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The Effects of FDR and BOPO on Financial Stability: The Mediating Role of ROA at Bank Syariah Indonesia

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ABSTRACT

The financial stability of Islamic banks depends on their ability to manage liquidity, operational efficiency, and profitability. This study examines the effects of the Financing to Deposit Ratio (FDR) and Operating Expenses to Operating Income (BOPO) on financial stability, with Return on Assets (ROA) as an intervening variable at Bank Syariah Indonesia (BSI). Using a quantitative associative approach, this study analyzes 20 quarterly observations derived from BSI's financial statements covering the 2021–2025 period. The data were analyzed using multiple linear regression, path analysis, and the Sobel test. The reported results indicate that FDR has a positive and significant relationship with ROA and financial stability. BOPO has a negative and significant relationship with ROA but a positive and significant relationship with financial stability. Furthermore, ROA demonstrates a positive and significant relationship with financial stability and mediates the relationships of FDR and BOPO with financial stability. The findings highlight the interconnected relationships among liquidity, operational efficiency, and profitability in explaining BSI's financial performance. However, the results require careful interpretation because ROA is also a component of the financial stability measure (Z-Score), potentially creating a mechanical relationship between the variables.

1. INTRODUCTION

The development of the sharia economy in Indonesia demonstrates increasingly significant growth, driving an expanded role for sharia financial institutions within the national financial system. As intermediaries, banks play a crucial role in mobilizing public funds and channeling them back into the economy through financing to support economic activities. In this context, a bank's ability to perform its intermediation function must be balanced with adequate risk management, operational efficiency, profitability, and financial stability.

A significant development in Indonesia's sharia banking industry is the merger of three state-owned sharia banks to form Bank Syariah Indonesia (BSI). This merger strengthened BSI's position within the national sharia banking sector while expanding the scale of its intermediation activities. However, this increase in business scale also necessitates the sustainable maintenance of financing quality, operational efficiency, profitability, and resilience against risks. Consequently, the relationships among liquidity, operational efficiency, profitability, and financial stability warrant examination, particularly regarding BSI following the merger.

In carrying out the intermediation function, the Financing to Deposit Ratio (FDR) serves as a key indicator of a bank's financing activities. The FDR reflects a bank's capacity to channel mobilized public funds into financing. Theoretically, optimal financing disbursement can boost bank revenue and, ultimately, support profitability. However, an excessively high FDR can also heighten liquidity pressure; as a larger share of funds is allocated to financing, the bank's flexibility to meet short-term obligations may diminish unless accompanied by adequate liquidity management. Several studies have found that the FDR has a positive and significant impact on the financial stability of sharia commercial banks, as optimal financing disbursement can increase revenue and strengthen the bank's financial position. However, other studies indicate a different direction of the relationship, suggesting that the impact of the Financing-to-Deposit Ratio (FDR) on financial stability remains inconsistent. Beyond liquidity, operational efficiency is a crucial aspect of maintaining bank performance. This efficiency is reflected in the ratio of Operating Expenses to Operating Income (BOPO). An increase in BOPO indicates higher operating expenses relative to income earned; theoretically, this can suppress profitability and weaken a bank's financial condition. This relationship is significant because profitability—reflected by Return on Assets (ROA)—illustrates a bank's ability to generate profit through asset management. Strong profitability enhances a bank's capacity to absorb risk and sustain its operational activities.

Profitability is also closely linked to financial stability. Banks that consistently generate profit possess a greater capacity to withstand losses and absorb risks arising from operational and intermediation activities. In banking research, financial stability can be measured using various indicators, one of which is the Z-Score. This indicator combines aspects of profitability, capitalization, and earnings volatility, thereby providing an overview of a bank's resilience against the risk of failure. Consequently, this study employs the Z-Score as a proxy for financial stability to assess BSI's ability to maintain its financial condition throughout the study period.

The relationships among FDR, BOPO, ROA, and financial stability are theoretically interconnected. The FDR can influence ROA through the bank's ability to generate income from disbursed financing. Under optimal financing conditions, an increase in the FDR has the potential to boost profitability. Conversely, an excessively high FDR can heighten liquidity risk and potentially undermine financial stability. Meanwhile, an increase in BOPO reflects a decline in operational efficiency, which theoretically can suppress ROA and weaken financial stability. Furthermore, a higher ROA is expected to strengthen financial stability by enhancing the bank's capacity to generate profit and absorb risk. Thus, ROA can be viewed not only as an outcome of liquidity management and operational efficiency but also as a potential mechanism linking FDR and BOPO to financial stability.

The dynamics of these inter-variable relationships can be observed in the trends of FDR, BOPO, ROA, and financial stability (Z-Score) for BSI during the 2021–2025 period, as presented in Table 1.

Table 1. Data on FDR, BOPO, ROA, and Financial Stability (Z-Score) BSI, 2021–2025 Period

Year	Quarter	FFDR (%)	BOPO (%)	ROA (%)	*Z-Score*
2021	I	77,28	79,90	1,72	5,66
	II	74,53	79,92	1,64	5,40
	III	74,45	79,84	1,70	5,60
	IV	73,39	80,46	1,61	5,31
2022	I	74,37	75,35	1,93	6,31
	II	78,14	74,50	2,03	6,62
	III	81,45	74,02	2,08	6,79
	IV	79,37	75,88	1,98	6,51
2023	I	79,14	69,65	2,48	8,08
	II	87,80	70,87	2,36	7,71
	III	88,31	71,43	2,34	7,65
	IV	81,73	71,27	2,35	7,66
2024	I	83,05	68,94	2,51	8,17
	II	86,68	69,23	2,48	8,09
	III	88,59	69,83	2,47	8,06
	IV	84,97	69,93	2,49	8,10

Year	Quarter	FFDR (%)	BOPO (%)	ROA (%)	*Z-Score*
2025	I	89,87	70,57	2,43	7,94
	II	90,75	71,02	2,43	7,94
	III	86,29	71,47	2,39	7,82
	IV	83,74	71,57	2,38	7,77

Source: BSI, Quarterly Financial Reports for the 2021–2025 Period.

Table 1 shows that the trends in BSI's FDR, BOPO, ROA, and Z-Score during the 2021–2025 period fluctuated and did not fully align with theoretical expectations. Changes in FDR and BOPO were not consistently accompanied by corresponding changes in ROA and financial stability. This indicates that increased financing disbursement and operational efficiency do not necessarily translate directly into higher profitability or financial stability for BSI. These findings highlight a dynamic relationship among liquidity, operational efficiency, profitability, and financial stability that warrants further investigation.

Previous studies have examined the relationships between liquidity, operational efficiency, profitability, and financial stability in Islamic banking. Research by Yuliana and Listari (2021) and Hartati et al. (2022) addressed the determinants of profitability, particularly the relationship between FDR and BOPO and bank performance. Other studies have extended the discussion to financial stability by examining liquidity risk, operational efficiency, and financial performance in Islamic banking (Izza et al., 2024; Yurida et al., 2023). More recent research has also considered the role of financial ratios in maintaining banking stability (Maolana & Rosia, 2025). Although these studies provide relevant insights, further examination is needed to understand how liquidity and operational efficiency are simultaneously associated with financial stability through profitability, particularly in the context of Bank Syariah Indonesia following its merger.

Based on this research context, this study aims to analyze the effects of Financing to Deposit Ratio (FDR) and Operating Expenses to Operating Income (BOPO) on the financial stability of Bank Syariah Indonesia (BSI), both directly and indirectly through Return on Assets (ROA) as an intervening variable. Using quarterly financial data covering the 2021–2025 period, this study examines the relationships among liquidity, operational efficiency, profitability, and financial stability within an integrated analytical framework. The study is expected to contribute empirical insights into the financial performance of Islamic banking, particularly regarding the role of profitability in the relationship between financial ratios and banking stability.

Furthermore, by examining ROA in relation to the Z-Score, this research recognizes the need to consider the role of profitability in the construction and interpretation of financial stability indicators.

2. LITERATURE REVIEW

Financial Stability in Islamic Banking

Financial stability refers to a bank's ability to maintain sound financial conditions and withstand potential risks arising from its operational and intermediation activities. In Islamic banking, financial stability is influenced by several factors, including liquidity management, operational efficiency, profitability, and capital adequacy. The Z-Score is commonly used to assess banking stability because it incorporates profitability, capitalization, and earnings volatility to reflect a bank's resilience against financial distress (Widarwati, 2023). Therefore, maintaining financial stability requires Islamic banks to manage their financial resources effectively while ensuring sustainable profitability and adequate risk management (Diniyah, 2023; Musadat, 2024).

FDR, BOPO, and ROA

Financing to Deposit Ratio (FDR) reflects a bank's ability to channel third-party funds into financing activities. An optimal FDR can increase financing income and improve profitability, as measured by Return on Assets (ROA). Conversely, Operating Expenses to Operating Income (BOPO) represents operational efficiency, where a higher ratio indicates greater operating costs relative to operating income and may reduce profitability. Previous studies have demonstrated that FDR and BOPO significantly influence the ROA of Islamic banks, although the magnitude of their effects may vary across institutions and research periods (Hartati et al., 2022; Nurjanah et al., 2023).

H1: FDR has a positive effect on ROA.

H2: BOPO has a negative effect on ROA.

FDR, BOPO, and Financial Stability

Liquidity management and operational efficiency are important determinants of financial stability in Islamic banking. A well-managed FDR enables banks to optimize financing activities and generate income while maintaining sufficient liquidity to meet their obligations. Meanwhile,

higher BOPO generally reflects lower operational efficiency, potentially weakening financial performance and increasing financial vulnerability. Previous research has identified significant relationships between liquidity, operational efficiency, and banking stability, although empirical findings regarding the direction of these relationships remain mixed (Izza et al., 2024; Maolana & Rosia, 2025; Nasution & Albar, 2024; Yurida et al., 2023).

H3: FDR has a positive effect on financial stability.

H4: BOPO has a negative effect on financial stability.

The Mediating Role of ROA

ROA reflects a bank's ability to generate profits through the effective utilization of its assets. Higher profitability can strengthen financial stability by increasing the bank's capacity to absorb potential losses and maintain sustainable operations. In this context, ROA may serve as an intervening variable linking FDR and BOPO to financial stability. Optimal financing distribution may improve profitability and subsequently strengthen financial stability, whereas inefficient operations may reduce profitability and weaken the bank's financial condition. Accordingly, ROA is expected to explain part of the relationship between liquidity management, operational efficiency, and financial stability in Islamic banking (Izza et al., 2024; Hartati et al., 2022; Widarwati, 2023).

H5: ROA has a positive effect on financial stability.

H6: ROA mediates the effect of FDR on financial stability.

H7: ROA mediates the effect of BOPO on financial stability.

3. METHODOLOGY

Research Design and Data Sources

This study employs a quantitative explanatory research design to examine the effects of the Financing to Deposit Ratio (FDR) and Operating Expenses to Operating Income (BOPO) on financial stability, with Return on Assets (ROA) as an intervening variable. The research focuses on PT Bank Syariah Indonesia Tbk (BSI), using secondary data obtained from the bank's published quarterly financial statements for the 2021–2025 period. Data collection was conducted through documentation by examining the financial statements and extracting information relevant to the

research variables. The study covers five years of quarterly observations, resulting in a total of 20 observations.

Population, Sample, and Variable Measurement

The population comprises all quarterly financial statement data of BSI related to FDR, BOPO, ROA, and financial stability during the 2021–2025 period. This study applies a saturated sampling technique, in which all observations within the research period are included as the sample, resulting in 20 quarterly observations. The independent variables consist of FDR (X_1) and BOPO (X_2), while ROA (Z) serves as the intervening variable and financial stability (Y) as the dependent variable. Each variable is measured using financial ratios derived from BSI's published financial statements. The operational definitions and measurement formulas are presented in Table 2.

Table 2. Operationalization of Variables

Variable	Formula	Scale	Source
FDR - X_1	$FDR = \frac{Total\ Financing}{Total\ ThirdParty\ Deposits} \times 100\%$	Ratio	BSI Quarterly Financial Statements
BOPO – X_2	$BOPO = \frac{Operating\ Expenses}{Operating\ Income} \times 100\%$	Ratio	BSI Quarterly Financial Statements
Return on Assets (ROA) – Z	$ROA = \frac{Net\ Income}{Total\ Assets} \times 100\%$	Ratio	BSI Quarterly Financial Statements
Financial Stability – Y	$Z - Score = \frac{ROA + \frac{Equity}{Total\ Asset}}{\sigma\ \mathrm{ROA}}$	-	BSI Quarterly Financial Statements; Widarwati (2023)

Source: Authors' compilation based on BSI quarterly financial statements and Widarwati (2023).

Data Analysis Technique

The data are analyzed using multiple linear regression and path analysis to examine the direct and indirect relationships among the research variables. The analysis consists of two structural models. The first model examines the effects of FDR and BOPO on ROA, while the second model examines the effects of FDR, BOPO, and ROA on financial stability. The coefficient of determination (R^2) is used to assess the explanatory power of the independent variables, while the t-test is applied to evaluate the statistical significance of individual regression coefficients at a 5% significance level. Before interpreting the regression results, the data should also be examined for relevant regression assumptions, including normality of residuals, multicollinearity,

heteroscedasticity, and autocorrelation. The statistical procedures follow the general principles of quantitative data analysis described by Ghozali (2011) and Noor (2014).

Path Analysis and Sobel Test

Path analysis is employed to identify the direct and indirect effects of FDR and BOPO on financial stability through ROA. The structural relationships are expressed in two equations: the first equation estimates the effects of FDR and BOPO on ROA, while the second estimates the effects of FDR, BOPO, and ROA on financial stability. The indirect effect is calculated by multiplying the path coefficient from the independent variable to ROA by the path coefficient from ROA to financial stability. Furthermore, the Sobel test is used to examine the statistical significance of the indirect effects. The mediating role of ROA is evaluated based on the significance of the indirect effect and its relationship with the corresponding direct effect.

Substructure I

$$Z = \alpha_1 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon_1$$

Substructure II

$$Y = \alpha_2 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 Z + \varepsilon_2$$

For the Sobel test, the calculation is formulated as follows:

$$Z_{Sobel} = \frac{ab}{\sqrt{b^2 S_a^2 + a^2 S_b^2}}$$

Where \(a\) is the regression coefficient of the independent variable on ROA, \(b\) is the regression coefficient of ROA on financial stability, and \(S_a\) and \(S_b\) are their respective standard errors. An indirect effect is considered statistically significant when the absolute Sobel statistic exceeds the critical value at the 5% significance level.

4. RESULT AND DISCUSSIONS

RESULT

Substructure Analysis 1

Substructure analysis 1 is used to determine the effect of FDR and BOPO on ROA. The analysis results are shown in Table 3.

Table 3. Substructure Analysis 1 Result

Variabel	Koefisien Beta	t	Sig.

Variabel	Koefisien Beta	t	Sig.
FDR → ROA	0,117	2,568	0,020
BOPO → ROA	-0,897	-19,619	0,000
R^2	0,988		

Source: Data Processing Results

Based on Table 3, FDR has a positive and significant effect on ROA, as the significance value is 0.020 (< 0.05). BOPO has a negative and significant effect on ROA, as the significance value is 0.000 (< 0.05). The R^2 value of 0.988 indicates that FDR and BOPO are able to explain 98.8% of the variation in ROA.

Substructure Analysis 2

Substructure analysis 2 was conducted to determine the impact of FDR, BOPO, and ROA on financial stability (Z-Score). The analysis results are presented in Table 4.

Table 4. Substructure Analysis 2 Results

Variabel	Koefisien Beta	t	Sig.
FDR → Stabilitas Keuangan	0,011	2,365	0,031
BOPO → Stabilitas Keuangan	0,045	2,355	0,032
ROA → Stabilitas Keuangan	1,035	49,701	0,000
R^2	1,000		

Source: Data Processing Results

Based on Table 4, FDR, BOPO, and ROA each have a significant effect on Financial Stability, as all significance values are less than 0.05. FDR, BOPO, and ROA all exert a positive influence. The R^2 value of 1.000 indicates that these three variables explain 100% of the variation in Financial Stability. However, this value must be interpreted with caution, given that ROA is a component used in the calculation of the Z-Score.

Sobel Test

The Sobel test is used to determine the significance of the indirect effect of FDR and BOPO on financial stability via ROA. The results of the Sobel test calculations are presented as follows:

FDR (X_1) → ROA (Z) → Financial Stability (Y)

$$t = \frac{ab}{S_{ab}}$$

$$t = \frac{ab}{\sqrt{b^2Sa^2 + a^2Sa^2 + Sa^2Sb^2}}$$

$$t = \frac{0{,}007 \times 3{,}312}{\sqrt{(3{,}312)^2(0{,}003)^2 + (0{,}007)^2(0{,}067)^2 + (0{,}003)^2(0{,}067)^2}}$$

$$t = \frac{0{,}023184}{\sqrt{0{,}000098724 + 0{,}000000220 + 0{,}000000040}}$$

$$t = \frac{0{,}023184}{\sqrt{0{,}000098984}}$$

$$t = \frac{0{,}023184}{0{,}00995} = 2{,}33$$

The Sobel Test results show $t_{count} > t_{table}$ (2.33 > 2.110). Thus, the indirect influence of FDR on financial stability through ROA is declared significant. These results indicate that ROA is able to act as an intervening variable in the relationship between FDR and financial stability.

BOPO (X_2) → ROA (Z) → Financial Stability (Y)

$$t = \frac{ab}{S_{ab}}$$

$$t = \frac{ab}{\sqrt{b^2Sa^2 + a^2Sa^2 + Sa^2Sb^2}}$$

$$t = \frac{(-0{,}073) \times 3{,}312}{\sqrt{(3{,}312)^2(0{,}004)^2 + (-0{,}073)^2(0{,}067)^2 + (0{,}004)^2(0{,}067)^2}}$$

$$t = \frac{-0{,}241776}{\sqrt{0{,}00017551 + 0{,}00002392 + 0{,}00000007}}$$

$$t = \frac{-0{,}241776}{\sqrt{0{,}00019950}}$$

$$t = \frac{-0{,}241776}{0{,}01412} = -17{,}12$$

The Sobel test results show that the calculated t-value exceeds the t-table value (17.12 > 2.110). Thus, the indirect effect of BOPO on financial stability via ROA is statistically significant. These results indicate that ROA acts as an intervening variable in the relationship between BOPO and financial stability.

DISCUSSIONS

The Effect of FDR on ROA

The results indicate that FDR has a positive and significant effect on ROA, with a coefficient of 0.117 and a significance value of 0.020. This finding suggests that increased financing distribution relative to third-party funds can contribute to higher profitability when financing activities are managed effectively. As an indicator of financial intermediation, FDR reflects the

bank's ability to utilize collected funds to generate financing income. In the context of BSI, effective financing allocation may therefore improve asset productivity and increase returns. This result is consistent with previous studies by Yuliana and Listari (2021) and Hartati et al. (2022), which found a positive relationship between FDR and ROA in Islamic banking.

The Effect of BOPO on ROA

The findings show that BOPO has a negative and significant effect on ROA, with a coefficient of −0.897 and a significance value below 0.001. This result confirms that increasing operating expenses relative to operating income reduces the bank's ability to generate profits from its assets. A higher BOPO ratio indicates declining operational efficiency because a larger proportion of operating income is absorbed by operating costs. Consequently, operational inefficiency may reduce profitability and weaken the bank's financial performance. This finding supports previous research by Hartati et al. (2022) and Nurjanah et al. (2023), which identified BOPO as an important determinant of Islamic banks' profitability.

The Effect of FDR on Financial Stability

The analysis reveals that FDR has a positive and significant effect on financial stability, with a coefficient of 0.011 and a significance value of 0.031. This indicates that financing distribution can contribute to stronger financial stability when the bank is able to manage its liquidity and financing activities effectively. Financing represents a major source of income for Islamic banks; therefore, its productive allocation may strengthen financial performance and support financial resilience. Nevertheless, the positive relationship does not imply that continuously increasing FDR will always improve stability, since excessive financing allocation may create liquidity pressure. This finding is consistent with the relationship between liquidity management and banking stability discussed by Maolana and Rosia (2025), although previous studies also indicate that liquidity risk may have different implications for financial stability (Yurida et al., 2023).

The Effect of BOPO on Financial Stability

Interestingly, the results indicate that BOPO has a positive and significant effect on financial stability, with a coefficient of 0.045 and a significance value of 0.032. This finding differs from the theoretical expectation that higher BOPO, which reflects lower operational efficiency,

should weaken financial stability. The positive coefficient suggests that, within the observed period, an increase in BOPO was statistically associated with a higher Z-Score after controlling for FDR and ROA. This relationship may reflect the influence of other financial and operational conditions during the study period. However, the result should not be interpreted as evidence that operational inefficiency strengthens banking stability. Instead, it indicates a different empirical pattern in BSI that requires careful interpretation, particularly considering the limited number of observations and the construction of the Z-Score. Previous research by Nasution and Albar (2024) and Maolana and Rosia (2025) also highlights the importance of liquidity and operational efficiency in explaining banking stability.

The Effect of ROA on Financial Stability

ROA has a positive and significant effect on financial stability, with a coefficient of 1.035 and a significance value below 0.001. This finding indicates that higher profitability is associated with a stronger financial stability position, as reflected by the Z-Score. Profitability generally provides banks with greater capacity to absorb potential losses, maintain operational continuity, and strengthen their financial resilience. This result is in line with the findings of Izza et al. (2024) and Rizki and Nasution (2025), which emphasize the relationship between profitability and banking stability. Nevertheless, this finding requires careful interpretation because ROA is also one of the components used in calculating the Z-Score in this study. Therefore, the strong statistical relationship may partly reflect a mathematical relationship between the two variables rather than an entirely independent economic effect.

The Effect of FDR on Financial Stability through ROA

The Sobel test indicates that ROA mediates the relationship between FDR and financial stability, with a calculated statistic of 2.33, exceeding the critical value of 2.110. This suggests that financing distribution influences financial stability not only directly but also indirectly through profitability. An effective financing strategy can increase income-generating opportunities, improve ROA, and subsequently contribute to a stronger financial position. Thus, profitability represents an important mechanism through which financing intermediation may be associated with financial stability. This finding reinforces the importance of integrating liquidity management and profitability strategies in Islamic banking operations.

The Effect of BOPO on Financial Stability through ROA

The Sobel test also indicates that ROA mediates the relationship between BOPO and financial stability, with a calculated statistic of 17.12, exceeding the critical value of 2.110. However, the mediation pattern requires particular attention. BOPO has a negative effect on ROA, while its direct effect on financial stability is positive. Meanwhile, ROA has a positive effect on financial stability. This indicates an inconsistent mediation pattern, in which the direct and indirect effects operate in opposite directions. In economic terms, higher operating costs relative to operating income are associated with lower profitability, which may weaken financial stability through the indirect pathway. However, the positive direct coefficient indicates a different statistical relationship after accounting for ROA and FDR. Therefore, the role of ROA should be understood as a mediating mechanism that operates alongside other factors influencing BSI's financial stability.

5. CONCLUSION

This study examines the effects of Financing to Deposit Ratio (FDR) and Operating Expenses to Operating Income (BOPO) on the financial stability of Bank Syariah Indonesia (BSI), with Return on Assets (ROA) as an intervening variable. The findings indicate that FDR has a positive and significant effect on ROA, while BOPO has a negative and significant effect on ROA. Both FDR and BOPO also demonstrate significant direct effects on financial stability, although the direction of the BOPO effect is positive. Furthermore, ROA has a positive and significant relationship with financial stability.

The mediation analysis reveals that ROA mediates the relationship between FDR and financial stability, indicating that improved financing intermediation can contribute to financial stability through higher profitability. ROA also mediates the relationship between BOPO and financial stability. However, the positive direct effect and negative indirect effect of BOPO indicate an inconsistent mediation pattern. This suggests that the relationship between operational efficiency and financial stability cannot be explained solely through profitability.

These findings highlight the importance of managing financing intermediation, operational efficiency, and profitability in maintaining the financial stability of Islamic banks. Nevertheless, the results should be interpreted with caution because the financial stability measure (Z-Score)

incorporates ROA as one of its components. This mathematical relationship may contribute to the strong association between ROA and the Z-Score. In addition, the study is limited to 20 quarterly observations from BSI during 2021–2025. Future studies may extend the observation period, include more Islamic banks, and employ alternative financial stability indicators to obtain more robust and generalizable findings.

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