28	0,380
5		Emirates Islamic Bank	0,8202	82,02%	37	0,186
6		Noor Islamic Bank	0,8641	86,41%	24	1,162
7		Sharja Islamic Bank	0,8810	88,10%	19	0,898
8		Amlak Finance	0,5979	59,79%	73	-
9		Mawarid Finance	0,6230	62,30%	69	-
1	Iraq	National Islamic Bank Of Iraq	0,6049	60,49%	72	0,184
2		Al Bilad Bank Iraq	0,1365	13,65%	110	0,533
3		Cihan Bank Iraq	0,1503	15,03%	107	0,743
4		Elaf Islamic Bank	0,6448	64,48%	67	1,817
5		Iraq Noor Islamic	0,7935	79,35%	43	4,088
6		International Development Bank For Investment & Finance	0,6938	69,38%	57	0,498
7		Iraqi Islamic Bank For Investment & Development Pjsc	0,3072	30,72%	100	2,642
8		Al-Janoob Islamic Bank	0,7361	73,61%	54	2,650
9		World Islamic Bank	0,3325	33,25%	99	4,642
10		Zain Iraq Islamic Bank	0,1473	14,73%	109	-

1	Syria	Al Baraka Bank Syria	0,4004	40,04%	97	0,066
2		Cham Bank	0,8753	87,53%	22	0,068
3		SIIB	0,4759	47,59%	90	0,070
1	Palestine	Arab Islamic Bank	0,4829	48,29%	89	1,373
2		Palestine Islamic Bank	0,4585	45,85%	92	0,404
1	Yemen	Tadhamon Bank	0,1496	14,96%	108	0,608
2		Shamil Bank	0,7590	75,90%	50	-

4.2. Efficiency Results & Analysis

Efficiency is measured using the parametric method of Stochastic Frontier Analysis (SFA). The results of the estimated technical-efficiency using SFA method can be seen in Table 1. Based on the *frontier* estimated-result, Bank Mellat from Iran has the highest average efficiency. The Islamic bank reached an average efficiency-value of 0.9752, which is almost perfectly efficient. Then, it was closely followed by Warba Bank from Kuwait with an average efficiency-value of 0.9729, and Ajman Bank from UAE with an average efficiency value of 0.9728. Interestingly, those three banks which scored the lowest efficiency value, all are based in Iraq. The lowest efficiency is Al Bilad Bank Iraq, which scored an average efficiency value of 0.1365. Then, it was closely followed by World Islamic Bank with an average efficiency value of 0.1473, and Cihan Bank Iraq, which scored an average efficiency value of 0.1503.

Bank Mandiri Syariah (BSM) is the most-efficient Islamic bank in Indonesia from the year 2016 to 2020, with an average efficiency value of 0.9513. BSM ranked as the 7th most-efficient Islamic bank in this sample. The second most-efficient Islamic bank in Indonesia is Bank Rakyat Indonesia (BRI) Syariah, with an average efficiency value of 0.9136. Meanwhile, Bank BTPN Syariah is the least-efficient Islamic bank in Indonesia, scoring an average efficiency value of 0.2646. With the country's Islamic-banking industry average efficiency at 0.6371, Indonesia still has a lot of room for improvements.

The Islamic banking of Indonesia is still left behind when being compared to Malaysia which scored an industry-average efficiency of 0.7604, and the Middle-East region with an industry-average efficiency of 0.8110. This also means that the efficiency could be a factor why Indonesian Islamic-banking industry is struggling to increase its market share past the 7% mark. Malaysia and the Middle-East region has a lot more Islamic banks than in does Indonesia, meaning that more competition could lead to more efficient banks.

4.3. Stability Results & Analysis

The Islamic-banking stability was measured using the Z-score method and calculated using *SPSS* and *Microsoft Excel* software. Some Islamic banks in the sample did not report their *Capital Adequacy Ratio* (CAR). Thus, their stability could not be measured. Based on Table 1, it can be seen that the highest average-stability value is 7.46, which was scored by Bank BCA Syariah from Indonesia. Meanwhile, the lowest average-stability value is -0.013, which was scored by Bank Alkhair BSC from Bahrain. Then based on the year, the highest stability value is 9.64, which was again scored by Bank BCA Syariah in 2020. And, the lowest stability value is -0.04 scored by Bank Alkhair BSC in 2020. Bank Alkhair BSC stability values are all negative from the year 2016 to 2020, as this is mainly due to its Return-on-Assets (ROA) values which were negative and its values that were higher than its Capital Adequacy Ratio (CAR).

The overall average-stability value of the Islamic-banking industry in Indonesia is 1.319, whilst the average Islamic-banking stability in Malaysia is 1.10, and in the Middle-East is 0.738. It means that the Indonesian Islamic-banking industry overall is more stable than those in Malaysia and the Middle-East in the period of 2016 to 2020. By this way, stability is most likely not to be a factor to the Indonesian Islamic-banking industry's struggle to increase its market share, because it is more stable than the market leaders, which are Malaysia and the Middle-East region.

4.4. OLS Regression Analysis

Table 2 OLS Regression Estimation

	Coefficient	Standard-error	T-ratio
Constants	0.92036911E+00	0.16019817E+00	5.74519130E+00
Labor Costs (X1)	0.22759519E+00	0.48955298E-01	4.64904110E+00
Total Fixed Assets (X2)	0.43556939E+00	0.22236260E-01	1.95882480E+00
Third-Party Funding (X3)	0.89278599E+00	0.31319030E-01	2.85061830E+01
Sigma-squared	0.70045788E+00		

The regression model above can be written as:

$$\mathbf{In\ Y = \beta_0 + \beta_1\ In\ X1_{(i-t)} + \beta_2\ In\ X2_{(i-t)} + \beta_3\ In\ X3_{(i-t)} + \varepsilon}$$

From the regression results, it can be seen that the biggest Constants is 0.9203, which means that if the input variables are considered constant, then for Islamic banks to distribute loans on a certain level, is 0.0797 from the total input. The variable that has the most significant influence upon Islamic-banking efficiency is third-party funding (X3). The regression coefficient for this variable is 0.8927, which means if the total third-party funding increase by 100%, then it would be followed by an increase in total financing for 89.27%. This also reflects that the Islamic banks had been very well optimized in managing third-party funding.

Total fixed-assets (X2) also has a positive influence on total financing with a regression coefficient of 0.4355. This means that for a 100% increase in fixed-assets, it would be followed by a 43.55% increase in total financing. This result also reflects that the Islamic banks are sufficient in managing their fixed-assets. Lastly, labor-costs (X1) also has a positive effect on total financing with a regression coefficient of 0.2275. This means that when labor-costs increases by 100%, then total financing would also increase by 22.75%.

5. CONCLUSIONS

The efficiency levels among the Islamic banks in Indonesia, Malaysia, and the Middle-East region using the Stochastic Frontier Analysis (SFA) method showed that the Bank Mellat of Iran reached the highest average value of efficiency as much as 0.9752. Meanwhile, Al Bilad Bank of Iraq has the lowest average value of efficiency of 0.1365. The results also showed that the Indonesian Islamic-banking industry is less efficient on average than do the Malaysian and Middle-Eastern Islamic-banking industry.

The stability levels of Islamic banks in Indonesia, Malaysia, and the Middle-East region using the Z-score method showed that the Islamic banks are generally stable. Bank BCA Syariah of Indonesia reached the highest average-stability value of 7.46. Meanwhile, Bank Alkhair BSC has scored the lowest average value of stability of -0.013. the results also showed that the Indonesian Islamic-banking industry is more stable on average than do the Malaysian and Middle-Eastern Islamic-banking industry.

Compared to the Islamic-banking market leaders, which are Malaysia and the Middle-Eastern region, the efficiency and stability levels of the Indonesian Islamic-banking industry is overall good. However, there are some Indonesian Islamic banks that need to improve their efficiency and ramp-up their stability, specifically Bank BTPN Syariah, Bank Mega Syariah, and Bank Jabar Banten Syariah. Bank Syariah Mandiri's performance has been a benchmark for the Indonesian Islamic-banking industry, with only Bank BRI Syariah closely following by.

Based on the OLS regression test, all of the input variables have a positive impact on Islamic banking efficiency, with the most significant input variable influencing the Islamic-banking efficiency is the third-party funding. This way, in order to increase the efficiency of Indonesian Islamic-banking industry, banks should increase their third-party funding and create an optimal way to manage their labor-costs and fixed-assets as well, so the total financing could increase, thus increasing their level of efficiency.

Noting that the efficiency of Indonesian Islamic-banking industry is below those of the market leaders', namely Malaysian and the Middle-Eastern Islamic-banking industry, thus it could very well be a reasoning factor why our industry has been struggling to increase its market share to pass the 7% mark. Further research should be conducted to confirm or deny this assumption.

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