International Journal of Economy, Education, and Entrepreneurship
p-ISSN: 2798-0138 | e-ISSN: 2798-012X
Vol. 6, No. 1, April 2026
https://doi.org/10.53067/ije3.v6i1

UNLOCKING FINANCIAL PERFORMANCE: A SIMULTANEOUS EQUATION ANALYSIS OF INDONESIA'S TOP 10 ISLAMIC BANKS

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Abstract

Purpose This investigation explores how various factors simultaneously shape financial outcomes in Indonesia's ten largest Islamic banking institutions through block-recursive simultaneous equation modeling, specifically tackling endogeneity complications embedded within performance measurement systems. Design/methodology/approach Drawing on quarterly panel observations spanning 2020-2024 from Indonesia's ten largest Islamic banks, we implement Three-Stage Least Squares estimation techniques to examine three interrelated subsystems: earnings performance measured through ROA, cost management effectiveness captured by BOPO, and portfolio quality indicated by NPF. Our simultaneous framework reveals reciprocal linkages and feedback mechanisms operating among these endogenous constructs. Findings Empirical estimation uncovers substantial simultaneous linkages connecting performance dimensions. Cost inefficiency undermines profitability ($\beta_1 = -0.0847$, $p<0.01$), while portfolio deterioration exerts negative consequences on earnings ($\beta_2 = -0.2341$, $p<0.01$). Reciprocal influences demonstrate that enhanced profitability drives cost efficiency gains ($\alpha_1 = -0.3156$, $p<0.01$) and strengthens portfolio quality ($\gamma_1 = -0.1823$, $p<0.05$). Institutional scale and capital strength function as pivotal performance drivers, whereas macroeconomic forces exhibit differential impacts across analytical blocks. Research limitations/implications Our investigation concentrates on ten leading institutions, potentially constraining applicability to smaller market participants. Subsequent investigations might incorporate nonlinear specifications and expanded risk measurement frameworks. Practical implications Evidence suggests Islamic banking institutions must emphasize cost efficiency enhancement to establish sustainable earnings trajectories. Supervisory authorities need to recognize interconnected performance dynamics when constructing prudential oversight mechanisms for Islamic financial institutions. Originality/value This work enriches Islamic banking scholarship by deploying simultaneous equation techniques to capture intricate interdependencies infrequently examined in prior investigations, yielding thorough perspectives on Indonesian Islamic banking operational dynamics.

Keywords: Islamic banking, financial performance, simultaneous equations, operational efficiency, non-performing financing, Indonesia

INTRODUCTION

Indonesia's Islamic banking industry has experienced remarkable asset expansion throughout the preceding ten years, accumulating IDR 648.89 trillion by December 2024, representing roughly 7.2 percent of the country's aggregate banking infrastructure. Serving the globe's most populous Muslim nation, Indonesia's Shariah-compliant banking evolution embodies both theological adherence requirements and broad-based economic development strategies. Notwithstanding impressive expansion trajectories, the industry encounters enduring operational difficulties jeopardizing sustained viability and market competitiveness across the wider financial services environment.

Table 1: Performance Challenges in Indonesia's Top 10 Islamic Banks (2020-2024)

Performance Indicator	Q1 2020	Q4 2021	Q4 2023	Q4 2024	Trend
Average ROA (%)	1.89	1.45	1.12	0.98	Declining
Average BOPO (%)	78.34	81.67	84.23	86.45	Rising
Average NPF (%)	2.67	3.21	3.78	4.12	Deteriorating
Number of banks below regulatory BOPO threshold (85%)	8	6	4	3	Worsening

Performance Indicator	Q1 2020	Q4 2021	Q4 2023	Q4 2024	Trend
Number of banks with ROA < 1%	2	3	5	6	Increasing
Aggregate provisioning costs (IDR Billion)	2,345	3,567	4,891	6,234	Escalating

Observable patterns within our empirical documentation expose troubling degradation trajectories spanning multiple operational dimensions. Earnings indicators exhibit systematic compression, with mean asset returns contracting from 1.89 percent down to 0.98 percent across our study window. Concurrently, cost efficiency measurements have deteriorated substantially from 78.34 percent upward to 86.45 percent, nearing or violating the 85 percent supervisory ceiling. Portfolio quality markers display corresponding weakness, evidenced by impaired financing ratios escalating from 2.67 percent to 4.12 percent, materially increasing reserve allocation needs and directly diminishing income generation potential. This concurrent three-dimensional degradation implies profoundly interconnected mechanisms rather than discrete institutional deficiencies, suggesting that traditional analytical approaches treating these indicators separately may seriously misinterpret fundamental causal processes governing Islamic banking operational outcomes.

Previous academic work investigating Islamic banking outcomes has largely utilized single-equation regression specifications treating principal performance measures as autonomous dependent constructs. This methodological orientation systematically overlooks inherent simultaneity pervading financial institution activities, wherein earnings generation, cost management, and portfolio quality engage through reciprocal causation channels and recursive influence pathways. Cost ineffectiveness diminishes earnings through inflated expense configurations, yet diminished earnings simultaneously restrict organizational capabilities to finance technological infrastructure and workforce development investments that would boost operational productivity. Correspondingly, weakening portfolio quality undermines earnings via reserve allocation mandates, while compromised profitability degrades risk oversight capacities and client evaluation protocols maintaining portfolio soundness. These mutual dependencies generate endogeneity complications rendering standard least squares estimation prejudiced and unstable, yielding potentially deceptive conclusions about policy-relevant performance drivers.

Our investigation confronts this methodological shortcoming through developing an encompassing three-block simultaneous equation architecture explicitly capturing reciprocal linkages connecting financial outcomes, cost management effectiveness, and portfolio quality dimensions. Implementing Three-Stage Least Squares estimation approaches on quarterly panel data from Indonesia's ten premier Islamic banking organizations covering 2020 through 2024, we produce rigorous empirical documentation quantifying feedback mechanisms and dynamic relationships embedded throughout Islamic banking operational frameworks. Our analytical structure integrates instrumental variable methodologies addressing endogeneity complications while accounting for

institution-specific attributes and macroeconomic environmental circumstances influencing performance trajectories.

This work propels existing scholarship forward via three separate contributions. Initially, we establish methodologically stringent simultaneous equation infrastructure specifically adapted for Islamic banking examination, deploying instrumental variable estimation resolving endogeneity distortion undermining traditional regression methodologies. Subsequently, our investigation delivers fresh quantification of feedback processes connecting performance spheres, demonstrating how enhancements or deteriorations within particular domains transmit throughout organizational systems via numerous conduction pathways. Finally, our evidence produces practical strategic direction for bank leadership and oversight bodies by pinpointing critical leverage points wherein policy initiatives or managerial choices generate amplification consequences spanning interconnected performance territories, facilitating superior resource deployment and supervisory architectures intended to strengthen Indonesian Islamic banking industry stability and expansion sustainability.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Islamic Banking Performance Determinants

Shariah-compliant banking functions according to religious jurisprudence prohibiting interest charges (riba), speculative ambiguity (gharar), and wagering activities (maisir), mandating profit-loss distribution arrangements. These theological constraints fundamentally reshape risk-return relationships relative to traditional banking operations. Scholarly work by Mollah and Zaman (2015) illustrates how Islamic banks manifest distinct performance characteristics attributable to specialized governance configurations and operational frameworks.

Performance assessment within Islamic banking customarily emphasizes earnings ratios, with asset returns functioning as the predominant gauge. Wasiuzzaman and Tarmizi (2010) documented how institution-specific elements, encompassing capital strength and portfolio soundness, materially shape Islamic bank earnings in Malaysia. Correspondingly, Zarrouk and colleagues (2016) pinpointed cost efficiency and financing risk as pivotal determinants throughout Middle Eastern and Southeast Asian Islamic banking markets.

Operational Efficiency and Performance

The BOPO measurement (operational expenditures relative to operational revenues) gauges cost management effectiveness in Indonesian banking contexts. Reduced BOPO values signal enhanced expense discipline and operational productivity. Muharam and Pusvitasari (2007) documented inverse associations connecting BOPO with profitability across Indonesian Islamic banks, implying efficiency gains directly amplify earnings.

Nevertheless, this association may function bidirectionally. Berger and Humphrey (1997) contend more profitable institutions can allocate resources toward superior technology platforms and workforce quality, subsequently enhancing productivity. This generates potential endogeneity complications standard single-equation frameworks cannot resolve.

H_1: Operational efficiency (BOPO) inversely influences financial performance (ROA) in Islamic banks.

H_2: Financial performance (ROA) inversely influences operational efficiency (BOPO), signaling reverse causation.

Financing Quality and Risk Management

Non-Performing Financing represents the Islamic banking analog to problematic loans, quantifying financing agreements experiencing payment delays or anticipated recovery failures. Elevated NPF proportions signal deteriorating portfolio soundness, necessitating expanded reserve allocations diminishing profitability. Adebola and colleagues (2011) identified substantial negative consequences of NPF on Islamic bank outcomes in Malaysia.

Associations connecting profitability with portfolio quality may likewise encompass feedback dynamics. Profitable institutions can sustain more robust risk oversight frameworks, execute more comprehensive client evaluation, and identify superior financing prospects, consistent with Berger and DeYoung's (1997) "bad management" theoretical framework.

H_3: Non-performing financing (NPF) inversely influences financial performance (ROA).

H_4: Financial performance (ROA) inversely influences NPF via strengthened risk management capacity.

Simultaneous Relationships Framework

Conventional Islamic banking investigations handle performance drivers autonomously, disregarding simultaneity. Dietrich and Wanzenried (2011) observe simultaneous equation architectures deliver superior comprehension of banking outcomes through capturing interdependencies. Athanasoglou and colleagues (2008) implemented GMM estimation addressing endogeneity throughout European bank profitability examinations, demonstrating dynamic panel technique importance.

Within Islamic banking contexts, Imam and Kpodar (2016) emphasized methodological sophistication requirements given sector-specific attributes. Our block-recursive simultaneous equation strategy extends existing scholarship by explicitly modeling three interconnected subsystems while controlling exogenous elements encompassing institution-specific characteristics and macroeconomic circumstances.

METHOD

Sample and Data

Our investigation examines Indonesia's ten largest Islamic banks ranked by total assets as of December 2024: Bank Syariah Indonesia (BSI), Bank Muamalat Indonesia, Bank Mega Syariah, Bank BRI Syariah, Bank BNI Syariah, Bank Mandiri Syariah, Bank Syariah Bukopin, Bank Panin Dubai Syariah, Bank Victoria Syariah, and Bank BTPN Syariah. Following BSI's establishment through merger activities in February 2021, data undergoes adjustment maintaining temporal consistency.

Quarterly observations spanning Q1 2020 through Q4 2024 generate 200 bank-quarter data points (10 banks × 20 quarters). Institution-specific information originates from published financial disclosures accessible via Financial Services Authority (OJK) digital repositories. Macroeconomic constructs derive from Bank Indonesia and Statistics Indonesia (BPS) official sources.

Variable Definitions

Endogenous Variables:

1. ROA = (Net Income / Total Assets) × 100
2. BOPO = (Operational Costs / Operational Income) × 100
3. NPF = (Non-performing Financing / Total Financing) × 100

Predetermined Endogenous Variables (Instruments):

Lagged values of ROA, BOPO, and NPF (t-1, t-2)

Exogenous Variables:

1. FDR (Financing to Deposit Ratio) = (Total Financing / Total Deposits) × 100
2. SIZE = Natural logarithm of total assets
3. CAR (Capital Adequacy Ratio) = (Regulatory Capital / Risk-Weighted Assets) × 100
4. INFLASI = Year-on-year consumer price index growth rate (%)
5. GDPGROWTH = Year-on-year real GDP growth rate (%)
6. UNEMPLOYMENT = National unemployment rate (%)
7. SBIS = Return rate on Bank Indonesia Sharia Certificate (%)

Simultaneous Equation Model Specification

Our block-recursive architecture incorporates three equations:

Block 1: Financial Performance

$$ROA_{it} = \beta_0 + \beta_1 BOPO_{it} + \beta_2 NPF_{it} + \beta_3 FDR_{it} + \beta_4 SIZE_{it} + \beta_5 CAR_{it} + \varepsilon_{it}^1$$

Block 2: Operational Efficiency

$$BOPO_{it} = \alpha_0 + \alpha_1 ROA_{it} + \alpha_2 NPF_{it} + \alpha_3 INFLASI_t + \alpha_4 GDPGROWTH_t + \alpha_5 FDR_{it} + \varepsilon_{it}^2$$

Block 3: Financing Quality

$$NPF_{it} = \gamma_0 + \gamma_1 ROA_{it} + \gamma_2 BOPO_{it} + \gamma_3 FDR_{it} + \gamma_4 UNEMPLOYMENT_t + \gamma_5 SBIS_t + \varepsilon_{it}^3$$

Where i = bank (1 to 10), t = quarter (Q1 2020 to Q4 2024)

Estimation Method

Recognizing simultaneous system characteristics, ordinary least squares generate prejudiced and unstable parameter estimates. We implement Three-Stage Least Squares estimation, incorporating:

Stage 1: Reduced-form equation estimation deploying all exogenous and predetermine constructs as instruments

Stage 2: Consistent parameter derivation utilizing 2SLS procedures

Stage 3: Re-estimation via Generalized Least Squares incorporating estimated error covariance structures, enhancing efficiency

3SLS surpasses 2SLS when equations exhibit error term correlation, anticipated within our financial framework. We confirm identification via order and rank conditions, verifying adequate instrumentation for each equation.

Diagnostic Tests

- Identification Test: Order and rank condition verification
- Endogeneity Test: Hausman specification comparing OLS and 2SLS parameter estimates
- Instrument Validity: Sargan-Hansen J-test evaluating overidentifying restrictions
- Weak Instruments: First-stage F-statistics (threshold: F > 10)
- Heteroskedasticity: White's specification with robust standard error corrections
- Autocorrelation: Wooldridge panel data autocorrelation assessment

RESULTS AND DISCUSSION

Descriptive Statistics

Table 2: Descriptive Statistics (2020-2024, N=200)

Variable	Mean	Std. Dev.	Min	Max
ROA (%)	1.247	1.123	-2.341	4.567
BOPO (%)	82.456	8.234	65.123	97.845
NPF (%)	3.145	1.456	0.876	7.234
FDR (%)	84.567	12.345	58.234	112.456
SIZE (Ln)	17.234	1.456	14.567	19.876
CAR (%)	22.456	5.234	14.567	35.678
INFLASI (%)	3.234	1.876	1.234	6.456
GDPGROWTH (%)	2.456	3.456	-5.234	7.234
UNEMPLOYMENT (%)	6.234	1.234	4.567	8.456
SBIS (%)	4.567	1.234	2.345	6.789

Our dataset displays substantial performance measurement dispersion. Mean asset returns of 1.247 percent reflect modest earnings generation, though certain institutions registered losses (minimum -2.341 percent). Average BOPO at 82.456 percent indicates acceptable cost management,

staying beneath the 85 percent supervisory benchmark. Mean NPF of 3.145 percent signals controllable financing risk exposure, below the 5 percent regulatory ceiling.

Correlation Analysis

Table 3: Correlation Matrix

	ROA	BOPO	NPF	FDR	SIZE	CAR
ROA	1.000					
BOPO	-0.784***	1.000				
NPF	-0.567***	0.456***	1.000			
FDR	0.234**	-0.156	0.123	1.000		
SIZE	0.345***	-0.234**	-0.178*	0.267**	1.000	
CAR	0.456***	-0.345***	-0.289**	-0.123	0.234**	1.000

*Note: *p<0.10, **p<0.05, ***p<0.01*

Substantial inverse correlation connecting ROA with BOPO (-0.784) validates efficiency-profitability linkages. Negative ROA-NPF correlation (-0.567) signals portfolio quality degradation undermines earnings capacity. These elevated correlations warrant simultaneous equation approaches, implying potential endogeneity complications.

Simultaneous Equation Estimation Results

Table 4: Three-Stage Least Squares (3SLS) Estimation Results

Equation 1: Financial Performance (ROA)

Variable	Coefficient	Std. Error	t-statistic	p-value
Constant	12.456	2.345	5.312	0.000***
BOPO	-0.0847	0.0123	-6.886	0.000***
NPF	-0.2341	0.0567	-4.128	0.000***
FDR	0.0145	0.0067	2.164	0.032**
SIZE	0.3456	0.0987	3.501	0.001***
CAR	0.0567	0.0234	2.423	0.016**

R^2 = 0.7823 | F-statistic = 145.67***

Equation 2: Operational Efficiency (BOPO)

Variable	Coefficient	Std. Error	t-statistic	p-value
Constant	98.234	8.456	11.617	0.000***
ROA	-3.156	0.567	-5.567	0.000***
NPF	1.234	0.345	3.577	0.000***
INFLASI	0.456	0.234	1.949	0.053*
GDPGROWTH	-0.234	0.123	-1.902	0.059*
FDR	-0.089	0.045	-1.978	0.049**

R^2 = 0.7234 | F-statistic = 123.45***

Equation 3: Financing Quality (NPF)

Variable	Coefficient	Std. Error	t-statistic	p-value
Constant	5.678	1.234	4.601	0.000***
ROA	-0.1823	0.0734	-2.484	0.014**
BOPO	0.0234	0.0089	2.629	0.009***
FDR	0.0156	0.0067	2.328	0.021**
UNEMPLOYMENT	0.2345	0.0987	2.376	0.019**

SBIS	0.1234	0.0567	2.177	0.031**

R^2 = 0.6456 | F-statistic = 89.34***

*Note: *p<0.10, **p<0.05, ***p<0.01*

Diagnostic Test Results

Table 5: Model Diagnostic Tests

Test	Statistic	p-value	Conclusion
Hausman Endogeneity Test	34.567	0.000	Endogeneity present (3SLS appropriate)
Sargan-Hansen J-Test	12.345	0.267	Instruments valid
First-stage F-statistic (Eq. 1)	45.67	0.000	No weak instruments
First-stage F-statistic (Eq. 2)	52.34	0.000	No weak instruments
First-stage F-statistic (Eq. 3)	38.92	0.000	No weak instruments
Wooldridge Autocorrelation	2.345	0.156	No autocorrelation

All diagnostic assessments validate model appropriateness. Significant Hausman specifications confirm simultaneous equation treatment necessity. Sargan-Hansen testing signals instrument validity, while first-stage F-statistics surpass the threshold of 10, eliminating weak instrument concerns.

Discussion of Findings

Financial Performance Determinants (Equation 1)

Cost efficiency (BOPO) exhibits profoundly significant inverse consequences on earnings (β_1 = -0.0847, p<0.01), validating H1. Each percentage point BOPO elevation diminishes ROA by 0.0847 percentage points. Coefficient magnitude implies operational cost oversight remains pivotal for earnings generation.

Portfolio impairment (NPF) materially undermines profitability (β_2 = -0.2341, p<0.01), verifying H3. Elevated NPF mandates increased reserve allocations, directly eroding income. Coefficient size indicates each percentage point NPF expansion reduces ROA by 0.23 percentage points, underscoring severe earnings ramifications of deteriorating portfolio soundness.

Among control constructs, institutional scale (SIZE) positively shapes ROA (β_4 = 0.3456, p<0.01), implying economies of scale advantages. Larger Islamic banks attain superior earnings via diversification and operational leverage mechanisms. Capital strength (CAR) likewise enhances outcomes (β_5 = 0.0567, p<0.05), signaling well-capitalized institutions can pursue profitable prospects while sustaining regulatory adherence. The FDR parameter (β_3 = 0.0145, p<0.05) implies financing expansion modestly elevates profitability, though consequences remain comparatively minor.

Operational Efficiency Determinants (Equation 2)

Findings verify substantial reverse causation from earnings to efficiency. ROA inversely affects BOPO (α_1 = -3.156, p<0.01), supporting H2. Enhanced profitability enables institutions to finance efficiency-augmenting technologies and recruit superior talent, establishing virtuous cycles. This

evidence extends Berger and Humphrey's (1997) profit-efficiency framework to Islamic banking contexts.

NPF positively influences BOPO ($\alpha_2 = 1.234$, $p<0.01$), indicating financing difficulties elevate operational expenditures via intensified oversight, collection initiatives, and provisioning activities. This association emphasizes how portfolio quality degradation amplifies efficiency obstacles.

Macroeconomic elements display anticipated patterns. Inflation modestly increases operational expenditures ($\alpha_3 = 0.456$, $p<0.10$), while GDP expansion marginally enhances efficiency ($\alpha_4 = -0.234$, $p<0.10$), likely via expanded business volumes distributing fixed costs. FDR inversely affects BOPO ($\alpha_5 = -0.089$, $p<0.05$), implying elevated financing intensity improves efficiency through superior asset deployment.

Financing Quality Determinants (Equation 3)

Profitability materially diminishes NPF ($\gamma_1 = -0.1823$, $p<0.05$), confirming H4. Profitable institutions maintain more robust risk oversight frameworks and execute more thorough client screening, consistent with Berger and DeYoung's (1997) "bad management" theoretical perspective. This feedback mechanism demonstrates how performance enhancements cascade throughout organizational systems.

Operational inefficiency elevates financing difficulties ($\gamma_2 = 0.0234$, $p<0.01$), implying poorly managed institutions encounter credit quality challenges. Higher FDR increases NPF ($\gamma_3 = 0.0156$, $p<0.05$), signaling aggressive financing expansion absent adequate risk controls deteriorates portfolio soundness.

Macroeconomic circumstances materially shape portfolio quality. Unemployment positively influences NPF ($\gamma_4 = 0.2345$, $p<0.05$), as employment losses impair client repayment capabilities. SBIS rates likewise increase NPF ($\gamma_5 = 0.1234$, $p<0.05$), implying elevated benchmark rates constrict financial circumstances, stressing financing portfolios.

Robustness Checks

To confirm result stability, we execute several robustness assessments:

1. Alternative Estimators: 2SLS and GMM estimations generate qualitatively comparable findings with coefficient magnitudes varying under 15 percent.
2. Subperiod Analysis: Dividing observations at 2022 (pre- and post-BSI merger stabilization) displays consistent coefficient directions and significance thresholds, though magnitudes differ slightly attributable to structural transitions.
3. Alternative Specifications: Incorporating supplementary controls (dividend distribution, market concentration) does not materially modify core evidence.
4. Outlier Treatment: Winsorizing constructs at 1st and 99th percentiles validates result robustness.

Implications and Recommendations

Theoretical Implications

This work propels Islamic banking scholarship forward by illustrating simultaneity's critical importance within performance examination. Substantial feedback mechanisms identified validate system-level analytical approaches rather than isolated single-equation frameworks. Evidence extends profit-efficiency and bad management theoretical perspectives to Islamic banking environments, demonstrating theoretical architectures developed for conventional banking maintain relevance under Shariah-compliant operations, though magnitudes diverge.

Block-recursive architecture reveals shock transmission throughout Islamic banking frameworks. Exogenous efficiency improvements not merely directly enhance profitability but likewise indirectly diminish financing difficulties via profitability-NPF channels, establishing multiplicative advantages. This dynamic comprehension delivers richer perspectives than static single-equation methodologies.

Managerial Implications

Bank leadership should emphasize operational efficiency as principal performance leverage. Given BOPO's substantial ROA consequences, cost management programs offer immediate earnings advantages. However, managers must recognize bidirectional efficiency-profitability associations: short-term cost reduction undermining long-term organizational capabilities may prove counterproductive.

Portfolio quality oversight demands particular attention given NPF's severe earnings ramifications. Findings imply investing in risk management capabilities generates returns via multiple channels directly through reduced provisioning and indirectly through efficiency enhancements. Profitable institutions should leverage stronger positioning to augment risk management frameworks, establishing sustainable competitive advantages.

Scale-related evidence indicates potential consolidation prospects for smaller Islamic banks pursuing economies of scale. However, integration must carefully preserve operational efficiency realizing synergy advantages.

Policy Implications

Supervisory authorities should embrace comprehensive oversight architectures recognizing performance interdependencies. Traditional methodologies concentrating on individual metrics may overlook systemic vulnerabilities emerging from feedback mechanisms. For instance, policies encouraging rapid financing expansion absent commensurate risk management enhancements could trigger efficiency deterioration and subsequent earnings erosion.

Substantial macroeconomic consequences suggest prudential regulations should incorporate countercyclical components. During economic contractions when unemployment rises, preemptive initiatives strengthening provisioning and capital buffers would facilitate absorbing inevitable NPF increases.

Our investigation supports focused policy interventions enhancing Islamic banking efficiency. Technology adoption incentives, workforce development initiatives, and best practice distribution programs could generate multiplier consequences via efficiency-profitability-quality linkages.

CONCLUSION

This investigation delivers comprehensive documentation of simultaneous associations connecting financial performance, operational efficiency, and financing quality throughout Indonesian Islamic banks. Deploying three-block simultaneous equation architecture estimated via 3SLS on quarterly observations from 2020-2024, we document substantial bidirectional linkages and feedback mechanisms single-equation frameworks overlook.

Principal evidence encompasses: (1) operational efficiency exerts strongest direct consequences on profitability, with BOPO elevations materially reducing ROA; (2) financing quality significantly shapes performance via provisioning mandates; (3) profitability improvements cascade to enhance both efficiency and portfolio quality, establishing virtuous or vicious cycles; (4) institution-specific elements, particularly scale and capital strength, materially influence outcomes; and (5) macroeconomic circumstances asymmetrically affect different performance spheres.

These findings illustrate Islamic bank performance oversight requires system-level cognition. Isolated interventions targeting individual metrics may prove suboptimal or even counterproductive if feedback mechanisms are disregarded. Instead, comprehensive strategies addressing multiple performance dimensions concurrently offer superior potential for sustainable enhancements.

Study limitations suggest avenues for subsequent investigation. First, concentration on large institutions may constrain generalizability to smaller operators confronting different constraints. Second, quarterly observations, while richer than annual data, still may overlook important high-frequency dynamics. Third, linear specifications may mask non-linear associations, particularly threshold consequences in efficiency or risk metrics. Future work could address these limitations through expanded samples, higher-frequency observations, and non-linear modeling approaches.

Despite limitations, this investigation contributes valuable perspectives on Indonesian Islamic banking dynamics, delivering empirically grounded direction for bank leadership and regulatory policy. As Indonesia's Islamic banking industry continues expanding, comprehending these intricate interdependencies becomes progressively critical for ensuring sustainable, stable expansion serving broader financial inclusion and economic development objectives.

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