

Determinants of Islamic Banking Vulnerability in Indonesia from 2014 to 2020

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Abstract

This study aims to analyze the effect of financial performance and macro-economic on Islamic banks' vulnerability in Indonesia from 2014 to 2020. Data were analyzed using the Autoregressive Distributed Lag since their several variables in the economy are dynamic. The results showed that exchange rates and financing are the dominant factors that affect the Islamic banks' vulnerability. Therefore, policymakers tend to identify financial instability and try to avoid the crisis if detected. The Z-score variable in the previous periods (VUL) is another factor that affects Islamic banks' vulnerability.

Keywords: autoregressive distributed lag (ARDL), vulnerability, Islamic banking, and Indonesia

INTRODUCTION

Banks as intermediary institutions still have several problems including the failure to manage or regulate operational activities that lead to bankruptcy. Therefore, the issue of bankruptcy needs to be examined because the latest threatening case hit Bank Muamalat Indonesia. In 2015, this issue was triggered by the Non-Performing Financing which reached 7.11% with a nominal value of IDR 2.89 trillion exceeding the maximum limit of 5%. Also, in 2017, financial difficulties occurred in the West Java Syariah Bank with an NPF of 19.2% and a loss of IDR 383 billion. In the same year, Panin Bank experience vulnerabilities and suffered a considerable loss of IDR 968 billion because its NPF reached 12.5% (Statistik Perbankan Syariah, 2021). Meanwhile, the failure of many Islamic commercial banks tends to have a domino effect on others. The following are statistics on the development of Indonesian Islamic Banking.

Table 1. Development of Islamic Banking in Indonesia

Year	Number of Banks	Number of Bank Offices
2013	11	1,987
2014	12	2,163
2015	12	1,990
2016	13	1,869
2017	13	1,825
2018	14	1,875
2019	14	1,919
2020	14	2,042

Source: OJK, 2021

The development of Indonesia's Islamic banking is relatively good despite being showing a slow trend. Table 1 indicates that there were 14 banks and 1,919 offices in December 2019. From 2013 to 2019, these financial institutions increase from 11 to 14 but their existing offices decrease. However, the bank offices reduce to 244 units in 2019 because it was 2,163 in 2014. The development of Islamic banks can also be indicated through bank profitability which one of its indicators is a Return on Assets. The following is the development of Islamic Banks' profitability in Indonesia.

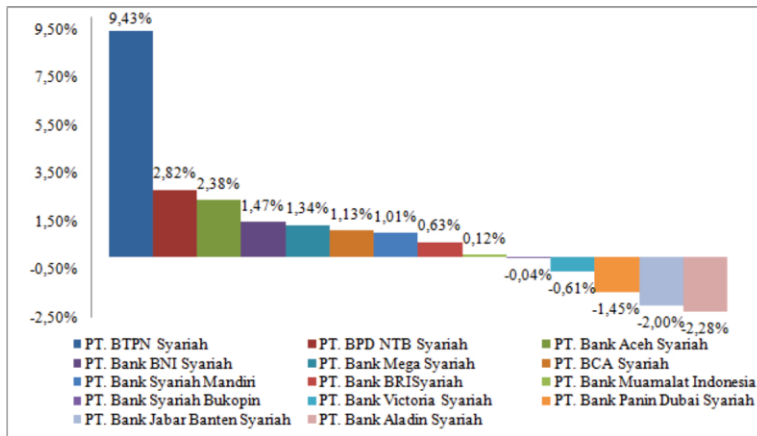


Figure 1. Average Profitability of Islamic Banks in 2015-2020

Figure 1 shows that only 3 out of 14 Islamic banks have an average ROA of more than 2% in 2015-2020. This means that these financial institutions in Indonesia failed to create minimum profits. Therefore, this is a problem for the banks because the ratio above does not meet the required ROA.

This study assesses financial instability using the Z-Score that is obtained from the comparison of Return on Assets plus Equity to Total Assets Ratio with standard deviation. The increase in the bank Z-Score leads to the reduction of bankruptcy (Khasawneh, 2016). According to Harzevili and Chirani (2016), a healthy and profitable system play an essential role in financial stability because it is resilient to economic shocks.

Vulnerability is an internal factors condition that leads to or causes the inability of facing a threat. Therefore, economic instability illustrates a level of financial fragility while battling with a danger. According to Bernanke (2013), a shock is a specific event that triggers the occurrence of a crisis or the proximate culture. Therefore, vulnerabilities including external and internal factors tend to increase credit, market, and liquidity risk because they disrupt Indonesian financial stability.

According to Rashid, Yousaf, and Khaleequzzaman (2017), Islamic banks in Pakistan perform better than conventional ones due to their effective contribution to economic durability. The study of Beck, Demirgüç-Kunt and Merrouche (2013) also Mirza, Rahat, and Reddy (2015) showed that there are no significant differences between the two financial institutions. Furthermore, Islamic banks have more asset quality and economic durability than conventional ones. According to Pambuko, Ichsan, and Anto (2018), Islamic banks have lower stability than conventional.

The study of Ghenimi, Chaibi, and Omri (2017) showed that there is no reciprocal relationship between credit and liquidity risk. However, these two risks separately affect bank stability in the Middle East and North Africa region. Trabelsi and Trad (2017) showed that the inflation rate influences financial durability and credit risk. Also, economic growth affects bank profitability, stability and minimizes credit risk. According to Fakhri and Khemaies (2017), capital ratios strengthen the Islamic and conventional banks' stability. Therefore, there is a negative effect of the corruption index on financial durability. The liquidity and credit risk hurts the conventional bank's stability but failed to affect the Islamic one.

According to Al-Khoury and Arouri (2016), the variable board size positively affects the Gulf State banks stability. Meanwhile, government ownership, non-performing loan, a fund to deposit, debt ratio, and regulation positively and insignificantly influences financial durability, while organizational size, concentration, and inflation negatively affect it. The

results showed that banks became less stable in times of high credit growth. According to Khasawneh's (2016), Islamic banks are profitable but the conventional ones are more stable in the Middle East and North Africa region. These results indicated that internal bank, macroeconomic variables, and financial crisis influence bank profitability and stability.

The internal and external factors cause the rise and fall of the Indonesian banking system. Meanwhile, the internal indicator or fundamental factors is originated and controlled by the management, while the external or non-fundamental is caused by economic conditions including interest rates and government policies (Ali, Sohail, Khan, & Puah, 2019). The fundamental factors include Non-Performing Financing, Liquidity Risk, Financing, and Bank Size. Furthermore, the macroeconomic indicators that affect bank performance comprise interest and exchange rates, inflation, and economic growth. Previous studies identified event-based to wait for the occurrence of the banking crisis (Ali & Puah, 2019; Fakhri & Khemaies, 2017). According to Pambuko et al., (2018), bank vulnerability measures the aggregate potential for crises in aggregate. This study estimates and identifies the financial instability without examining the factors that trigger the crisis. Therefore, further study is needed to analyze the internal and external indicators that influence Islamic banks' vulnerability in Indonesia. This study aims to analyze the effect of financial performance and macroeconomic on Islamic banks' vulnerability.

Financial System Stability Theory

Financial stability is the absence of instability that is an economic activity disrupted due to large fluctuations in assets price (Crockett, 1996). The study of Bundesbank (2003) described this economic durability as a balanced state of the financial system. This stability functions efficiently in resource allocation because it manages risks, performs the payment function, and overcomes economic shocks, bankruptcy, as well as fundamental structural changes. The study of Chant (2003) showed that circumstances disrupt financial institution functions and operations.

Meanwhile, financial instability occurs while there is a shock to the economy due to information flow problems. The study of Mishkin (1999) showed that the banking system failed to perform its function of channeling funds into productive investments. Schinasi (2007) defines financial stability as the absence of a crisis because it is a situation where the economy is resilient to shocks. Therefore, the intermediation function, payment system, and risk distribution function are correct. According to Simorangkir (2014), economic resilience includes financial, operational, technological weakness, legal, reputation, strategic, construction, and capital risk.

The Banking Vulnerability

The banking vulnerability on the liability side uses the Prisoner's Dilemma theory because the loss of public trust in financial institutions causes simultaneous and instantaneous withdrawals of funds. Also, the behavioral mechanisms were investigated by Diamond and Dybvig (1983). Bank vulnerabilities occur because of the interaction between liquid liabilities and illiquid assets that usually exist for short and long-term respectively.

According to Rusydiana, Rani, and Hasib (2019), banks are easily affected by external factors because they are part of the financing system. Furthermore, banking shakes directly because (1) the cash price is minimal compared to its immediate obligations, (2) the bank's capital is deficient compared to its liabilities, and (3) the short-term financing is substantial. According to Kaufmann, Kraay, and Mastruzzi (2013), vulnerability is a characteristic element that amplifies and propagates the initial shock to magnify financial system wonder.

METHOD

Data were collected through the secondary results obtained from the Sharia Banking Statistics by The Financial Services Authority. Data were amassed each month between June 2014 and December 2020. Meanwhile, interest, inflation, and exchange rate were obtained from Indonesian Bank, while economic growth was obtained from the Indonesia Central Bureau of Statistics (BPS).

In this study, vulnerability is regarded as the dependent variable because its measuring instrument which consists of 3 components was used by Demirgüç-Kunt, Detragiache, and Tressel, (2008) and Čihák and Hesse (2010). Instability is measured using the Z-Score that is a reflection of bank strength because it assesses the financial failure probability. The following formula is used to calculate the Z-Score.

$$Z - score = \frac{RoA + ETA}{\sigma RoA}$$

Description:

RoA = Return on Assets

ETA = Equity to Total Assets Ratio

σ RoA = Standard Deviation RoA

According to Khasawneh (2016), the increase in the Z-Score value tends to reduce the bank's probability of experiencing failure because it indicates the vulnerability level. In this study, the independent variables consist of internal and external factors. Meanwhile, the fundamental indicator includes Non-Performing Financing, Liquidity Risk, Financing and

Bank Size, while the non-fundamental indicator comprises Interest and Exchange Rates, Inflation, as well as Economic Growth. The following table shows the description of the variables.

Table 2. Research Variables

Variable	Definition	Source
VUL	Vulnerability banking namely the Z-Score of Islamic Banks	(Khasawneh, 2016)
NPF	Ratio Non-Performing Financing of Islamic Banks	(Ghenimi <i>et al.</i> , 2017 and Trabelsi & Trad, 2017)
LIK	Liquidity Ratio of Islamic Banks	(Khasawneh, 2016; Ali <i>et al.</i> , 2019; and Ali and Puah, 2018)
LFIN	The logarithm of Financing of Islamic Banks	(Ali <i>et al.</i> , 2019 and Ali and Puah, 2018)
LSIZE	The logarithm of Total Assets of Islamic Banks	(Khasawneh, 2016 and Rashid <i>et al.</i> , 2017)
RATE	The interest rate of the Indonesian Bank	(Khasawneh, 2016 ; Srairi, 2013 ; Rajhi and Hassairi, 2013)
INF	Change in a consumer price index	(Ghenimi <i>et al.</i> , 2017 and Ozili, 2018);
USD	IDR: USD at time t	(Srairi, 2013 ; Rajhi and Hassairi, 2013);
GROWTH	Economic growth, Interpolation of quarterly data.	(Ali & Puah, 2018 ; Khasawneh, 2016 ; Trad, Rachdi, Hakimi, and Guesmi, 2017)

Method of Data Analysis

Test Autoregressive Distributed Lag (ARDL)

ARDL is a combination of Autoregressive and Distributed Lag methods. Meanwhile, the Lag is used to see future values, while the AR uses one or more past data from the variable. The Distributed Lag is a regression method that involves data on the present and past times. According to Gujarati (2011), the ARDL has several advantages including (1) it is different from the Vector Autoregression (VAR) and Vector Error Correction Model (VECM) that require stationary of the same order, and (2) ARDL is not concerned with small samples or observations. Therefore, this study uses the specification of the Autoregressive Distributed Lag method. The following equation defines the dynamic model equation.

$$\begin{aligned}
 \Delta VUL_t = & \beta + \beta_1 \sum_{t-i}^p \Delta VUL_{t-i} + \beta_2 \sum_{t-i}^p \Delta NPF_{t-i} + \beta_4 \sum_{t-i}^p \Delta LFIN_{t-i} \\
 & + \beta_5 \sum_{t-i}^p \Delta LSIZE_{t-i} + \beta_6 \sum_{t-i}^p \Delta RATE_{t-i} + \beta_7 \sum_{t-i}^p \Delta INF_{t-i} \\
 & + \beta_8 \sum_{t-i}^p \Delta USD_{t-i} + \beta_9 \sum_{t-i}^p \Delta GROWTH_{t-i} + \beta_{10} NPF_{t-i} + \beta_{11} LIK_{t-i} \\
 & + \beta_{12} LFIN_{t-i} + \beta_{13} LSIZE_{t-i} + \beta_{14} RATE_{t-i} + \beta_{15} INF_{t-i} \\
 & + \beta_{16} USD_{t-i} + \beta_{17} GROWTH_{t-i} + \varepsilon_t
 \end{aligned}$$

The Autoregressive Distributed Lag (ARDL) method has two advantages including unbiased and efficient because it is used with a small sample. This model enables the long and short-term estimates to be obtained simultaneously to avoid autocorrelation problems. However, it is only a few studies examined the influence of banks' vulnerability using the autoregressive distributed lag method.

RESULT AND DISCUSSION

Table 3 shows the stationarity using the PP test (Phillips-Perron). The results indicated that all data are stationary.

Table 3. Stationarity Test

No	Variable	PP(Phillips-Perron)		
		At Level Prob.	1 st Prob.	2 nd Prob.
1	Vul	0.690	0.000	-
2	NPF	0.798	0.000	-
3	LIK	0.090	0.000	-
4	LFIN	0.934	0.000	-
5	LSIZE	0.914	0.000	-
6	RATE	0.614	0.000	-
7	INF	0.221	0.000	-
8	USD	0.158	0.000	-
9	GROWTH	0.012	0.552	-

Cointegration Test Results

Table 4 presents the cointegration using the Bound Test. The results showed that there is a short-run to balance a long-term on these variables.

Table 4. Bound Test

Test Statistical	Value	Significant.	I(0)	I(1)
F-statistic	5.122	10%	1.85	2.85
K	8	5%	2.11	3.15
		2.5%	2.33	3.42
		1%	2.62	3.77

Short and long-term coefficients of ARDL method estimation

Table 5 shows the short-term relationship based on the ARDL.

Table 5. ARDL Short-Term Estimation Results

Variable	Coefficient	Std. Error	T-Statistic	Prob.*
VUL(-1)	0.391	0.145	2.709	0.011*
VUL(-2)	-0.099	0.150	-0.665	0.512
VUL(-3)	-0.090	0.137	-0.659	0.515
VUL(-4)	-0.280	0.111	-2.524	0.017*
NPF	-1.114	0.481	-2.316	0.028*
NPF(-1)	-1.285	0.511	-2.515	0.017*
NPF(-2)	-0.535	0.556	-0.962	0.344
NPF(-3)	-0.454	0.545	-0.834	0.412
NPF(-4)	-0.835	0.536	-1.558	0.131
LIK	0.079	0.021	3.741	0.000*
LFIN	-11.580	5.180	-2.235	0.033*
LSIZE	-17.477	7.272	-2.403	0.023*
-	17.585	8.120	2.166	0.039*

Variable	Coefficient	Std. Error	T-Statistic	Prob.*
LSIZE(1)				
LSIZE(-2)	8.458	8.069	1.048	0.304
LSIZE(-3)	-20.103	7.730	-2.601	0.014*
LSIZE(-4)	16.677	6.651	2.507	0.018*
RATE	0.700	0.484	1.449	0.159
RATE(-1)	-3.027	0.660	-4.586	0.000*
RATE(-2)	1.772	0.773	2.292	0.029*
RATE(-3)	0.407	0.708	0.575	0.570
RATE(-4)	0.859	0.543	1.582	0.125
INF	0.494	0.242	2.040	0.051
INF(-1)	-0.631	0.251	-2.519	0.018*
INF(-2)	0.511	0.241	2.117	0.043*
INF(-3)	-0.203	0.189	-1.069	0.294
USD	8.022	5.221	1.537	0.136
USD(-1)	6.935	5.431	1.277	0.212
USD(-2)	-11.130	5.112	-2.177	0.038*
USD(-3)	17.557	5.719	3.070	0.007*
USD(-4)	11.428	6.187	1.847	0.075
GROWTH	0.988	3.026	0.326	0.747
GROWTH(-1)	-2.335	4.731	-0.493	0.626
GROWTH(-2)	0.592	4.413	0.134	0.894
GROWTH(-3)	4.146	2.678	1.548	0.133
C	-81.081	70.221	-1.155	0.258
R-squared	0.977	Akaike info criterion		1.862
Adjusted R-squared	0.949	Schwarz criterion		3.053
F-statistic	35.630	Prob(F-statistic)		0.000

Description: * Significance level below 0.05

The exceptional ARDL version with the most acceptable lag mixture was decided primarily based on the Akaike Info Criterion. Therefore, the best model for this study is ARDL (4, 4, 0, 0, 4, 4, 3, 4, 3). The R-Squared Adjusted value and the R-Bar-Squared are relatively high with an average of 0.977 and 0.949. Meanwhile, the R-Squared Adjusted value of 0.949 shows that 94.90% of the vulnerability is explained by the independent variables. This makes this study to be properly analyzed.

The table shows that VUL(-1), VUL(-4), NPF, NPF(-1), LIK, LFIN, LSIZE, LSIZE(-1), LSIZE(-3), LSIZE(-4), RATE(-1), RATE(-2), INF(-1), INF(-2), USD(-2), and USD(-3) have probability values less than 0.05. This means that at the 95% confidence level independent variables significantly affects banks vulnerability. Table 6 shows the long-term relationship based on the ARDL method.

Table 6. ARDL Long-Term Estimation Results

Variable	Coefficient	Std. Error	T-Statistic	Prob.*
NPF	-3.916	0.655	-5.979	0.000
LIK	0.073	0.021	3.542	0.001
LFIN	-10.738	4.421	-2.429	0.022
LSIZE	4.765	3.586	1.329	0.195
RATE	0.661	0.219	3.022	0.005
INF	0.158	0.277	0.571	0.573
USD	30.424	3.728	8.161	0.000
GROWTH	3.145	2.217	1.418	0.167
C	-75.180	65.424	-1.149	0.260
EC = VUL - (-3.916*NPF + 0.073*LIK -10.738*LFIN + 4.765*LSIZE +0.661*RATE + 0.158*INF + 30.424*USD + 3.144*GROWTH 75.179)				

Note: The significance level is below 0.05

The long-term estimation showed that the NPF, LIK, LFIN, RATE, and USD significantly affects Islamic banking VUL with 5%, while the LSIZE, INF, and GROWTH failed to influence it because they have a probability value greater than 0.05 (5%). These results indicated that the USD variable has the most considerable coefficient value. This means that the exchange rate is the dominant factor that affects the Islamic banking vulnerability in Indonesia. Meanwhile, the increase in the exchange rate by 1% tends to develop the financial instability by 30.42%. The following is the equation formed from the table.

$$\text{VUL} = -75.180 - 3.916 * \text{NPF} + 0.073 * \text{LIK} - 10.738 * \text{LFIN} + 4.765 * \text{LSIZE} + 0.661 * \text{RATE} + 0.158 * \text{INF} + 30.424 * \text{USD} + 3.145 * \text{GROWTH}$$

These results showed that NPF significantly affects the Islamic bank's vulnerability in Indonesia. Also, the short-term estimation indicated that NPF and NPF(-1) have a significant effect on financial instability. This means that the increase in the credit risk disbursed tends to make it have a relationship with the lower bank vulnerability. However, credit with risk means potential for failure in large returns from creditors. Failure to repay these funds tends to increase banks' vulnerability because it affects their operational activities. These results are in line with the previous studies that showed the relationship between credit risk and financial instability (Ghenimi et al., 2017; Trabelsi & Trad, 2017).

The long-term estimation indicated that liquidity risk significantly affects Islamic bank vulnerability in Indonesia. Also, the short-term results showed that LIK substantially influences financial instability. Banks tend to face LIK if they do not liquidate their assets at a fair price because this risk is not eradicated on time. Meanwhile, the low selling prices of investments lead to significant losses and decreases in revenue. These results are in line with previous studies that liquidity risk significantly influences bank stability (Ali & Puah, 2018, Trabelsi & Trad, 2017; Fatoni & Sidiq, 2019; Ghenimi et al., 2017; Amara & Mabrouki, 2019).

Also, the long-term estimation indicated that Financing significantly affects Islamic bank vulnerability in Indonesia. The short-term results showed that LFIN has a substantial influence on vulnerability. Financing in the form of a credit to individuals and corporations for various purposes of consumption, investment, working capital, and others affects the natural sector movement and economic growth. The increase in the funds disbursed tends to high the bank's ability to provide loans. This means that the influence of an increased income irrespectively develops bank profits. Therefore, more funds will be channeled if this ratio increases within a specific limit. Adequate distribution of financing tends to boost bank profits and decrease its vulnerability. These results are in line with previous studies that LFIN significantly affects bank stability (Al-Khoury & Arouri, 2016; Ghenimi et al., 2017; Ali & Puah, 2018).

The long-term estimation indicated that LSIZE has no significant influence on the Islamic bank vulnerability in Indonesia. Also, the short-term results showed that LSIZE, LSIZE(-1), LSIZE(-3), LSIZE(-4) significantly affect financial instability. Companies with a more considerable influence increase in profitability and value because they are relatively stable. Therefore, size development tends to easily allow an organization to obtain funds to increase its value. These results are in line with previous studies that total assets significantly influences bank vulnerability (Trabelsi & Trad, 2017; Ghenimi et al., 2017; Amara & Mabrouki, 2019; Ozili, 2018).

Moreover, the long-term estimation showed that BI Rate significantly affects Islamic bank vulnerability in Indonesia. The short-term results indicated that RATE(-1) and RATE(-2) significantly influences financial instability. The bank is a financial institution that collects funds from the public in form of savings, demand, and time deposits. These deposits have a cost that needs to be replaced in the form of a profit-sharing bonus. Meanwhile, the interest rate is a systemic monetary instrument that influences the determination of bank deposits. The profit-sharing that needs to be paid to creditors increases if there is a development in the SBI. However, the increase in fees causes the banks to pay their obligations to creditors in high financial instability. These results are in line with the study of Diaconu and Oanea (2014) also Sevim, Oztekin, Bali, Gumus, and Guresen (2014).

The long-term estimation showed that inflation has no significant effect on Islamic bank vulnerability in Indonesia. Also, the short-term results indicated that INF(-1) and INF(-2) significantly affect financial instability. This indicates that the debtor is benefitted if inflation is higher than what is expected. Moreover, the creditor is harmed because the debtor pays the financing with a smaller amount of money, and the profits obtained are not proportional to the costs that need to be paid. This enables banks to pay obligations to creditors which directly leads to an increase in vulnerability. These results are in line with the study of Trabelsi and Trad (2017), Ghenimi et al. (2017), and Trad et al. (2017).

Furthermore, the Rupiah's exchange rate against the US Dollar is essential in the international economy. The long-term results showed that USD significantly affects the Islamic bank vulnerability in Indonesia. Also, the short-term estimation indicated that USD (-2) and USD (-3) significantly affect financial instability. These results showed that the LKURS variable has the most significant coefficient value. This means the exchange rate is the dominant factor that affects the Islamic banks' vulnerability in Indonesia. Therefore, an increase in the exchange rate by 1% tends to develop financial instability by 30.42%. The exchange rate influences Islamic banking because some deposits are denominated in US Dollars and not only in Rupiah. Meanwhile, the Rupiah is called depreciation and appreciation

if it weakens and strengthens the USD respectively. This is because the amount of Rupiah that needs to be returned increases if its exchange rate cuts. These results are in line with the study of Srairi (2013), Rajhi and Hassairi (2013), and Ariefianto and Soepomo (2013) that the exchange rate positively affects bank vulnerability.

The long-term estimation showed that GROWTH does not affect Islamic bank vulnerability in Indonesia. These results indicated that economic growth failed to directly reduce financial instability while it increases. For instance, a country's economic growth does not encourage banks to channel credit while it advances in 2014-2020. Also, in the 2008-2009 crisis, the economic activity failed to reduce Islamic bank vulnerability despite its development in Indonesia. These results are not in line with the study of Fatoni and Sidiq (2019) and Abdul, Saba, and Muhammad (2017) that economic growth significantly affects financial instability.

CONCLUSION

In Indonesia, Islamic bank vulnerability is influenced by Non-Performing Financing, Liquidity Risk, Financing, Bank Size, Interest, Rupiah Exchange Rate, and Inflation. This study results showed that Economic Growth is the only variable that failed to affect financial instability. Moreover, the Lags including VUL(-1) and VUL(-4) affect Islamic bank vulnerability.

There tend to be a continuous and synergized cooperation between the government, the Central Bank, and society to accelerate market share because this study provides an overview of financial condition and activities. However, Islamic banks need to always pay attention to internal and external factors especially the profit-sharing-based that affect their stability. Also, this financial institution has to perform stricter monitoring and assistance to avoid the risk of bad loans and reduce operational costs.

Further study is needed to consider using the banking condition, stress, and stability Index for the vulnerability measurement. Also, it has to use macroeconomic variables including the IDX composite, foreign exchange reserves, gold prices, profit sharing equivalents, and investment levels. In conclusion, all countries that operate an Islamic banking system are recommended to participate in the study.

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