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Operational Efficiency and Financing Risk on the Asset Growth of Sharia Commercial Banks: The Mediating Role of Profitability

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ABSTRACT

The growth of Islamic banking assets in Indonesia following the global health crisis faces significant challenges due to uncertainty in macroeconomic conditions and the post-pandemic structural recovery process. These dynamics require adaptive internal governance, as fluctuations in financial performance can directly threaten the sustainability of business expansion for Islamic financial institutions. This quantitative study aims to empirically test the effects of operational efficiency and financing risk on asset growth, with profitability serving as a mediating variable. This study employs a purposive sampling approach covering 13 Sharia Commercial Banks (BUS) in Indonesia under the supervision of the Financial Services Authority (OJK). The collection of annual financial statement data for the 2021–2025 period yielded a total of 65 observations. The methodological framework was analyzed using panel data regression and indirect effect path testing (Sobel test) via EViews 12 software. The empirical findings reveal that operational efficiency (BOPO) paradoxically exerts a significant positive impact on asset growth, proving that directing operating expenses toward productive, targeted allocations effectively fuels bank expansion. In contrast, financing risk (NPF) acts as a severe roadblock, carrying a sharp negative influence on the asset growth rate and confirming that a rise in bad loans directly puts the brakes on asset accumulation. Furthermore, profitability (ROA) successfully serves as a vital mediating bridge for both pathways, significantly connecting BOPO to asset growth as well as bridging the impact of NPF on asset growth. This insight conveys a clear message: strictly controlling operating costs and keeping credit default rates low are essential for improving profitability, which ultimately acts as the main financial driver fuelling sustainable asset growth for Ssharia Commercial Banks (BUS).

Keywords: Asset Growth; BOPO; Non-Performing Financing; Return on Assets; Sharia Commercial Banks

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INTRODUCTION

The banking sector plays a crucial role as the primary driver in accelerating economic growth at the national level. The existence of these financial intermediary institutions

fundamentally relies on their capacity to mobilize liquidity from the public and channel it back in the form of productive financing (Widyawati & Nursiam, 2024). Strengthening the banking system will have a linear, multiplier effect on a country's macroeconomic resilience (Lestari et al., 2023). Given the significance of this role, monitoring the stability of the financial industry's performance is an urgent priority, as year-over-year fluctuations in total assets are often relied upon as the primary parameter for measuring the success of financial institutions' expansion.

In Indonesia, the expansion of the banking market is no longer dominated by conventional entities but is marked by the rapid growth of the Islamic finance industry (Khansa & Zahra, 2023). As the country with the world's largest Muslim population, the dynamics of asset growth at Sharia Commercial Banks (BUS) are not merely a reflection of statistics on paper, but a manifestation of shifting market preferences and the strengthening of public legitimacy and trust in the profit-sharing system (Yunus & Padang, 2025). Consequently, the expansion of the BUS industry in Indonesia has not always proceeded smoothly. Official data from the Financial Services Authority (OJK) indicates that trends in Islamic financial asset accumulation showed significant deviations and volatility during the observation period from 2021 to 2025. These unpredictable dynamics have created uncertainty in business projections, necessitating an in-depth examination of the internal determinants that govern the pace of Islamic banking asset capitalization.

Table 1. Trends in Key Financial Ratios and Total Assets, 2021–2025

Ratio	2021	2022	2023	2024	2025
BOPO	71.99	67.76	77.51	80.90	77.99
NPF	3.09	2.66	2.35	2.11	2.15
ROA	2.35	2.64	2.04	1.77	1.97
TOTAL ASET	14.17	12.11	17.48	10.36	14.38

Source: processed data (2026)

An evaluation of the annual financial statements for the period from 2021 to 2025 reveals a contradictory phenomenon, particularly in 2024. Theoretically, an increase in the Operating Expenses to Operating Revenue (BOPO) ratio indicates a surge in inefficient spending that could potentially constrain the bank's capacity for expansion. However, on-the-ground data shows that in 2024, when the BOPO ratio surged to a peak of 80.90%, the asset growth rate actually plummeted to its lowest level in the past five years just 10.36%. This significant slowdown in asset growth occurred at a time when risk management of non-performing financing (NPF) was at its best, standing at 2.11 per cent, whilst profitability (Return on Assets/ROA) was under pressure at 1.77 per cent. This empirical contrast demonstrates that low financing risk does not automatically guarantee accelerated capital growth if the institution's internal operational cost efficiency is compromised (Millania et al., 2021).

The trends in these financial indicators are closely linked to the process of structural transformation in the banking sector during the recovery period (Masruron & Safitri, 2021). Although during the initial transition period from early 2021 to 2022, financial instability was a direct consequence of the prolonged impact of restrictions on social activities and mass loan restructuring programmes resulting from the COVID-19 pandemic, the turbulence experienced between 2023 and 2025 reflects solely internal governance challenges within the Islamic banking sector. The surge in operating costs in 2024 signalled a substantial allocation of capital expenditure towards long-term investments, such as upgrades to information technology infrastructure and the expansion of digital service networks. Whilst these strategic expenditures do erode net profit margins in the short term, they are projected to make a significant contribution to the expansion of the banks' business scale and the cumulative growth of their assets in the long term. The importance of conducting this analysis is further reinforced by the theoretical gap arising from inconsistencies in previous scientific findings. Research carried out by (Hafiz et al., 2025) emphasises that BOPO and NPF have a dominant influence on fluctuations in the net profit of Islamic banks in Indonesia.

With regard to capital expansion, (Mahendra & Musthofa, 2023) demonstrates that an increase in non-performing loans acts directly as a structural constraint that slows the growth of banks' assets. Conversely, a study by (Millania et al., 2021) indicates that BOPO and ROA are key determinants in shaping the growth curve of total assets. The uncertainty surrounding the direction of this relationship is further compounded by other academic findings, (Agung & Subekti, 2022) which points to a paradoxical result, whereby an increase in operating expenditure, under certain conditions, is actually found to provide a positive stimulus to a bank's ability to generate profits.

The uncertainty regarding the direction of this effect stems from the differing perspectives of the Efficient Market Hypothesis and the Signalling Theory, which are seemingly contradictory but are in fact complementary within the context of the financial industry. From the perspective of the Efficient Market Hypothesis, any increase in operating costs is viewed negatively as a form of inefficiency that erodes net profit, thereby limiting the availability of internal capital required for expansion (Yupita & Sukartha, 2026). However, the Signal Theory offers a contrasting perspective, whereby high operating expenditure is often a reflection of strategic investment in digitalisation and improvements to service quality (Putri & Latifah, 2025). The market interprets these positive signals from the modernisation of services as a sign of long-term credibility. These signals ultimately boost customer loyalty, encouraging them to deposit third-party funds (DPK), which in turn accelerates the bank's asset growth cycle. Consequently, the diversity of previous findings stems from the fact that the indirect transmission mechanism linking these variables to asset growth—via the mediating role of profitability has not yet been fully elucidated.

The uniqueness and novelty of this study lie in the integration of Efficiency Theory and Signal Theory into a single comprehensive mediation model to explain the high-cost anomaly that drives growth. Furthermore, this study specifically identifies profitability

(ROA) as a mediating variable, utilising path analysis and the Sobel test to accurately detect the transmission of these indirect effects during the post-pandemic recovery period (2021–2025).

Consequently, the primary objective of this study is to analyse the role of profitability in mediating the effects of operational efficiency and funding risk on the asset growth of Islamic commercial banks in Indonesia. The findings of this research are expected to make a new theoretical contribution to the literature on Islamic financial management, whilst also serving as a practical guide for regulators and industry stakeholders in optimising sustainable business growth.

LITERATURE REVIEW

Efficiency Theory

Operational efficiency in banking essentially reflects the extent to which a company is able to effectively manage and utilize its internal capital to control daily expenses. High levels of efficiency serve as a key driver for banks in maximizing profits while strengthening the stability of their financial performance. This concept aligns with Efficiency Theory, which states that a company can achieve optimal performance if it manages its resources effectively to generate maximum profit at the lowest possible cost (Jatmiko, 2025).

Signalling Theory

Signaling Theory conceptualizes how the disclosure of information by management serves as a mechanism to communicate future business prospects to investors. Given that internal parties naturally possess more in-depth control over operational information than external parties, ensuring transparency in reporting becomes vital. External parties then use this information to bridge the knowledge gap and evaluate the company's intrinsic value. (Agus & Sutanto, 2024).

Such transparency is extremely helpful to investors, clients, and all stakeholders in assessing the strength and financial health of the relevant institution. In the Islamic banking industry, improvements in the BOPO, NPF, and ROA indicators reflect the issuer's fundamental health while signaling credibility to the market (Agung & Subekti, 2022). From a signaling theory perspective, the positive sentiment stemming from this sound financial performance effectively strengthens public confidence in entrusting their liquidity to the bank, which in turn drives the sustainable expansion of the bank's scale and asset growth.

Operational Efficiency

The BOPO ratio is a key indicator for measuring operational efficiency, particularly in assessing a bank's ability to control its operating costs. According to a study by (Astuti, 2022), the lower the BOPO ratio, the more efficient the bank is, thereby creating significant.

opportunities for increased profitability. This phenomenon is reinforced by the findings of (Hafiz et al., 2025) , which state that profitability stability is significantly influenced by fluctuations in the BOPO ratio. When operating expenses increase without sufficient revenue to support them, profit margins will automatically decline.

The BOPO formula is as follows:

$$\text{BOPO} = \frac{Operating\ Costs}{Operating\ revenue}$$

Financing Risk

Financing risk essentially arises when a customer fails to meet their financial obligations in accordance with the contract agreed upon with the bank. In the operations of Sharia Commercial Banks (BUS), the potential for losses resulting from such payment defaults is generally monitored and assessed using the Non-Performing Financing (NPF) ratio. (Fahriani, 2022) explains that a surge in the NPF ratio indicates a significant expansion in the non-performing financing portfolio, which can directly erode revenue and squeeze profitability. These negative impacts do not stop there; according to (Maulida & Arfiansyah, 2024), a high NPF rate also acts as a hindrance for bank management in growing the company's assets.

The NPF formula is as follows:

$$\text{NPF} = \frac{Non-performing\ loans}{Total\ Funding}$$

Profitabilitas

The Return on Assets (ROA) ratio serves as a proxy for profitability, providing a metric to assess how efficiently a bank manages its total asset base to generate net income. This ratio serves as an essential indicator for assessing a company's capacity for business expansion. Achieving a superior ROA reflects optimized asset management, which in turn provides the internal capital crucial for driving the company's sustainable asset growth (Millania et al., 2021).

The Profitability formula is as follows:

$$\text{Profitability} = \frac{Net\ profit}{Total\ Assets}$$

Asset Growth

Financial institution progress is highly visible through total asset accumulation, which demonstrates a company's success in broadening its business scope. Consequently, tracking asset growth becomes an essential metric in Sharia banking to determine the organization's proficiency in fund allocation and operational expansion. A high rate of asset growth indicates that the bank has significant potential to expand its business and

strengthen its position amid competition in the Islamic banking industry (Azzabi & Lahrichi, 2023).

The formula for asset growth is as follows:

$$\text{Asset Growth} = \frac{\text{total assets}_t - \text{total assets}_{t-1}}{\text{total assets}_{t-1}} \times 100\%$$

HYPOTHESIS DEVELOPMENT

The Impact of Operational Efficiency on Profitability

A bank's capability to suppress its operational expenditures relative to its generated operating revenue constitutes a primary determinant of corporate rentability. From the perspective of efficiency theory, a high operating ratio (BOPO) signifies a heavy burden of non-productive expenses, which directly erodes the net profit margins generated by the institution.

Conversely, stringent cost containment broadens the bank's capacity to optimize financing returns and maximize net income. This structural relationship is reinforced by the empirical evidence of (Hafiz et al., 2025), which demonstrates that operational cost control plays a pivotal role in dictating the profitability fluctuations of Islamic commercial banks in Indonesia.

H_1: Operational efficiency (BOPO) has a significant negative effect on the profitability (ROA) of Islamic Commercial Banks.

The Impact of Financing Risk on Profitability

Financing risk serves as a direct indicator of the quality of productive assets deployed by Islamic financial institutions. According to signaling theory, a surge in the Non-Performing Financing (NPF) ratio sends a negative distress signal to the market, indicating credit management deficiencies. Reguatory frameworks compel banks to allocate higher allowance for impairment losses as default risks rise, which subsequently disrupts the revenue-sharing distribution and depresses net earnings. This mechanism aligns with the findings of Diliana et al. (2025) as well as Yunus & Padang (2025), which argue that an expansion in credit default risk directly impedes institutional capability to sustain high returns.

H_2**:** Financing risk (NPF) has a significant negative effect on the profitability (ROA) of Islamic Commercial Banks.

The Impact of Profitability on Asset Growth

The capacity of a banking institution to generate superior net profits functions as the primary internal engine for structural scale expansion. High profitability implies that the management has productively deployed its corporate assets, thereby generating robust

retained earnings to finance asset accumulation autonomously. Furthermore, through the lens of signaling theory, exceptional return performance projects a strong signal of financial soundness and credibility to the public. This positive sentiment fosters enhanced depositor loyalty, stimulating a massive influx of third-party funds (DPK) that accelerates the total asset growth curve. This premise is heavily corroborated by (Millania et al., 2021), who position return performance as a critical prerequisite for bank capitalization.

H_3: Profitability (ROA) has a significant positive effect on the asset growth of Islamic Commercial Banks.

The Impact of Operational Efficiency on Asset Growth

The transmission channels connecting operational expenses and asset expansion exhibit a complex, paradoxical dynamic. An elevated BOPO ratio does not necessarily reflect purely detrimental operational waste; rather, in the context of modern banking post-pandemic recovery, it frequently represents a strategic, aggressive reallocation of capital toward digital banking infrastructure, fintech integration, and broad-scale market penetration. While these massive initial outlays contract short-term margins, they significantly enhance virtual customer accessibility and transactional efficiency. As a consequence, this capital investment functions as a strategic catalyst that multiplies third-party fund mobilization and expands financing portfolios, ultimately accelerating total asset growth. This argument resolves the theoretical mismatch, aligning with (Wang et al., 2025) as well as (Hafiz et al., 2025), who found that strategic operational outlays positively stimulate bank asset scales.

H_4: Operational efficiency (BOPO) has a significant positive effect on the asset growth of Islamic Commercial Banks.

The Impact of Financing Risk on Asset Growth

The mitigation of financing defaults is intrinsically tied to the sustainability of a bank's scale expansion. A pronounced escalation in credit defaults implies a structural blockage in the cash flow loop, as funds expected from debtors fail to materialize. This contraction in internal liquidity restricts the bank’s capacity to underwrite new financing facilities, thereby acting as a structural constraint that slows down total asset expansion. Conversely, maintaining a low default ratio demonstrates robust portfolio health, preserving capital availability to back continuous asset growth.

This direct adverse transmission mechanism is highly consistent with (Mahendra & Musthofa, 2023), who prove that deteriorating credit portfolios slow bank asset accumulation.

H_5: Financing risk (NPF) has a significant negative effect on the asset growth of Islamic Commercial Banks.

The Mediating Role of Profitability in the Relationship Between Operational Efficiency and Asset Growth

The structural expansion of banking assets is driven by the simultaneous interplay between internal cost governance and institutional earnings capacity. Operational efficiency that is optimally aligned with strategic investment objectives serves to enhance net profitability margins. These healthy retained earnings are subsequently reinvested as the primary internal financial source required to fund long-term asset expansion and infrastructure development. Consequently, the bank's capacity to generate returns acts as a vital intervening pathway, channeling the indirect effects of operational cost structures into the overall asset expansion curve. This mediating transmission path is supported by Ahzahra et al. (2025).

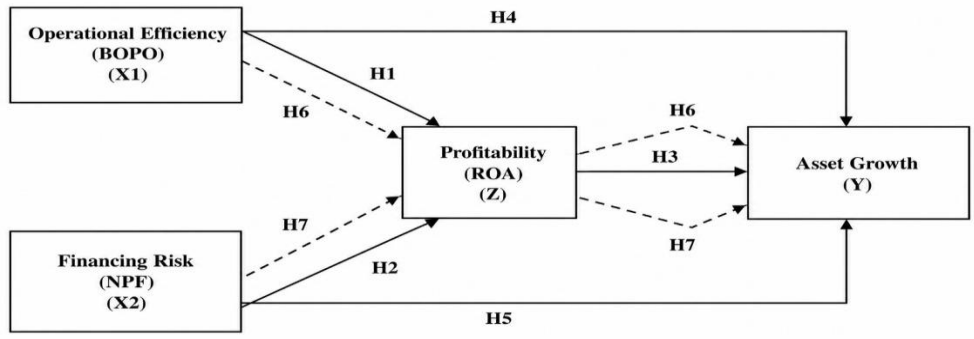
H_6: Profitability (ROA) significantly mediates the effect of operational efficiency (BOPO) on the asset growth of Islamic Commercial Banks.

The Mediating Role of Profitability in the Relationship Between Financing Risk and Asset Growth

Beyond its direct consequences on immediate liquidity, credit portfolio quality dictates the pace of asset accumulation through its impact on corporate return capacity. Successful mitigation of non-performing loans secures the stability of financing revenues, thereby driving net profitability upward. The upward trend in profitability solidifies the internal capital structures of Islamic banks, giving the management the necessary financial flexibility to execute sustainable asset acquisitions (Millania et al., 2021). Based on this interconnected logic, institutional profitability is hypothesized to function as a bridge that conditions how strongly asset quality issues can impair the long-term asset growth momentum of the bank.

H_7: Profitability (ROA) significantly mediates the effect of financing risk (NPF) on the asset growth of Islamic Commercial Banks.

Research Hypotheses



Source: processed data (2026)

METHODOLOGY

This study adopts a rigorous quantitative approach utilizing a causal-explanatory design to evaluate the structural pathways through which operational efficiency and credit risk dictate asset growth in the Indonesian Islamic banking architecture, with financial return serving as an intervening mechanism. The choice of Sharia Commercial Banks (known as Bank Umum Syariah or BUS) as the explicit object of this investigation is grounded in their unique institutional operating framework. Unlike their conventional counterparts, BUS operates on profit-sharing paradigms and stringent ethical constraints which make their operational expenditure patterns and financing asset qualities highly sensitive to systemic shocks and internal structural transformations. The temporal horizon spans from 2021 to 2025, capturing a critical macroeconomic narrative that bridges the peak disruptions of the global pandemic and the subsequent structural digitalization era within the domestic banking sector.

The target population defined for this empirical inquiry encompasses all licensed Islamic commercial banking institutions officially operating under the strict regulatory oversight of the Financial Services Authority (*Otoritas Jasa Keuangan* or OJK) throughout the 2021–2025 observation window. To ensure data homogeneity and analytical consistency, a *purposive sampling* strategy was deployed based on three primary operational filters:

1. The institution must maintain its active legal status as a Sharia Commercial registered with the OJK continuously from 2021 to 2025.

2. The banking entity must have consistently published audited comprehensive annual financial reports throughout the designated five-year observation window.

3. The published statements must provide fully articulated and complete financial disclosures regarding all specific operational and macroprudential metrics under examination.

The application of these sampling criteria resulted in the final selection of 13 BUS entities out of a total population of 14 BUS operating in Indonesia during the study period. This high representation rate (92.8% of the entire domestic Sharia commercial banking sector) ensures that the sample provides a highly generalized reflection of the industry. By observing these 13 banking corporations over a continuous 5-year chronological horizon, a balanced panel dataset comprising 65 distinct observations (13 banks x 5 years) was generated, providing an empirically robust foundation for panel data estimation techniques.

Table 2. Variable Measurements

Variable	Simbol	Measure
Operational Efficiency	X1	BOPO = Operating Expenses / Operating Revenue
Financing Risk	X2	NPF = Non-Performing Financing / Total Financing
Profitability	Z	ROA = Net Income / Total Assets
Asset Growth	Y	$\text{Total Aset}_t - \text{Total Aset}_{t-1}/\text{Total Aset}_{t-1} x100$

Source: Authors (2026)

Regression Model

Model I (Intervening Equation):

$$Z_{it} = \alpha_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \epsilon_{it}$$

Model II (Outcome Equation):

$$Y_{it} = \gamma_0 + \beta_3 X_{1it} + \beta_4 X_{2it} + \beta_5 Z_{it} + e_{it}$$

RESULTS

An initial descriptive analysis of the panel dataset revealed a highly conspicuous data anomaly, in which the Operating Expenses to Operating Revenue (BOPO) ratio exceeded 428.40% and profitability (Return on Assets/ROA) plummeted to -10.85%. Tracking results indicate that this extreme spike originated from the 2021 financial statements of PT Bank Panin Dubai Syariah Tbk. This drastic increase in costs and decline in profits were triggered by a policy to write off non-performing productive assets and the creation of a large Provision for the Valuation of Productive Assets (PPAP) due to the impact of the pandemic. Given that the inclusion of this outlier data could compromise normality and distort the regression coefficients, this study applied the Winsorization technique at the 5th and 95th percentiles rather than excluding the bank in question. This approach successfully normalized the data distribution, met the classical assumptions, and maintained the balance of the total 65 observations from the 13 Sharia Commercial Banks (BUS) under examination.

Descriptive Statistics

Descriptive statistics in this study are intended to map out the general picture and fundamental characteristics of the variables under investigation. Through this analytical framework, the data can be mathematically described to facilitate initial interpretation prior to the model estimation stage.

Table 3. Descriptive Statistics

	BOPO_X1	NPF_X2	ROA_Z	TOTAL_ASET_Y
Mean	100.2164	2.547031	0.916563	48.05172
Median	81.71000	2.370000	1.450000	10.64500
Maximum	428.4000	9.560000	11.43000	2104.470
Minimum	58.12000	0.000000	-10.85000	-27.66000
Std. Dev.	61.00584	2.053764	3.685359	262.8581

Source: E-views 12, processed data (2026)

The data in Table 3 show that the average ratio of Operating Expenses to Operating Income (BOPO) is 100.22%. At the macro level, this percentage reflects that Sharia Commercial Banks (BUS) were less efficient during the study period. The data range for this variable extends from a minimum of 58.12% to a maximum of 428.40%. The presence of this extremely high maximum value reflects unusual operational practices within the sample of banks. This performance disparity is further underscored by a relatively large standard deviation of 61.01%, indicating wide variations in efficiency levels among the evaluated Sharia banks.

Regression Model Selection

Used to verify and select the most appropriate model.

Table 4. Chow Test Regression 1

Effect Test	Statistic	df	Prob
Cross section F	14.035592	(12.50)	0.000
Cross section Chi square	95.837908	12	0.000

Source: E-views 12, processed data (2026)

Based on the Chow test results in Table 4, the null hypothesis is rejected with a highly significant p-value of 0.0000. This outcome provides strong empirical justification for selecting the Fixed Effect Model (FEM) for the subsequent regression analysis.

Table 5. Chow Test Regression 2

Effect Test	Statistic	df	Prob
Cross section F	3.987206	(12.49)	0.000
Cross section Chi square	44.284933	12	0.000

Source: E-views 12, processed data (2026)

Given the p-value of the cross-sectional chi-squared test of 0.000 in Table 5, the null hypothesis is rejected. Therefore, the Fixed Effects Model (FEM) is selected as the most appropriate specification for this analysis.

Table 6. Hausman test for Regression 1

Test Summary	Chi-Sq.staistic	Chi Sq df	Prob
Cross section random	2.919941	2	0.2322

Source: E-views 12, processed data (2026)

The Hausman test results in Table 6 yield a cross-section Chi-square p-value of 0.2322($p > 0.05$). Consequently, the Random Effects Model (REM) is selected as the most appropriate and valid estimator for the panel data regression analysis.

Table 7. hausman test for Regression 2

Test Summary	Chi-Sq.staistic	Chi Sq df	Prob
Cross section random	28.683785	3	0.0000

Source: E-views 12, processed data (2026)

The model specification results in Table 7 show a p-value of 0.000 for the cross-section chi-squared test, which is less than 0.05. Based on this criterion, it is concluded that the Fixed Effects Model (FEM) is the most valid estimation specification to be applied in the next stage of the panel data regression analysis.

Classical Assumption Tests

Normality Test

The Jarque-Bera (JB) test was applied to detect trends toward a normal distribution in the data by measuring the kurtosis and skewness values. Statistically, the data are considered to be normally distributed if the p-value obtained from the JB test exceedsthe significance level $\alpha > 0{,}05$.

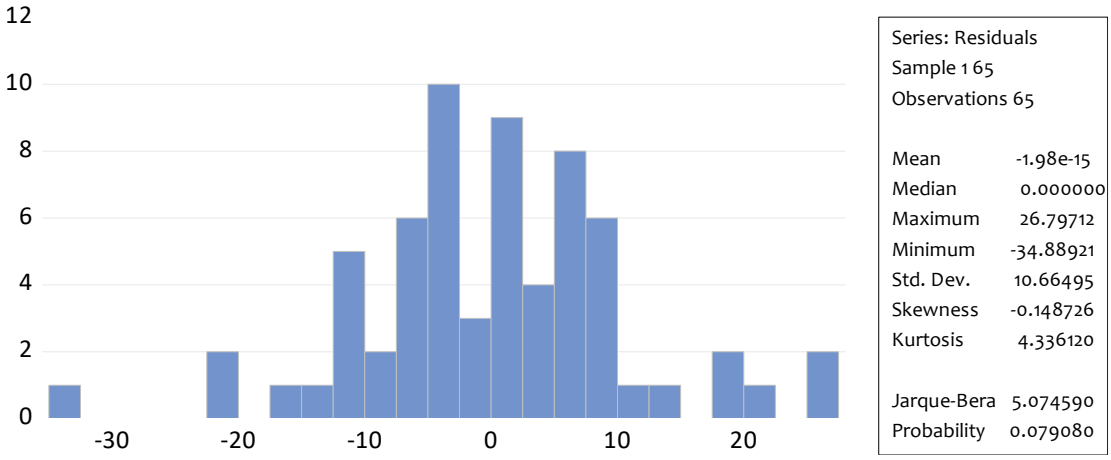


Figure 2. Normality Test
Source: E-views 12, processed data (2026)

Through the normality test using the Jarque-Bera approach, a probability value of 0.079080 was obtained. Since this significance level is above sig. 0.05, empirical evidence indicates that the residual parameters in the model meet the requirements for a normal distribution. Thus, the regression model estimated in this study is deemed valid and meets the required assumption of data normality.

Multicollinearity Test

A multicollinearity test serves as a diagnostic tool to evaluate whether strong linear relationships exist among the independent variables in the multiple linear regression network. Within this classical assumption verification phase, the core goal is to guarantee the absence of excessive correlation, a condition satisfied as long as the Variance Inflation Factor (VIF) does not surpass 10.

Table 8. Multicollinearity

Variable	Coefficient variance	Uncentered VIF	Centered VIF
BOPO X1	0.004089	10.92517	2.906529
NPF X2	1.347498	2.806778	1.116653
ROA Z	1.163273	3.329924	3.101153
C	75.10712	14.73889	NA

Source: E-views 12, processed data (2026)

Based on the correlation output, no independent variable exhibits a correlation coefficient of 0.90 or above with another. This lack of high mutual correlation validates the methodological assumption that multicollinearity does not distort the model. As a result, the relationships among the independent variables remain stable and uncompromised, qualifying every parameter for the multiple linear regression model.

Heteroscedasticity Test

The model is considered free from heteroscedasticity if the Chi-Square R^2 probability value from the residual test exceeds the 0.05 threshold, confirming homoscedasticity. Conversely, a probability value below 0.05 indicates heteroscedasticity, meaning the residual variance is non-constant and inefficient.

Table 9. Heteroscedaticity Test

F-statistic	0.492941	Prob. F (9.55)	0.8730
Obs*R-squared	4.851745	Prob. Chi-Square (9)	0.8470
Scaled expalined	21.54037	Prob. Chi-Square (9)	0.0105

Source: E-views 12, processed data (2026)

Using the White test approach, the inference process is based on the Prob. Obs*R-squared parameter. Given that the resulting coefficient is 0.8470 a value significantly above the critical threshold of 0.05 this empirical finding provides evidence that the estimated regression model is free from heteroscedasticity. Furthermore, the variance of the residuals is confirmed to be constant (homoscedasticity), so the model specification meets the validity requirements for application in further research analysis.

Autocorrelation Test

The acceptability criterion for the regression model regarding a violation of the autocorrelation assumption is met when the Durbin-Watson (DW) parameter consistently falls within the upper bound interval (du) and 4 - du. This statistical justification is strengthened if the calculated DW value tends to approach an estimated value of 2, an ideal condition indicating the absence of a linear relationship between errors across observation periods.

Table 10. Autocorrelation Test

Root MSE	9.713783	R-squared	0.893762
Mean dependent…	14.84677	Adjusted R-squared	0.861241
S.D. dependent var	30.03418	S.E. of regression	11.18786
Akaike info criterion	7.877276	Sum squared resid	6133.243
Schwarz criterion	8.412510	Log likelihood	-240.0115
Hannan-Quinn cri…	8.088460	F-statistic	27.48200
Durbin-Watson stat	2.446427	Prob(F-statistic)	0.000000

Source: E-views 12, processed data (2026)

Based on the Durbin-Watson test, the DW statistic is 2.446427. This value is close to 2, so it can be concluded that the regression model does not suffer from autocorrelation. Consequently, the classical assumption regarding the absence of correlation between residuals has been met, meaning the regression model is suitable for hypothesis testing.

Coefficient of Determination Test (R^2 Test)

The coefficient of determination (R^2) was used as a measure of the independent variables' ability to account for variation in the dependent variable. The R^2value systematically ranges from 0 to 1. An increase in the value toward 1 indicates optimal accuracy and the regression model's capacity to estimate operational data. In other words, a high coefficient of determination provides empirical justification for a stronger fit of the constructed model.

Table 11. R^2 Test

Root MSE	9.713783	R-squared	0.893762
Mean dependent…	14.84677	Adjusted R-squared	0.861241
S.D. dependent var	30.03418	S.E. of regression	11.18786
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Schwarz criterion	8.412510	Log likelihood	-240.0115
Hannan-Quinn cri…	8.088460	F-statistic	27.48200
Durbin-Watson stat	2.446427	Prob(F-statistic)	0.000000

Source: E-Views 12, processed data (2026)

The model yielded an F-statistic of 27.48200 with a p-value of 0.000000. Since this probability is far below the 0.05 threshold, the independent variables collectively exert a significant effect on the dependent variable. Additionally, an Adjusted R^2 of 0.861241 indicates that the explanatory factors account for 86.12% of the variance in the dependent variable, leaving 13.88% to external factors.

Partial Hypothesis Testing (t-Test)

Partial testing using the t-test is intended to determine the significance of the impact of each explanatory variable independently on the dependent variable. In this process, statistical conclusions are drawn by comparing the Prob. (t-statistic) score from the estimation results with the significance level threshold (a = 0,05), which has been established as the standard for hypothesis testing.

Table 12. Sub-structural test

Variable	Coefficient	Std. Error	T statistic	Prob
BOPO X1	-0.037832	0.003175	-11.91687	0.0000
NPF X2	-0.327849	0.147098	-2.228772	0.0295
C	5.542389	0.704398	7.868268	0.0000

Source: E-views 12, processed data (2026)

Based ons the t-test, BOPO -0.037832, p = 0.0000 and NPF -0.327849, p = 0.0295, both exert significant negative effects on profitability.

These results demonstrate that high operating expenses and weak financing asset quality independently restrict the banking sector's capacity to generate net earnings.

Table 13. Sub-structural test

Variable	Coefficient	Std. Error	T statistic	Prob
BOPO X1	0.600448	0.060225	9.970156	0.0000
NPF X2	-5.653701	1.743078	-3.243516	0.0021
ROA Z	6.985205	1.394016	5.010849	0.0000
C	-37.23409	9.166068	-4.062166	0.0002

Source: E-views 12, processed data (2026)

Individual t-tests revealed that BOPO p = 0.0000 and ROA both exert a significant positive effect on the dependent variable. Conversely, the NPF risk parameter exhibits a significant negative impact p-value = 0.0021 < 0.05.

Simultaneous Hypothesis Testing (F-Test)

Model validity testing generally relies on a significance threshold of 0.05. This criterion is assessed through the Prob(F-statistic) value in the regression estimation output, where the model specification is deemed valid and meets the criteria for acceptability if the calculated probability value is significantly below 0.05.

Table 14. Sub-structural F

Root MSE	1.116688	R-squared	0.713949
Mean dependent...	0.243421	Adjusted R-squared	0.704722
S.D. dependent var	2.104150	S.E. of regression	1.143385
Sum squared resid	81.05444	F-statistic	77.37228
Durbin-Watson stat	1.401690	Prob(F-statistic)	0.000000

Source: E-views 12, processed data (2026)

With a Prob (F-statistic) of 0.000000 ($p < 0.05$), the simultaneous significant effect of all independent variables on the dependent variable is empirically proven. This model's validity is reinforced by an Adjusted R^2 of 0.7737228, showing that the predictors explain 77.37% of the total variation, while external factors account for the remaining 22.63%.

Table 15. Sub-structural F-Test II

Root MSE	9.713783	R-squared	0.893762
Mean dependent...	14.84677	Adjusted R-squared	0.861241
S.D. dependent var	30.03418	S.E. of regression	11.18786
Akaike info criterion	7.877276	Sum squared resid	6133.243
Schwarz criterion	8.412510	Log likelihood	-240.0115
Hannan-Quinn cri...	8.088460	F-statistic	27.48200
Durbin-Watson stat	2.446427	Prob(F-statistic)	0.000000

Source: E-views 12, processed data (2026)

The F-test results yielded a Prob(F-statistic) of 0.000000 < 0.05, proving that all independent variables simultaneously have a significant effect on the dependent variable. The model's validity is further supported by an Adjusted R-squared value of 0.861241, meaning the independent variables account for 27.48 % of the variation in the dependent variable. The remaining 72.52% is attributed to external factors beyond the scope of this study.

Mediation Test

Mediation test criteria in EViews generally use path analysis or stepwise regression to assess the significance of indirect effects. The main criterion is that the path coefficient is significant at a p-value < 0.05, and this is often verified using the Sobel Test (z-value > 1.96 or $p < 0.05$) to confirm the role of the mediator variable.

Table 16. Sobel test

Path	A	B	SEA	SEB	t	sig	Description
BOPO-ROA-Asset growth	-0.37832	6.985.205	0.003175	1.394.016	-99.240	0.0000	Sig
NPF-ROA-Asset growth	-0.327849	6.985.205	0.147098	1.394.016	-22.066	0.0273	sig

Source: EViews 12, processed data (2026)

The Sobel test calculations clearly support the mediating role of profitability in both pathways. For the first channel, a p-value of 0.0000 confirms that operational efficiency (BOPO) relies on profit margins to drive asset growth. Essentially, when a bank keeps its overhead under control, it boosts its earnings, which in turn generates the internal funding needed to expand its asset base.

Similarly, profitability acts as a significant bridge for financing risk (NPF) with a p-value of 0.0273. This shows that bad loans drag down asset growth indirectly by first eroding the bank's profit margins, leaving fewer resources for capital accumulation. In short, profitability is the critical engine that translates both cost efficiency and risk mitigation into actual corporate expansion.

DISCUSSION

The Effect of Operational Efficiency on Asset Growth

A review of the research question regarding the direct impact of operational efficiency indicates that, paradoxically, the BOPO indicator has a significant positive impact on the asset growth of Sharia Commercial Banks (BUS) in Indonesia throughout the 2021–2025 period, thereby offering a new perspective on conventional efficiency theory. This phenomenon demonstrates that the rise in costs at Islamic Commercial Banks during the post-pandemic recovery era does not represent administrative waste, but rather an aggressive reallocation of the budget toward long-term capital expenditures specifically to modernize digital infrastructure, expand virtual service networks, and strengthen the cyber ecosystem. Based on Signaling Theory, massive spending on this technological transformation is perceived by the market as a positive credibility commitment, which effectively stimulates customer loyalty to deposit Third-Party Funds (TPF), thereby multiplying business volume and accelerating the cumulative expansion of total assets. What sets these findings apart from previous studies, such as Hafiz et al. (2025), is this research's ability to resolve the high-cost anomaly by demonstrating that Islamic banks that are adaptable in the era of digitalization can transform operational cost burdens into a highly expansive driver of physical asset growth.

The Impact of Financing Risk on Asset Growth

An in-depth study on financing risk mitigation demonstrates that non-performing loans (NPLs) directly exert a significant negative impact on the asset growth rate of commercial banks in Indonesia. When the volume of non-performing loans escalates, banks are required by regulation to divert a significant portion of their liquidity to build up an allowance for impairment losses a defensive measure that drastically ties up working capital and reduces banks' capacity to channel new financing to productive sectors. In addition to clogging internal cash flows, a surge in NPFs sends a negative signal regarding poor management to financial markets, which can trigger panic among depositors and slow the expansion of total asset capitalization. A key distinction between the findings of this study and the conventional empirical study by Mahendra & Musthofa (2023) lies in the sensitivity of Sharia portfolios; the absence of interest based bailout instruments makes Sharia banks far more vulnerable to payment defaults in the real sector, meaning that even the slightest fluctuation in credit risk immediately exerts significant downward pressure on the asset expansion curve.

The Impact of Operational Efficiency on Profitability

Based on the research findings, it was found that the BOPO has a significant negative impact on the profitability of Sharia Commercial Banks. Consequently, a rise in operating expenses will directly reduce the entity's net profit. Conversely, minimizing the BOPO ratio indicates management's success in implementing internal cost efficiency, which in turn acts as a stimulus to boost the bank's operational profitability.

The Impact of Financing Risk on Profitability

Research findings show that NPF exerts a significant negative effect on Islamic banks' profitability, confirming that an increase in default risk linearly diminishes profit-generating capacity. This surge in risk disrupts the optimization of profit-sharing income, thereby triggering a decline in profitability. Conversely, a low non-performing financing ratio reflects high- quality productive assets, enabling banks to maximize returns to boost the entity's profitability.

The Effect of Profitability on Asset Growth

Empirical results demonstrate that profitability (ROA) exerts a significant positive influence on the asset growth rate of Sharia Commercial Banks. This statistical indication reflects that the bank's effectiveness in generating profits serves as the primary driver for the growth of the company's capital and assets. High profitability justifies that management has utilized assets productively to facilitate the corporation's expansion and development needs. From the perspective of Signaling Theory, strong profit performance sends a signal of credibility to stakeholders that the Islamic financial institution is operating in a sound condition and has a promising future. The

psychological impact of this signal is increased loyalty and public confidence in depositing third-party funds (DPK). This inflow of capital, in turn, accelerates the sustainable growth cycle of Sharia Commercial Banks' assets.

The Role of Profitability in Mediating the Effects of Operational Efficiency and Financing Risk on Asset Growth

The Sobel test calculations clearly back up the idea that profitability acts as a vital bridge between operational efficiency (BOPO) and asset growth ($p = 0.0000$). Essentially, keeping operational costs in check directly strengthens the bank's bottom line, which in turn provides the necessary financial fuel to expand its assets. Along the same lines, profitability also mediates the relationship between financing risk (NPF) and asset growth ($p = 0.0273$). This suggests that credit risk chips away at asset expansion indirectly; by keeping default rates low, banks can protect their profit margins, accumulate stronger internal capital, and ultimately support steady, long-term asset growth.

CONCLUSIONS

This study shows that asset growth in Sharia Commercial Banks (BUS) is driven positively by operational efficiency (BOPO) and dragged down by financing risk (NPF), with profitability (ROA) acting as a crucial engine that directly drives expansion and successfully bridges both of these pathways. The real value of these findings lies in how they solve the high-cost paradox of modern Islamic banking during its post-pandemic recovery. By looking through the lens of both Efficiency and Signaling theories, we can see that high operational expenses (BOPO) aren't just wasted overhead; they actually represent strategic, heavy investments in digital and cyber-infrastructure. This sends a strong signal of technological readiness to the market, which helps draw in third-party deposits (DPK) and scale up the bank's assets.

At the same time, the mediated impact of credit defaults (NPF) reveals how financing risk acts as a major roadblock by first eating away at the bank's bottom line. High default rates drag down profitability (ROA), which in turn starves the bank of the internal profits it needs to fund asset growth. Because of this, BUS executives need to move away from lazy, short-sighted cost-cutting and adopt a highly targeted productive-expenditure mindset. While investing heavily in digital networks makes perfect sense to spark growth, it has to be strictly balanced with sharp, real-time risk management to keep NPF under control. In the end, balancing this dual control mechanism is the only realistic way for Islamic banks to protect their profits, keep the public's trust, and secure steady, long-term asset growth.

Limitations and Recommendations

Although this paper offers useful empirical insights, its scope is strictly limited to internal bank metrics, leaving out the broader impact of macroeconomic shifts. Future studies can address this by testing external variables like domestic inflation and the Bank Indonesia Sharia Certificates (SBIS) yield, which heavily influence sharia pricing. Additionally, relying on static panel data means this study might overlook dynamic feedback loops or potential reverse causality between profitability and asset size. Using dynamic models like the Generalized Method of Moments (GMM) in future research would help control for these endogeneity issues and eliminate hidden biases. Finally, adding Sharia Business Units (UUS) to the sample alongside Sharia Commercial Banks (BUS) would provide a much more complete picture of the country's Islamic banking landscape.

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