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VAR ANALYSIS UNLEASHED: THE VOLATILE IMPACT OF NON-PERFORMING FINANCING ON ISLAMIC BANK PROFITABILITY IN INDONESIA

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Abstract

The purpose of this study is to analyse and understand the impact of Non-Performing Financing (NPF) volatility on the profitability of Islamic commercial banks in Indonesia. This study uses the Vector Auto Regressive (VAR) approach. The results show a strong interdependence between NPF and ROA in Islamic banks in Indonesia. Although in the short term NPF has a negative impact on ROA, in the long term NPF has a positive effect. Variance decomposition indicates that these two variables influence each other and their contribution increases over time. These findings are important for the management of Islamic banks to understand how fluctuations in NPF can affect the financial performance of banks and vice versa, and to make effective strategic decisions in risk management and profitability.

Keywords: Islamic Bank, Profitability, Non Performing Financing, Vector Auto Regressive

1. Introduction

Profitability is one of the crucial financial performance indicators for any banking institution, including Islamic commercial banks in Indonesia (m.kamil & Nainggolan, 2023; W. K. N. Nasirin, 2020; Nugroho et al., 2019). As institutions that operate based on sharia principles, Islamic banks face unique challenges in maintaining the stability of their profitability while still complying with the rules of Islamic finance. Return on Assets (ROA) is a measure often used to assess profitability, as it provides an overview of how effectively a bank uses its assets to generate profits (A'la & Mawardi, 2015; Cahyono, 2020).

The profitability of Islamic banks in Indonesia has experienced significant fluctuations over time. Bank Syariah Indonesia, which has conducted an Initial Public Offering (IPO), shows diverse profitability movements from quarter 1 of 2010 to quarter 4 of 2023. Based on Return on Assets (ROA) data, it can be seen that the bank's profitability peaked in the 4th quarter of 2010 with an ROA of 2.30, but experienced a drastic decline in the 1st quarter of 2018 with an ROA of only 0.17. Since then, the bank's profitability has slowly increased until it reached 2.34 in quarter 4 of 2023. These fluctuations reflect the challenges faced by Bank Syariah Indonesia in maintaining the stability of its performance amidst changing economic and financial dynamics.

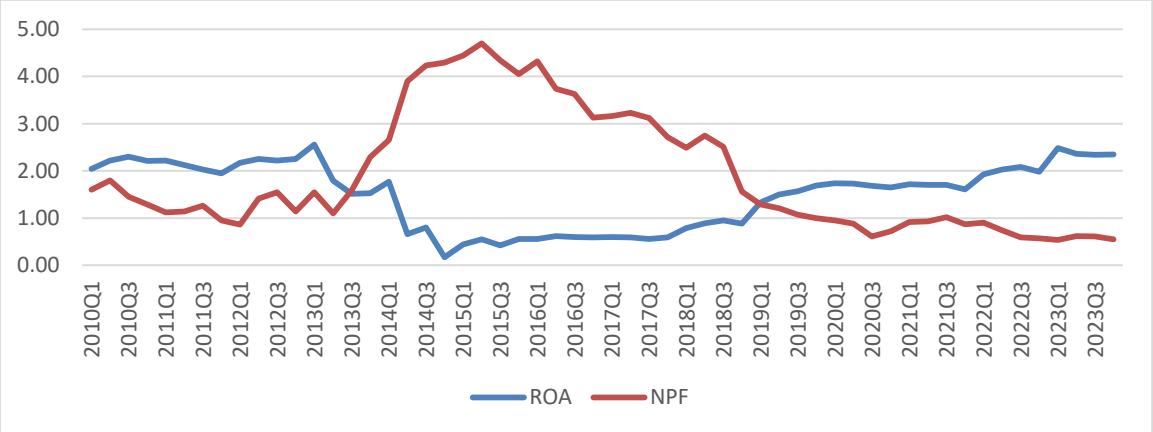

Figure 1 Movement of Profitability and Problem Financing of Islamic Banks in Indonesia

However, this condition cannot be separated from the main factor that has a significant impact on profitability is non-performing financing (NPF). Data shows that Bank Syariah Indonesia's NPF ratio also experienced striking fluctuations during the same period. In the first quarter of 2010, the NPF stood at 1.60 and increased sharply reaching its peak in the second quarter of 2020 with an NPF ratio of 4.70. After that, the NPF ratio showed a downward trend until it reached 0.55 in quarter 4 of 2023. The high NPF rate in some periods indicates a significant problem in the management of financing that has a direct impact on bank profitability. This phenomenon indicates a gap between the expected conditions and the conditions that actually occur. Theoretically, Islamic banks are expected to maintain stable profitability and manage financing risks well. However, the reality shows that high fluctuations in NPF have disrupted the stability of Islamic Bank Indonesia's profitability. This theoretical gap is derived from a literature review that emphasises the importance of risk management and stable financial performance in Islamic banking.

Practically, this gap is also reflected in the phenomenon in the field. High fluctuations in NPF indicate problems in the management of financing that not only impact profitability but also customer perception and trust. This symptom can be seen from the increase in the NPF ratio that goes hand in hand with a decrease in ROA in a certain period. A clear example is in quarter 2 of 2019, when NPF reached 4.44 and ROA was only 0.44. This shows that an increase in non-performing financing has a direct impact on decreasing bank profitability. Previous research has tried to address this issue through various risk management approaches and financial performance analysis. However, the results still show significant fluctuations (Almunawwaroh & Marliana, 2018; Asriyati, 2017; Difa et al., 2022; Harjanti & Farhan, 2021; Khoiriyah & Wirman, 2021; Nurwan, 2022; Qurotulaeni & Wirman, 2021; Rumasukun & Reza, 2022; Wulandari & Shofawati, 2017).

Therefore, a more comprehensive and integrated approach is needed to understand these dynamics. This study seeks to analyse the relationship between non-performing financing and profitability of Indonesian Islamic Banks using the Vector Auto Regressive (VAR) method. This method allows for a more in-depth and dynamic analysis of how changes in one variable can simultaneously affect another. The importance of this research is not only limited to the development of knowledge in the field of Islamic banking, but also to the practical recommendations that can be generated to improve the stability and financial performance of Islamic banks in Indonesia. By understanding the volatile impact of non-performing loans on profitability, Islamic banks can develop more effective strategies in risk management and financial performance improvement, thus contributing to the stability of the national financial system.

2. Theoretical Study

2.1 Profitability

Profitability is a measure of financial performance that shows the ability of a company to generate profits from its operational activities (Harianto, 2017). In the context of banking, profitability is often measured using Return on Assets (ROA), which calculates how effectively a bank uses its assets to generate profits. ROA is calculated by dividing net income by total assets and expressed as a percentage. ROA is an important indicator because it provides an overview of management's efficiency in utilising its assets to increase profits. This dimension includes a comprehensive analysis of the operational efficiency and management of assets owned by the bank. The benefits of measuring profitability using ROA are significant in various aspects. Firstly, ROA assists bank management in evaluating financial performance on a periodic basis and identifying areas that require improvement. Second, ROA is an important indicator for investors and other stakeholders to assess the financial health and growth potential of the bank. Third, by knowing the level of profitability, banks can design more appropriate strategies to improve operational efficiency and asset management. Overall, ROA measurement allows banks to conduct more

accurate performance assessments and make strategic decisions based on solid financial data. In the context of Islamic banking, profitability has a more complex dimension as it must comply with sharia principles that prohibit usury (interest) and emphasise asset- and risk-based financing. Profitability in Islamic banks depends not only on operational efficiency, but also on compliance with sharia principles governing financial transactions. Therefore, risk management, including the risk of non-performing financing, becomes crucial. The profitability of Islamic banks can be affected by various factors such as financing quality, risk management, and macroeconomic conditions. Using ROA to measure profitability in Islamic banks provides important insights into how well the bank can manage its assets in accordance with sharia principles while still achieving its expected financial objectives.

2.2 Non Performing Financing

Non-performing financing, or NPF, is financing that does not result in principal or interest payments according to the agreed schedule (Harianto, 2017). In the context of Islamic banking, NPF refers to financing that fails to meet the payment obligations specified in a sharia contract, such as murabahah, mudharabah, or ijarah. NPF is usually categorised based on the length of arrears, such as 90 days or more. Non-performing financing is an important indicator of a bank's financial health as it reflects credit risk and management effectiveness in managing the financing portfolio (Nuraeni et al., 2022).

The benefits of measuring NPF are significant in banking risk management. Firstly, NPF provides an overview of the quality of the bank's financing portfolio and how much exposure the bank has to credit risk. Second, NPF is used by regulators and other stakeholders to assess the financial health of banks and ensure financial system stability. Thirdly, measuring NPF allows bank management to take appropriate corrective actions, such as restructuring financing or increasing loan loss reserves. By understanding the level of NPF, banks can develop more effective strategies to manage credit risk and maintain optimal financial health.

In Islamic banking, the management of non-performing financing has its own challenges because it must comply with sharia principles that emphasise fairness, transparency, and profit sharing. Non-performing financing can have a negative impact on the profitability of Islamic banks as it reduces the expected income from the financing provided. High NPF also reflects a lack of efficiency in risk management and financing portfolio management. Therefore, Islamic banks need to adopt effective risk management practices and adhere to sharia principles in the entire financing process to reduce the level of NPF. Thus, good management of non-performing financing not only improves the profitability of Islamic banks but also strengthens customer confidence and financial system stability.

3. Research Method

3.1 Research Design

This research uses an explanatory research design to link the research questions with the methods used. The explanatory design aims to explain the causal relationship between the variables of non-performing financing (NPF) and profitability (ROA) at Islamic commercial banks in Indonesia. This design was chosen because it is able to provide an in-depth picture of how fluctuations in NPF can affect the ROA of Islamic banks over time. This study uses the Vector Auto Regressive (VAR) method to analyse the data, as VAR allows researchers to capture the dynamics of interdependence between the variables simultaneously.

3.2 Operational Definition of Variables

The main variables in this study are profitability (ROA) and non-performing financing (NPF). Profitability (ROA) is defined as a ratio that measures the efficiency of a bank in using its assets to generate profits. ROA is calculated by the formula net income divided by total assets, expressed as a percentage. The measurement indicators are net income and total assets from the

bank's quarterly financial statements. Non-performing financing (NPF) is defined as the ratio of financing that does not result in principal or margin payments according to the agreed schedule. NPF is calculated by dividing total non-performing financing by total financing provided, also expressed as a percentage. The measurement scale for these two variables is a ratio scale.

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3.4 Sample and Sampling Technique

The samples in this study are Islamic commercial banks in Indonesia that have conducted IPOs and have complete financial data from 2010 to 2023, with data collected quarterly. The sampling technique used is purposive sampling, with the main criteria being banks that have conducted IPOs before 2010 and consistently report quarterly financial data during the study period. Data completeness is very important to ensure the validity of the VAR analysis to be carried out.

Data Collection Technique

The data used in this study are secondary data obtained from the quarterly financial statements of Islamic banks that are the research sample. This data includes information about ROA and NPF from 2010 to 2023. Data sources are taken from official Islamic bank publications, annual reports, and trusted financial databases.

3.5 Data Analysis Method

The data analysis method used in this research is Vector Auto Regressive (VAR). VAR is a statistical technique used to capture the linear relationship between several time variables in a dynamic system. VAR allows the analysis of how one variable affects another and vice versa in various time periods. The analysis process includes data stationarity testing, optimal lag determination, VAR model estimation, and Granger causality test to understand the direction of influence between variables. The results of the VAR analysis will provide an overview of the dynamics of the interaction between non-performing financing and profitability in Islamic commercial banks in Indonesia, which is expected to provide important insights for risk management and bank performance improvement (Aji & Surjandari, 2020; Aljandali & Tatahi, 2018; Anton, 2006; W. K. Nasirin et al., 2023).

4. RESULT AND DISCUSSION

4.1 Stationarity Test

Stationarity test is the first step to ensure the data used is stationary or not. If the data is not stationary, then test the stationary data at the difference level. The following are the results of the stationarity test using Augmented Dickey Fuller (ADF) in this study:

Tabel 1 Stasionerity Test

Variabel	*Level*		*First Difference*	
	ADF	Prob	ADF	Prob
ROA	1,17	0,68	8,87	0,00
NPF	0,69	0,84	5,82	0,00

Source: EVIEWS 12 Data Processing Results

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The stationarity test results show that the ROA and NPF variables are not stationary at the level. However, after the data stationary test at the first difference level, the ROA and NPF variables are stationary because the ADF significance has a probability value of each variable smaller than 5%.

4.2 Stability Test

After all variables are stationary, the next step is the stability test. In the stability stage, the maximum interval length of the stable VAR system will be seen. The following are the results of the stability test in this study.

Tabel 2 Stability Test

Root	Modulus
0.645504	0.645504
-0.176617 - 0.510078i	0.539790
-0.176617 + 0.510078i	0.539790
-0.528184	0.528184

Source: EVIEWS 12 Data Processing Results

Based on the test results, it can be concluded that all roots have a modulus smaller than one (Modulus < 1) and all are located inside the unit circle. Therefore, the data is stable.

4.3 Optimal Lag Determination

After the research data is stable, the next step is to determine the optimal lag length of this research. This aims to determine the optimum number of lags. This optimum lag test is very useful for eliminating autocorrelation problems in the VAR system. so that by using the optimum lag it is hoped that the autocorrelation problem will no longer arise. The following are the results of determining the optimal lag of this study:

Tabel 1 Optimal Lag Determination

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-20.65986	NA	0.008486	0.906394	0.982875*	0.935519
1	-14.92371	10.78395	0.007919	0.836949	1.066391	0.924322
2	-9.086084	10.50773*	0.007365*	0.763443*	1.145848	0.909065*
3	-6.953841	3.667459	0.007955	0.838154	1.373520	1.042024
4	-3.593303	5.511282	0.008196	0.863732	1.552060	1.125851
5	-0.710124	4.497759	0.008628	0.908405	1.749695	1.228773

Source: EVIEWS 12 Data Processing Results

Determination of the optimal lag results obtained by the selected hose candidate based on the shortest lag, which is optimal at lag 2.

4.4 Granger Causality Test

After obtaining the optimal lag size, this study conducted a Granger causality test which shows whether there is a causal relationship between the five variables studied and what is the direction of the relationship.

Tabel 2 Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
D(NPF) does not Granger Cause D(ROA)	53	7.00197	0.0021
D(ROA) does not Granger Cause D(NPF)		1.84452	0.1691

Based on the results of conducting the Granger causality test with the NPF variable, it shows that there is a one-way causality relationship, namely NPF has a one-way relationship with the ROA of Bank Syariah Indonesia. Conversely, the Granger test with the ROA variable shows that there is no one-way causality relationship, namely ROA does not have a one-way relationship with Bank Syariah Indonesia's NPF. This means that there is no two-way causality relationship between NPF and ROA, but NPF has a one-way relationship with ROA of Islamic Bank Indonesia.

4.5 Cointegration Test

The next step is cointegration testing which is used to see the long-term balance between the observed variables. A data that is individually non-stationary, but when connected linearly the data becomes stationary or often known as cointegrated. The following are the provisions of the cointegration test:

Table IV.5 Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.450731	37.08813	15.49471	0.0000
At most 1 *	0.107802	5.931471	3.841465	0.0149

Source: EVIEWS 12 Data Processing Results

Based on the cointegration test, the Significance Probability value of 0.00 < 5%, it is assumed that cointegration occurs. This indicates that between NPF and ROA variables have a long-run equilibrium. So further research uses the Error Correction Model (ECM) test.

4.6 VECM Model Estimation

The Vector Error Correction Model (VECM) estimation is used to analyse the correlation in the dependent variable due to the imbalance condition of several variables. The following are the results of the research model estimation generated in this study:

Table 6 VECM Estimation

Cointegrating Eq:	CointEq1	
D(ROA(-1))	1.000000	
D(NPF(-1))	0.462084	
	(0.07092)	
	[6.51550]	
C	0.006695	
Error Correction:	D(ROA,2)	D(NPF,2)
CointEq1	-1.609984	-0.912735
	(0.31380)	(0.47132)

	[-5.13053]	[-1.93653]
D(ROA(-1),2)	0.210919	0.713387
	(0.23497)	(0.35292)
	[0.89763]	[2.02137]
D(ROA(-2),2)	0.125269	0.267774
	(0.13900)	(0.20877)
	[0.90125]	[1.28265]
D(NPF(-1),2)	0.452853	-0.358387
	(0.13427)	(0.20168)
	[3.37259]	[-1.77704]
D(NPF(-2),2)	0.124487	-0.233753
	(0.10351)	(0.15546)
	[1.20270]	[-1.50360]
C	0.000378	0.006644
	(0.03229)	(0.04849)
	[0.01170]	[0.13701]

Source: EVIEWS 12 Data Processing Results

Long-term analysis in the profitability equation model of Bank Syariah Indonesia formed, namely:

$$ROA = 0{,}0067 + 0{,}46\ NPF + e$$

Based on the long-term equation, it can be interpreted that the constant value of ROA is 0.0067, meaning that if the variable is 0, then the profitability of Bank Syariah Indonesia in the long term is 0.0067%. Then, the coefficient value of the NPF variable is 0.46. This means that if NPF increases by 1 unit, then the profitability of Bank Syariah Indonesia in the long term will increase by 0.46%.

In addition, the short-term analysis in the Bank Syariah Indonesia profitability equation model formed is:

$$ROA = 0{,}00038 - 1{,}61\ NPF + e$$

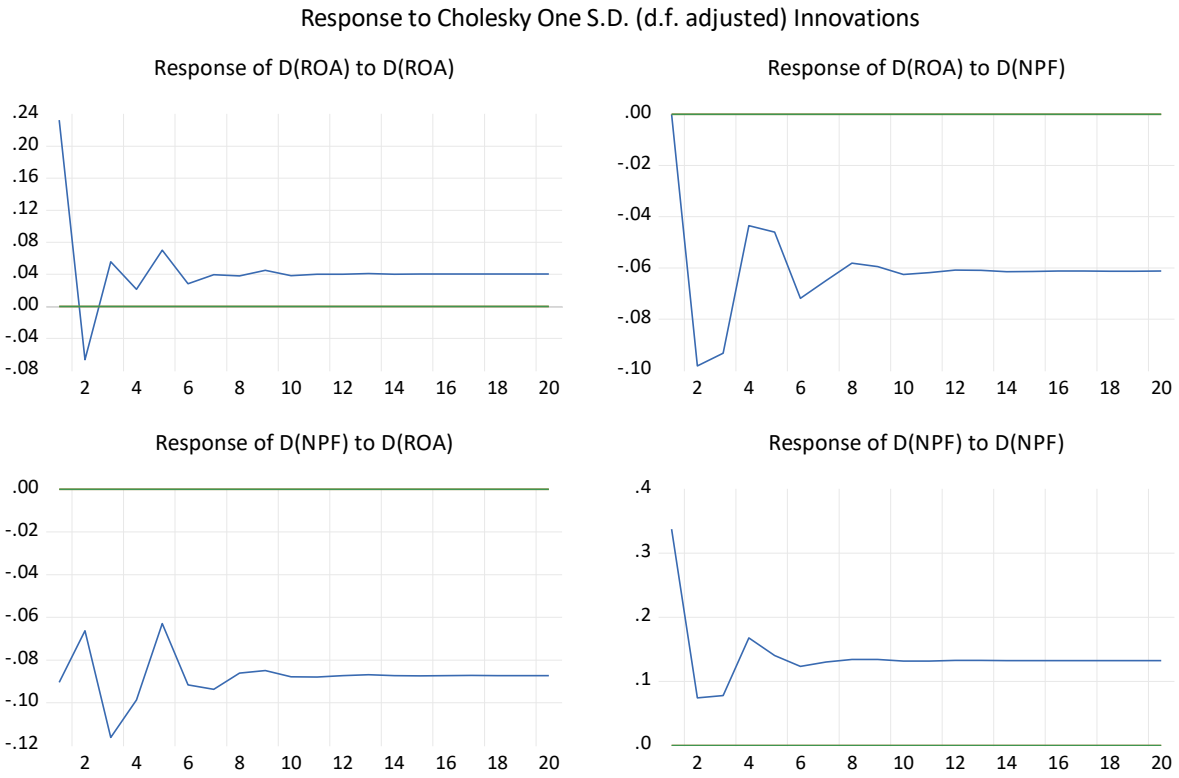
Based on the short-term equation, it can be interpreted that the constant value of ROA is 0.00038, meaning that if the variable is 0, then the profitability of Bank Syariah Indonesia in the long term is 0.00038%. Then, the coefficient value of the NPF variable is minus 1.61. This means that if NPF increases by 1 unit, the profitability of Bank Syariah Indonesia in the short term will decrease by 1.61%. The following are the results of the long and short-term hypothesis tests of this study:

1) The T value of NPF statistics in the long term is positive 6.52; which indicates that in the long term non-performing financing (NPF) has a positive effect on the profitability of Bank Syariah Indonesia.
2) The T value of NPF Statistics in the short term is negative 5.13; which indicates that in the short term non-performing financing (NPF) has a negative effect on the profitability of Bank Syariah Indonesia.

4.7 Impulse Response Functions (IRFs)

IRF (Impulse Response Function) analysis is a tool used in econometric analysis to measure the long-run and short-run impact of changes in certain variables on other variables in an economic model. In the context of this study, if we analyse the IRF of Indonesia's external debt with a period of 24 periods, the IRF can be explained as follows:

Figure 1 Impulse Response Functions (IRFs)



Source: EVIEWS 12 Data Processing Results

In this impulse response function (IRF) analysis, Return on Assets (ROA) of Islamic banks in Indonesia responds to a shock in Non-Performing Financing (NPF). In the first period, D(ROA) increased by 0.232690 without any change in D(NPF), which indicates that the initial shock did not directly affect NPF. In the following periods, the response of D(ROA) fluctuates and shows some small increases and decreases. In the 2nd period, D(ROA) decreases by -0.066518, followed by an even smaller decrease in the 3rd period with a value of 0.055622. The response of D(ROA) to D(NPF) continues to fluctuate but tends to stabilise around the value of 0.040 after the 10th period. This shows that after several periods, the effect of NPF on ROA starts to stabilise and its impact becomes less significant.

The response of D(NPF) to a shock in D(ROA) shows a different pattern. In the first period, D(NPF) increases significantly by 0.337575 even though D(ROA) decreases by -0.090487. In subsequent periods, the response of D(NPF) shows more complex variations. For example, in the 2nd period, D(NPF) remains positive but with a lower value (0.074217), while D(ROA) continues to show a decline. The response of NPF to changes in ROA appears to have a diminishing effect over time, but remains at a positive value indicating a persistent albeit small effect. In subsequent periods, the value of D(NPF) tends to stabilize around 0.132 after the 10th period, suggesting that the impact of a shock to ROA on NPF remains stable and sustainable.

The IRF results indicate that there is a dynamic relationship between ROA and NPF in Islamic banks in Indonesia. Initially, a shock to NPF has a significant impact on ROA, but this impact tends to subside and stabilize over time. Conversely, a shock to ROA also shows a large initial impact on NPF, but then stabilizes at a certain level. This indicates that while NPF may affect bank profitability in the short term, the impact becomes more stable and manageable in the long term. This finding is important for bank management and regulators to understand how fluctuations in NPF can affect the financial performance of banks, and conversely, how bank

profitability can affect the level of NPF. This understanding can help in making strategic decisions to minimize risk and optimize profitability in Islamic bank operations.

4.8 Variance Decompositions (VD)

Variance decomposition is a method to understand the relative role of various variables in explaining the variation of Indonesia's external debt equation from the first period to the twenty-fourth period. In this context, the variation in Indonesia's external debt equation can be broken down into two components: the contribution from Indonesia's external debt itself and the contribution from other variables such as exports, imports, inflation, exchange rates, and foreign exchange reserves. The following are the results of the variance decomposition test in this study:

Tabel 3 Variance Decomposition

Variance Decomposition of D(ROA):			
Period	S.E.	D(ROA)	D(NPF)
1	0.232690	100.0000	0.000000
2	0.261200	85.84653	14.15347
3	0.282865	77.06662	22.93338
4	0.286972	75.42387	24.57613
5	0.299011	74.99516	25.00484
6	0.308838	71.14277	28.85723
7	0.318057	68.63080	31.36920
8	0.325578	66.87101	33.12899
9	0.334017	65.35567	34.64433
10	0.341992	63.60621	36.39379
Variance Decomposition of D(NPF):			
Period	S.E.	D(ROA)	D(NPF)
1	0.349492	6.703404	93.29660
2	0.363381	9.527673	90.47233
3	0.389419	17.21206	82.78794
4	0.435329	18.91685	81.08315
5	0.461732	18.67093	81.32907
6	0.486679	20.35415	79.64585
7	0.512472	21.70184	78.29816
8	0.536695	22.36051	77.63949
9	0.559738	22.85838	77.14162
10	0.581743	23.44539	76.55461
Cholesky Ordering: D(ROA) D(NPF)			

Source: EVIEWS 12 Data Processing Results

Variance decomposition (VD) gives an idea of the proportion of variability of one variable that can be explained by surprises to other variables in the model. For D(ROA), in the first period, the entire variability (100%) is explained by itself, D(ROA), with no influence from D(NPF). However, starting from the second period, the contribution of D(NPF) to the variability of D(ROA) increases gradually. In the second period, 14.15% of the variability of D(ROA) is explained by D(NPF), and this figure continues to increase until it reaches 36.39% in the tenth period. This shows that over time, Non-Performing Financing (NPF) becomes increasingly significant in

explaining the variability of profitability (ROA) of Islamic banks in Indonesia. The role of NPF in influencing ROA cannot be ignored due to its increasing influence on the variability of bank profitability. For D(NPF), in the first period, most of the variability (93.30%) is explained by itself, with a contribution from D(ROA) of 6.70%. As the period increases, the contribution of D(ROA) to the variability of D(NPF) increases. In the second period, 9.53% of the variability of D(NPF) is explained by D(ROA), and this figure continues to increase until it reaches 23.45% in the tenth period. While D(NPF) remains more dominant in explaining its own variability, the influence of D(ROA) is also significant and increases over time. This suggests a bidirectional relationship between ROA and NPF, where changes in the profitability of Islamic banks also have a significant impact on the level of non-performing loans.

The variance decomposition results provide important insights into the dynamics of the interaction between ROA and NPF in Islamic banks in Indonesia. From the results of VD D(ROA), we can see that the effect of NPF on the profitability of Islamic banks increases gradually and significantly over time. This indicates that risk management of non-performing loans is becoming increasingly important to maintain and improve bank profitability. Conversely, from the results of VD D(NPF), it can be seen that bank profitability also contributes significantly to the variability of NPF, indicating that an increase or decrease in profitability can have a direct impact on the level of non-performing financing. Therefore, good profitability management is not only important for financial purposes but also to maintain asset quality and overall financial stability of the bank. The variance decomposition results show a strong interdependence between profitability (ROA) and non-performing financing (NPF). These two variables influence each other and their contribution increases over time, indicating the importance of a holistic approach in managing risk and profitability in Islamic banks in Indonesia.

5. Conclusion

This study begins with a stationarity test using Augmented Dickey-Fuller (ADF) to ensure that the data used is stationary. The results show that the ROA and NPF variables are not stationary at the level, but become stationary after the first differencing. This is evidenced by the ADF probability value which is less than 5% at the first differencing level, so it can proceed to the next stage of analysis. After ensuring stationarity, a stability test is conducted to verify that the VAR system used is stable. The results show that all roots have a modulus of less than one and are located inside the unit circle, which means that the data is stable and can be used for further VAR analysis. Determining the optimal lag is important to eliminate autocorrelation problems in the VAR system. The results of determining the optimal lag show that the optimal lag for this study is lag 2, which was chosen based on several criteria such as AIC, SC, and HQ. Granger Causality Test is conducted to see whether there is a causal relationship between NPF and ROA. The results show that there is a one-way causality relationship from NPF to ROA, but not vice versa. That is, changes in NPF affect ROA, but changes in ROA do not significantly affect NPF. Cointegration test is used to see the long-run equilibrium between NPF and ROA. The results show that there is cointegration between these two variables, which means that there is a long-run equilibrium between NPF and ROA in Islamic banks in Indonesia. This indicates that although there may be short-term fluctuations, the long-term relationship between NPF and ROA remains stable.

The Vector Error Correction Model (VECM) estimation shows that in the long run, NPF has a positive influence on ROA. This means that an increase in NPF will increase the profitability of Islamic banks in the long run. Conversely, in the short run, an increase in NPF has a negative effect on ROA, which means that an increase in NPF reduces profitability in the short run. The IRF analysis shows how ROA responds to a shock in NPF and vice versa. The results show that in the initial period, a shock to NPF has a significant impact on ROA, but this impact tends to subside and stabilize over time. Conversely, a shock to ROA also shows a large initial impact on NPF, but then stabilizes at a certain level. Variance Decomposition provides an overview of the relative contribution of the variables in explaining the variability of each variable in the model. The VD

results for D(ROA) show that the contribution of NPF to the variability of ROA increases gradually over time, reaching 36.39% in the 10th period. This indicates that NPF is becoming an increasingly significant factor in explaining the variability of Islamic bank profitability. In contrast, the VD results for D(NPF) show that the contribution of ROA to NPF variability also increases, reaching 23.45% in the 10th period. Although NPF is more dominant in explaining its own variability, the influence of ROA is also significant and increases over time. The results of this study indicate a strong interdependence between NPF and ROA in Islamic banks in Indonesia. Although in the short term NPF has a negative impact on ROA, in the long term NPF has a positive effect. Variance decomposition indicates that these two variables influence each other and their contribution increases over time. These findings are important for the management of Islamic banks to understand how fluctuations in NPF can affect the financial performance of banks and vice versa, and to make effective strategic decisions in risk management and profitability.

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