



## Islamic Commercial Bank Performance: The Nexuses by Financial Ratios, Macro Economics, And Financial Technology

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### **Abstract:**

*The objective of this study is to examine the relationship between various factors and the performance of Islamic commercial banks in Indonesia over the next 12 periods. The variables considered include Non-Performing Assets, Capital Adequacy Ratio, Insolvency-risk, Inflation, Financial Technology, and Bank Size. The research methodology employed is a quantitative approach with a descriptive analysis. The sampling technique utilized is saturated sampling, resulting in a total of 96 data points. The findings indicate that the Non-Performing Assets (NPA) variable has a significant impact on Return on Assets (ROA), while the ROA variable does not significantly affect the NPA variable. Additionally, the inflation variable does not have a statistically significant effect on ROA, and vice versa. In the short term, the variables that influence bank performance are NPA, Capital Adequacy Ratio, Insolvency-risk, Financial Technology, and Bank Size. In the long term, significant factors influencing bank performance are NPA, Insolvency-risk, Financial Technology, and Bank Size. The Impulse Response Function (IRF) test demonstrates that ROA shows a positive response to the impact of NPA, Capital Adequacy Ratio, Inflation, Financial Technology, and Bank Size, while it exhibits a negative response to shocks caused by inflation. Throughout the study period, the variable with the greatest contribution remains Financial Technology, followed by other variables. Ultimately, the aim of this study is to provide insights for future policy implementation and decision-making within companies.*

**Keywords:** Bank Performance, Financial Ratio, Macroeconomic, Financial Technology

**JEL Classification Code:** F62, G21, G28

### **1. Introduction**

Bank performance is important for management, shareholders, government, and related parties (Li et al., 2021; Taylor, 2022). Banking performance can increase the value of its business by increasing profits, assets, and prospects (Canggih et al., 2022; Miranti et al., 2022; Pratama, 2018; Sholikah & Miranti, 2020; Sumarta, 2000). Supervision of the rating system is related to Bank Indonesia Regulation Number/9/1/PBI/2007 concerning the Rating System for Commercial Banks Based on Sharia Principles (Bahri et al., 2022; Devianto & Dwiasnati, 2018).

The study of banking performance is very important for evaluating bank operations. In addition, banks can make management plans as well as strategic analyses. Financial performance is used to determine the soundness of a bank. The studies do relate to financial ratios on bank performance. Some researchers state that non-performing assets (NPA) have a significant effect on banking performance (Alwi et al., 2021; Santhi., 2022; Rakshit & Bardhan, 2022) .



Financial ratios Capital Adequacy Ratio (CAR) shows how big the total of all bank assets that contain risk. CAR does not significantly affect financial performance (Ningsih & Dewi, 2020; Putri et al., 2022). On the contrary, several other researchers stated that CAR has a significant effect on financial performance (Diantini et al., 2020; Sudarmawanti & Pramono, 2017).

Financial insolvency-risk ratio where insolvency occurs when a bank cannot fulfil its obligations in its operations. That is, the cost of funds is greater than the profit. Insolvency risk in this study is measured using the Z-Score ratio (Altman & Hotchkiss, 2011). The higher the Z-Score illustrates that the bank is healthier and more stable. Thus, the bank's performance is increasing (Alwi et al., 2021). Insolvency risk significantly affects ROA (Alwi et al., 2021; Tan, 2016).

Banking is inseparable from macroeconomic conditions (Li et al., 2021; Montagnoli et al., 2021; Syahwildan & Damayanti, 2022; Taylor, 2022; Z. Wang & Tang, 2020). Macroeconomists constantly study the causes and effects of slow growth, unemployment, and inflation. Inflation that occurs continuously will result in worsening economic conditions and financial performance in companies (Burhanudin et al., 2019). Some researchers state that inflation has an impact on bank performance (Merko & Habili, 2023; Silva & de Araújo, 2023; Tan, 2016).

The performance of bank also has developments related to financial technology. Several studies have stated that fintech significantly impacts bank performance (Phan et al., 2020; Yudaruddin et al., 2023). Nonetheless, other results suggest otherwise. Fintech has no significant effect on bank performance (Syahwildan & Damayanti, 2022; Ma'ruf, 2021).

In this study, researchers tried to review some of the differences in the results of previous studies. Furthermore, the researchers combined microeconomic and macroeconomic factors and fintech to influence bank performance. In addition, the approach used is the time series data regression Vector Autoregressive (VAR) and Vector Error Correction Model (VECM) which allows for the emergence of models with developed analytical results. The results of this research are one of the considerations for policymakers to make better decisions for banks and the country's economy.

## 2. Literature Review

Financial performance at a bank is a measure that provides an overview of a bank's financial condition. Before depositing funds in a bank, the customer will read the bank's financial performance using the financial statements (balance sheet and profit and loss). This study uses one of the financial performances in terms of profitability, namely Return on Assets (ROA). ROA focuses on a company's ability to earn earnings in company operations (Shenurti et al., 2022). The greater the ROA, the better the bank's financial performance due to the greater return (Hayati et al., 2019; Heikal et al., 2014; Kohar Mudzakar & Wardanny, 2021).



Financial ratios describe the company's financial condition by looking for relationships between items contained in reports (Chinedu Innocent et al., 2013; Restianti & Agustina, 2018). The use of financial ratios will be explained and given an overview regarding the good and bad conditions of the company's financial position. A comparison of the current ratio with future ratios will provide an overview of the bank's financial condition (Wahyuni, 2018). Financial ratios can provide management solutions in identifying some of the weaknesses and strengths in company finances. Ratio analysis can be grouped into five types, namely: (1) liquidity ratios, (2) solvency ratios, (3) profitability or profitability ratios, (4) asset utilization ratios and (5) performance ratios in operations (Putra & Dana, 2016).

Several studies reveal the relationship between a ratio and financial performance. NPA has a significant positive effect on Financial Performance (ROA) (Santhi, 2022; Tanted et al., 2021). NPA refer to the classification of loan assets that stop generating income. A high NPA level will hurt bank profitability and productivity (Ningsih & Dewi, 2020). CAR has a positive and significant effect on Financial Performance (Diantini et al., 2020). A high CAR ratio can protect customers and give them confidence in banks. Insolvency risk is measured using the Z-Score, which is an inverse proxy of insolvency risk, describes a positive relationship to bank ROA (Alwi et al., 2021). The Z-Score, which is an inverse proxy of insolvency risk, illustrates a positive relationship to bank ROA.

Macroeconomics is the study of the behaviour of all economies. Macroeconomic analysis related to long-term growth includes cycles of total output movements, unemployment and inflation, money supply and budget deficits, and international trade and finance (Ratanapakorn & Sharma, 2007; Yunus, 2012). The main objectives of macroeconomic policy are employment, economic growth, and price stability (Indriwati & Purwana, 2021). The existence of jobs helps everyone to get a decent job, economic growth is sure to increase living standards, and a stable low inflation rate makes it easier to plan. Macroeconomics is constantly linked to the causes of slow growth, unemployment, and inflation. Many measures are used as assessors or estimators of the key macroeconomic variables. Indicators that can be used as proxies include Gross Domestic Product (GDP) (Indriwati & Purwana, 2021; Ratanapakorn & Sharma, 2007; Yunus, 2012), exchange rates, and interest rates.

Financial technology is technology in the financial sector that focuses on new things that provide innovation in the development of applications, products or business models in the financial services industry that applies technology (Popović-Pantić et al., 2020; Pruteanu-Podpiera et al., 2008). Financial Technology is an innovation in financial services that provides adaptation to technological developments to facilitate financial services and the financial system to be more efficient and effective.



### 3. Research Methods

This research is quantitative research with a causality approach. The data used in this study are Islamic banking statistics (SPS) published by the Financial Services Authority (OJK) and the Central Statistics Agency (BPS) for the period August 2014 to August 2022. The method used did Sims develop VAR in 1980. VAR is used as a data method with the nature of a time series, which is often used in research, especially in economics (Bruns & Stern, 2019). The variables used in this research are NPA, CAR, Insolvency Risk, Inflation, Financial Technology, and Bank Size as control variables on Bank Performance. The several tests included in the VAR analysis include the Stationarity Test, Optimum Lag Determination, VAR Stability Test, Cointegration Test, Granger Causality Test; establishment of an Empirical VAR/VECM model, Impulse Response Function, Variance decomposition analysis (Abrigo & Love, 2016; Asari et al., 2011; Boğa-Avram et al., 2018).

### 4. Finding and Discussion

The initial stage in analysing time series data is identifying the stationary of the data (Asari et al., 2011; Gutierrez et al., 2009). The results of the data stability test are presented in Table 1. At this level, the data appears not stationary. Nevertheless, in the first stage, the data difference is stationary. It is based on the ADF prob. value showing a value smaller than alpha (0.05).

**Table 1:** Augmented Dickey-Fuller Test

Variable	ADF (Level)		ADF (1 <sup>st</sup> Difference)	
	Adj. t-Stat	Prob	Adj. t-Stat	Prob
ROA	-1.430.894	0.5641	-1.155.534	0.0001
NPA	-1.065.554	0.7266	-7.251.794	0.0000
CAR	-1.248.933	0.6504	-1.012.272	0.0000
INS.R	-1.860.401	0.3496	-9.669.129	0.0000
INFLASI	-1.887.575	0.3368	-7.675.787	0.0000
FINTECH	-0.566423	0.8715	-2.495.060	0.0000
BANK SIZE	0.817734	0.9939	-6.065.224	0.0000

Source: Data processed by the Authors

After the data is stationary, the next step is to find the optimal lag by using the selected lag sequence based on Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quin Creation (HQ) (Khasanah et al., 2021). Optimal lag measurement to ensure that the model can dynamically and efficiently explain the whole. Table 2 shows the results of the Lag test. Calculating the optimum lag test results shows that the smallest LR, FPE, AIC, SC, and HQ values are obtained



at lag 3. The lag value determines the length of an endogenous variable's influence period in the past or on other endogenous.

**Table 2:** Lag Criteria Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-9.501.875	NA	8.492461	22.00431	22.20272*	22.08420*
1	-8.977.450	95.24053	7.874890	21.92517	23.51242	22.56431
2	-8.511.014	77.20322	8.487171	21.97934	24.95544	23.17772
3	-7.935.908	85.93534*	7.367298*	21.78370	26.14864	23.54132
4	-7.483.031	60.38357	8.928612	21.86904	27.62282	24.18591
5	-7.125.692	41.89495	14.55991	22.17400	29.31663	25.05012
6	-6.651.648	47.94920	20.27564	22.21069	30.74216	25.64605
7	-6.048.663	51.28846	24.61296	21.95095	31.87127	25.94556
8	-5.088.917	66.18933	16.67369	20.87107*	32.18024	25.42493

Source: Data processed by the Authors

The stability test confirms that in the lag 3, so the model is workable. In addition, using an unstable model will result in less valid estimation results (Asari et al., 2011; Gutierrez et al., 2009). The test results show that the VAR system is stable if all the roots have a modulus of less than one (Kim et al., 2018; L. Wang, 2023). The stability test results on the first difference with lag 3 are stable. It can be seen by having an overall value at modulus less than number 1 and nothing more than number 1.

Cointegration test (Table 3) to determine the use of the model, choose to use the VAR model or the VECM model. This test is carried out to determine if there is a long-term balance with the same movement and a stable relationship between variables (Jebran et al., 2017; Nath Sahu et al., 2014). Cointegration test results show a probability rate of less than 0.05. It shows cointegration between variables. The value of bank performance, NPA, CAR, insolvency risk, financial technology, and bank size has a Max-Eigen Statistical and Trace Statistical value greater than the critical value, meaning that the variables in this study have a long-term relationship. With this cointegration, the analysis with the VECM model can be continued.

The causality test determines the reciprocal relationship between variables. If the Granger causality probability value is smaller than alpha 5%, then causality is said to occur. Several factors affect the bank's performance (ROA), including NPA, CAR, Fintech, and bank size (Table 4 & 5). The Table describes the short-term and long-term estimation results of the VECM. At a significance level of 0.05, there is a significant influence on bank performance, namely the variables NPA, CAR, insolvency risk, fintech, and bank size at different lags.



**Table 3:** Cointegration Test

Hypothesized No. of CE(s)	Unrestricted Cointegration Rank Test (Trace)			Unrestricted Cointegration Rank Test (Maximum Eigenvalue)		
	Trace Statistic	0.05 Critical Value	Prob	Max eigen Statistic	0.05 Critical Value	Prob
None *	287.0625	125.6154	0.0000	90.90447	46.23142	0.0000
At most 1 *	196.1580	95.75366	0.0000	61.57047	40.007757	0.0001
At most 2 *	134.5875	69.81889	0.0000	40.27818	33.87687	0.0075
At most 3 *	94.30935	47.85613	0.0000	36.46417	27.58434	0.0028
At most 4 *	57.84518	29.79707	0.0000	28.51646	21.13162	0.0038
At most 5 *	29.32873	15.49471	0.0002	16.22803	14.26460	0.0242
At most 6 *	13.10070	3.841465	0.0003	13.10070	3.841465	0.0003

Source: Data processed by the Authors

Short-term estimation (Table 4) shows that NPA, CAR, Insolvency-Risk, Fintech, and Bank Size significantly affect bank performance. NPA is an asset whose interest income and principal instalments have matured over time. Revenue is recognized on a cash basis (Dawn, 2018). A high NPA level will affect a bank's net worth because banks are required to maintain the required capital adequacy level. NPA influences bank performance in terms of profitability, increased operating expenses, and low power of loan/credit policy sanctions, resulting in a mismatch of liquidity and cash flow (Tanted et al., 2021).

CAR illustrates the internal strength of a bank in reducing losses during a crisis. This ratio directly affects bank profitability by determining expansion into risky but profitable businesses (Dwiningsih, 2023). The positive effect of CAR on bank financial performance is based on the Theory of Bank Capital. It states that the banking industry must meet the minimum capital requirements set to continue operating properly. CAR shows bank assets contain risk, where high and adequate capital adequacy will increase bank credit volume (Diantini et al., 2020). Insolvency risk influences bank performance (Alwi et al., 2021). The results of this research indicate that maintaining capital is very important for the Bank. Because the higher the capital adequacy, the stronger the ability of the Bank to bear the risk of any risky credit or productive assets. In other words, the higher the capital to bear the risk of bad credit, the better the Bank's financial performance and can increase public confidence in the Bank concerned, increasing profits (Dewi & Sudarmawan, 2022; Salsabila et al., 2022).

Fintech influences bank performance (Syahwildan & Damayanti, 2022). The effect of fintech on financial performance is evidenced by Mobile banking having a significant influence on financial performance. So, the higher the significant level, the more positive the financial performance will be. Furthermore, bank size influences performance (Alwi et al., 2021). Bank size as a control variable has a significant positive relationship with ROA.

**Table 4:** VECM Short Run Test

Variable	Coefficient	t-Statistic	Prob.
D(ROA(-1),2)	-1.059.852	[-6.31725]	Significant
D(ROA(-2),2)	-0.689966	[-3.22742]	Significant
D(ROA(-3),2)	-0.033145	[-0.18156]	Insignificant
D(NPA(-1),2)	-0.361756	[-3.27496]	Significant
D(NPA(-2),2)	-0.257032	[-2.47471]	Significant
D(NPA(-3),2)	-0.072414	[-0.76027]	Insignificant
D(CAR(-1),2)	-0.114990	[-3.73352]	Significant
D(CAR(-2),2)	-0.029317	[-0.94704]	Insignificant
D(CAR(-3),2)	-0.053710	[-1.85257]	Insignificant
D(INFLASI(-1),2)	0.069755	[ 1.62480]	Insignificant
D(INFLASI(-2),2)	-0.009169	[-0.23319]	Insignificant
D(INFLASI(-3),2)	0.011850	[ 0.31502]	Insignificant
D(INSOLVENCY(-1),2)	0.314375	[ 4.15086]	Significant
D(INSOLVENCY(-2),2)	0.212464	[ 2.76979]	Significant
D(INSOLVENCY(-3),2)	-0.007701	[-0.11046]	Insignificant
D(FINTECH(-1),2)	-0.018370	[-3.68951]	Significant
D(FINTECH(-2),2)	-0.018005	[-4.01233]	Significant
D(FINTECH(-3),2)	-0.002422	[-0.61374]	Insignificant
D(BANKSIZE(-1),2)	-0.000523	[-3.07255]	Significant
D(BANKSIZE(-2),2)	-0.000476	[-2.70833]	Significant
D(BANKSIZE(-3),2)	-0.000309	[-2.25825]	Significant

Source: Data processed by the Authors

Long-term estimation (Table 5) illustrate that the variables significantly influence bank performance are NPA, Insolvency-risk, Financial Technology, and Bank Size. Positive coefficient values indicate comparable fluctuations. Conversely, a negative coefficient value indicates an inverse relationship. Increases in NPA, CAR, inflation, Fintech, and bank size show a directly proportional relationship. Nevertheless, it does not apply to insolvency risk.

**Table 5:** VECM Long Term Test

Variable	Coefficient	t-Statistic	Prob.
D(NPA(-1))	3.226.760	[ 3.33770]	Significant
D(CAR(-1))	0.466177	[ 1.87560]	Insignificant
D(INSOLVENCY(-1))	-2.550.211	[-4.64245]	Significant
D(INFLASI(-1))	0.094869	[ 0.30831]	Insignificant
D(FINTECH(-1))	0.201177	[ 5.25068]	Significant
D(BANKSIZE(-1))	0.004455	[ 3.83111]	Significant

Source: Data processed by the Authors



Based on bank performance theory, bank performance is a matter that describes company performance achievements or the company's ability to work, which is supported by management in operational activities (Pujiyanty et al., 2022; Saputra & Lina, 2020). The research was found that Non-Performing Assets affect bank performance (Tanted et al., 2021). NPA is an asset or loan that stops generating income in the form of interest and the principal loan amount for the bank. NPA is a blunt weapon for the banking sector because it does not produce anything, while banks must make provisions or provisions for their assets (Bag & Islam, 2017).

Likewise, the Insolvency-Risk has significant effect to ROA (Hersugondo et al., 2021). Insolvency risk or bankruptcy occurs when a bank cannot fulfil its obligations in its operations, which means that the cost of funds is greater than the profit. This can occur when doubtful credit increases on the asset side, leading to a loss of profits and costs not covering the investment. Therefore, this situation leads to insolvency for banks (Tursoy, 2018).

The fintech influences bank performance. The influence of Fintech on financial performance, as evidenced by mobile banking, has a significant influence on financial performance, so the higher the significant level, the more positive the financial performance. Bank size influences bank performance. Some research shows that bank size as a control variable has a significant positive relationship with ROA (Alwi et al., 2021; Sanjay Dawn, 2018; Widyastuti, 2022). Bank size is seen from the total assets the bank owns each year. Bank size is not proportional to bank profits. When an organization becomes larger, the volume of bureaucracy increases and will cause strong resistance, ultimately reducing profit levels (Ilaboya & Ohiokha, 2016).

Estimation of the impulse response function (IRF) needs to be applied to be able to check the shock response where there is a response of a variable due to the shock of other variables up to several periods after the shock occurs. The response impulse describes a movement getting closer to the point of balance (convergence) (Wicaksono et al., 2023; Khasanah et al., 2021). Figure 1 shows the IRF value. ROA shows a negative response in a certain period. The NPA shock was responded to by declining bank performance. It also occurs in CAR, insolvency risk and inflation. Even so, several periods of shocks resulted in a positive response on ROA. In contrast to several previous factors, shocks to Fintech and Bank size from period 1 to period 12 received a positive response from ROA.

The results of the IRF test as a ROA response to the impact caused by NPA, CAR, Inflation, Financial Technology, and Bank Size showed a positive response. Meanwhile, the ROA response to shocks caused by the inflation variable shows a negative response. An increase in CAR has a major influence on the income of Non-Foreign Islamic Commercial Banks and directly improves the condition of ROA which has decreased (Indriwati & Purwana, 2021; Pujiyanty et al., 2022).



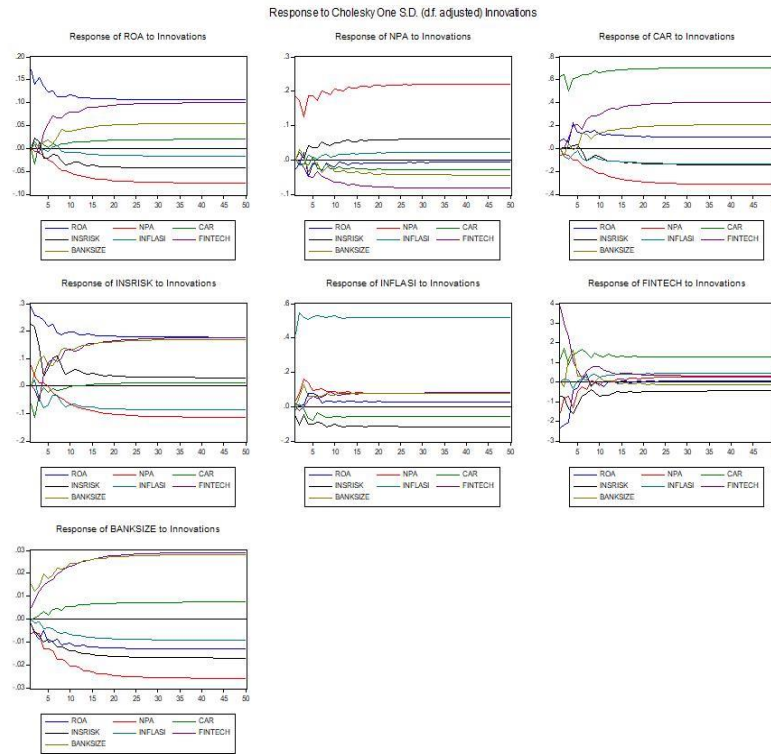


Figure 1: Impulse Response Function

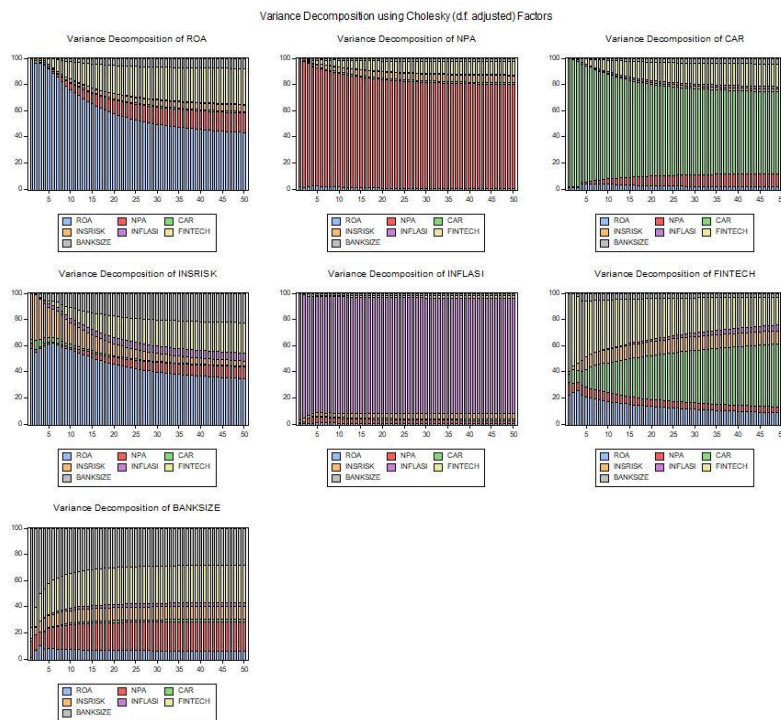


Figure 2: Variance Decomposition



Variance decomposition (VDC) aims to provide a large measure of the contribution or composition of the effect of each independent variable on the dependent variable (Wicaksono et al., 2023; Khasanah et al., 2021). Variance decomposition (Figure 2) also measure the magnitude of the contribution or composition of the effect of each independent variable on the dependent variable. Based on the VDC results that have been found, the contribution of ROA shocks begins to respond to other variable shocks in the next period, namely the values of NPA, CAR, Insolvency-Risk, Inflation, Fintech, and Bank Size. The VDC analysis results show that the ROA is the most dominant fluctuation in the variation of a bank's financial performance at the end of the period. This also happened to the turmoil caused by NPA, CAR and inflation. Even so, several other volatility factors such as risk insolvency, fintech and bank size provide almost the same variations. Bank performance in the coming period will depend on factors with dominant variations.

## 5. Conclusions

NPA, CAR, insolvency risk, inflation, and fintech do not have a causal relationship, while Bank Size has a causal relationship with other factors. Short-term testing shows that NPA, CAR, Insolvency-Risk, Fintech, and Bank Size significantly affect bank performance. It means that the increase experienced in the previous month significantly influenced the performance of Islamic commercial banks in Indonesia. Meanwhile, inflation did not have a significant effect. Long-term testing shows that NPA, Insolvency-Risk, Fintech, and Bank Size significantly influence bank performance. However, CAR has no significant effect. The results of IRF testing as a ROA response to shocks caused by NPA, CAR, Inflation, Financial Technology, and Bank Size show a positive response. Meanwhile, the ROA response to shocks caused by the insolvency-risk variable shows a negative response. Fintech contributed greatly to the increase in ROA. Various types of bank operations can support the bank's performance. The policies issued make it possible to build and strengthen bank performance. Banks must maintain the stability of bank performance to suppress inflation and attract investors.

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