

Analysis of the Effect of Capital Adequacy (CAR) and Intermediation Liquidity (FDR) on Net Operating Margin (NOM) Performance in Indonesian Islamic Banking

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Abstract

This study examines the relationship between Capital Adequacy Ratio (CAR), Financing to Deposit Ratio (FDR), and Net Operating Margin (NOM) in Indonesian Islamic Commercial Banks using monthly data from January 2022 to December 2024. The study employs a quantitative explanatory approach with 36 observations obtained from the Sharia Banking Statistics published by the Financial Services Authority (OJK). The analysis includes descriptive statistics, Ordinary Least Squares regression, diagnostic tests, stationarity testing, cointegration analysis, and a first-difference regression with calendar-month effects and Newey–West HAC standard errors. The benchmark regression indicated that CAR had a positive and significant relationship with NOM, while FDR was negative and insignificant. However, the variables were non-stationary in levels and did not exhibit significant cointegration. After first differencing and applying robust estimation, both CAR and FDR showed negative but statistically insignificant coefficients. The findings indicate that short-run changes in capital adequacy and financing intermediation do not independently explain changes in NOM. Operating margin performance is therefore likely influenced by broader financial and operational factors beyond CAR and FDR.

Keywords: Capital Adequacy Ratio; Financing to Deposit Ratio; Islamic Commercial Banks; Net Operating Margin; Sharia Banking

INTRODUCTION

Islamic banking plays an important intermediary role by mobilizing funds from surplus units and channeling them into financing activities based on Sharia principles. The sustainability of this intermediary function depends not only on the ability of Islamic banks to expand financing but also on their capacity to maintain adequate capital, manage liquidity, and generate sufficient operating returns. Consequently, financial performance has become an important area of evaluation because changes in internal banking ratios may reflect differences in the ability of Islamic banks to maintain profitability and financial resilience. Previous empirical studies have consistently placed capital adequacy and financial intermediation among the important internal indicators associated with the financial performance of Islamic Commercial Banks in Indonesia (Sjarief et al., 2023; Hasibuan et al., 2022).

One indicator that is particularly relevant to the operating performance of Islamic banks is Net Operating Margin (NOM). Unlike conventional banking measures that emphasize interest-based margins, NOM reflects the ability of Islamic banks to generate net operating income from productive assets within the structure of Sharia-compliant financial intermediation. A higher NOM indicates a stronger ability to convert productive assets into net operating income, whereas a lower NOM may indicate pressure on earning-asset productivity, financing returns, or funding and operating costs. Empirical studies have consequently used NOM both as an indicator of Islamic bank profitability and as an intermediary variable connecting financial ratios with broader profitability measures (Ardiani et al., 2023; Novitasari & Annisa, 2023).

Capital Adequacy Ratio (CAR) represents one of the principal indicators of a bank's ability to absorb financial risk. A sufficiently strong capital position provides a buffer against unexpected losses and creates greater capacity for banks to support the expansion of productive assets and financing. From this perspective, higher capital adequacy may strengthen the ability of Islamic banks to undertake income-generating activities and consequently improve their operating

margin. Nevertheless, a high CAR does not necessarily lead automatically to higher profitability because additional capital may remain underutilized or be allocated conservatively rather than being transformed into productive earning assets. Previous studies of Indonesian Islamic banks have therefore generated varying conclusions regarding the relationship between capital adequacy and financial performance (Ardichy & Rahayu, 2022; Ibrahim et al., 2026).

The potential relationship between CAR and NOM is particularly important because capital strength and operating-margin performance represent different dimensions of financial soundness. CAR primarily indicates a bank's loss-absorbing capacity, whereas NOM reflects the effectiveness of earning assets in generating net operating returns. Khasanah and Stiawan (2023) found that CAR did not have a statistically significant effect on NOM in their study of Islamic Commercial Banks, suggesting that stronger capitalization does not necessarily translate directly into higher operating margins. Conversely, more recent research examining the 2022–2024 period reported evidence of a relationship between capital adequacy and NOM, indicating that the empirical connection between the two ratios remains open to further examination. The inconsistency in these findings suggests that the CAR–NOM relationship may be influenced by the observation period, data frequency, banking conditions, and statistical model employed.

In addition to capital adequacy, the Financing to Deposit Ratio (FDR) represents a fundamental indicator of the intermediary function of Islamic banks. FDR reflects the proportion of collected funds that is distributed into financing activities. An increase in FDR can indicate that a larger proportion of available funds is being transformed into financing, potentially increasing income generated from productive assets. However, a higher FDR can also increase liquidity pressure when financing expansion exceeds the bank's capacity to maintain an appropriate funding structure. Therefore, the relationship between financial intermediation and profitability is theoretically ambiguous and depends on the quality, pricing, and productivity of the financing distributed by the bank (Rizky et al., 2023; Sjarief et al., 2023).

Empirical evidence regarding FDR also remains inconsistent. Ardiani et al. (2023), using NOM as the profitability indicator, reported a negative relationship between FDR and NOM among Indonesian Islamic Commercial Banks. In contrast, Khasanah and Stiawan (2023) found that FDR significantly affected NOM. Research that uses ROA rather than NOM also reports varying results; several studies have found that FDR is relevant to profitability, whereas others have obtained statistically insignificant relationships. Such differences indicate that the profitability consequences of financing intermediation may depend on the profitability measure, sample structure, observation period, and econometric specification used in the analysis (Mulyawisdawati et al., 2025; Ardichy & Rahayu, 2022).

The relationship among CAR, FDR, and NOM is also potentially reciprocal rather than mechanically one-directional. Fitriana et al. (2024), for example, examined NOM and FDR as determinants of CAR and found that NOM influenced capital adequacy while FDR did not. Other research has positioned NOM as a moderating variable in the relationship between CAR, FDR, and ROA, demonstrating that operating-margin performance may play a more complex role within the financial structure of Islamic banks (Novitasari & Annisa, 2023). These different model specifications reveal that there is still no single empirical framework that conclusively explains how capitalization, intermediation liquidity, and operating-margin performance interact.

A further research gap concerns the dependent variable used in the Islamic banking literature. A substantial proportion of empirical studies focuses primarily on Return on Assets (ROA) as the measure of profitability and examines CAR and FDR as its determinants (Hasibuan et al., 2022; Sjarief et al., 2023). More recent studies also continue to emphasize CAR and FDR in explaining ROA, including research using more contemporary post-pandemic observations (Ibrahim et al., 2026; Mulyawisdawati et al., 2025). Although these studies provide important evidence concerning overall profitability, relatively fewer studies directly position NOM as the principal dependent variable and simultaneously examine CAR and FDR as its determinants. Studies involving NOM have more frequently treated it as a mediator, moderator, explanatory variable, or one component among several financial performance indicators.

This gap is important because ROA and NOM capture different dimensions of bank performance. ROA reflects the overall ability of a bank to generate profit from its asset base, whereas NOM more specifically reflects the net operating return generated through productive assets. Accordingly, examining NOM directly may provide a more focused understanding of whether capital strength and the intensity of financial intermediation are translated into operating-margin performance. The importance of distinguishing among different measures of profitability has also been emphasized in previous research showing that the significance and direction of internal financial ratios can differ depending on the performance indicator and analytical framework employed (Novitasari & Annisa, 2023; Ardiani et al., 2023).

The present study therefore examines the relationship between Capital Adequacy Ratio (CAR), Financing to Deposit Ratio (FDR), and Net Operating Margin (NOM) in Indonesian Islamic Commercial Banks using monthly secondary data for the 2022–2024 period. The use of monthly observations provides a more detailed representation of short-term financial dynamics than annual observations and allows changes in capitalization, intermediation, and operating-margin performance to be evaluated over time. This approach is particularly relevant because recent research continues to identify inconsistencies in the effects of CAR and FDR on Islamic bank financial performance, indicating that conclusions may be sensitive to both the period analyzed and the econometric specification adopted (Ibrahim et al., 2026; Mulyawisdawati et al., 2025).

Accordingly, this study aims to analyze whether changes in capital adequacy and financing intermediation are associated with the Net Operating Margin of Indonesian Islamic Commercial Banks. The study contributes to the literature in three respects. First, it places NOM directly as the principal performance variable rather than merely as an intervening or moderating variable. Second, it jointly evaluates CAR and FDR to distinguish the role of capital strength from the intensity of the intermediary function in explaining operating-margin performance. Third, the study uses higher-frequency monthly observations and evaluates the statistical properties of the financial-ratio series before final hypothesis inference. This approach is expected to provide more robust empirical evidence regarding the relationship between capitalization, intermediation liquidity, and operating-margin performance in Indonesian Islamic banking.

METHOD

This study employs a quantitative explanatory approach using secondary monthly time-series data from Indonesian Islamic Commercial Banks (Bank Umum Syariah or BUS). The dataset comprises 36 consecutive monthly observations covering January 2022 through December 2024. The monthly CAR, FDR, and NOM series were obtained from Table 1a, “Kinerja Keuangan Bank Umum Syariah (Financial Performance of Islamic Commercial Bank),” reported in the December 2022, December 2023, and December 2024 editions of the Sharia Banking Statistics published by the Financial Services Authority of Indonesia (OJK). These publications provide aggregate monthly financial-performance ratios for Indonesian Islamic Commercial Banks, allowing the three variables to be compiled consistently across the entire observation period. Net Operating Margin (NOM) is used as the dependent variable, while Capital Adequacy Ratio (CAR) and Financing to Deposit Ratio (FDR) are employed as independent variables.

The analysis began with descriptive statistics to identify the distribution and development of CAR, FDR, and NOM. An Ordinary Least Squares (OLS) regression was subsequently estimated as the benchmark model. Residual normality was evaluated using the Jarque–Bera test, which provides a formal procedure for assessing deviations from normality in regression residuals (Jarque & Bera, 1980). Heteroskedasticity was examined using the Breusch–Pagan test to determine whether the residual variance remained constant across observations (Breusch & Pagan, 1979).

Because the study uses monthly time-series data, stationarity was examined using the Augmented Dickey–Fuller approach. Unit-root testing is necessary because regressions involving non-stationary variables may produce misleading statistical relationships (Dickey & Fuller, 1979). The ADF regressions were specified with an intercept but without a deterministic time trend,

reflecting the non-zero mean of the financial ratios while avoiding the imposition of a deterministic linear trend over the relatively short observation period. One lag of the differenced variable was included in each ADF specification to capture immediate month-to-month dependence while limiting the loss of degrees of freedom associated with the 36-observation sample.

When the variables were identified as integrated of the same order, the Engle–Granger procedure was applied to test whether they shared a stable long-run equilibrium relationship (Engle & Granger, 1987). The procedure was implemented in two stages: first, the level relationship between NOM, CAR, and FDR was estimated by OLS with an intercept, and the resulting residual series was retained; second, an ADF unit-root test was applied to the estimated residuals. Cointegration was inferred when the null hypothesis of a unit root in the residual series was rejected; failure to reject this null was interpreted as evidence that the variables did not form a statistically stable long-run equilibrium relationship.

Residual autocorrelation was evaluated using the Durbin–Watson statistic and the Breusch–Godfrey Lagrange Multiplier test. The Breusch–Godfrey procedure allows serial dependence to be examined beyond first-order autocorrelation and is appropriate for regression-based time-series diagnostics (Godfrey, 1978). Since the variables were non-stationary in levels and no significant cointegration relationship was identified, the final regression was estimated using first-differenced variables.

Calendar-month effects were included to account for recurring monthly patterns in the financial ratios. In addition, Newey–West heteroskedasticity and autocorrelation consistent (HAC) standard errors were employed to provide more robust statistical inference in the presence of heteroskedasticity and temporal dependence (Newey & West, 1987). All hypotheses were evaluated using a 5% significance level.

RESULTS AND DISCUSSION

Descriptive Statistics Analysis

This study uses monthly aggregate data of Indonesian Islamic Commercial Banks (*Bank Umum Syariah* or BUS) obtained from the *Sharia Banking Statistics* published by the Financial Services Authority (OJK). The observation period covers January 2022 to December 2024, resulting in 36 monthly observations for Capital Adequacy Ratio (CAR), Financing to Deposit Ratio (FDR), and Net Operating Margin (NOM). The descriptive statistics are presented in Table 1.

Table 1. Descriptive Statistics of Research Variables, 2022–2024

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Capital Adequacy Ratio (CAR)	36	22.41	26.28	24.826	1.186
Financing to Deposit Ratio (FDR)	36	68.98	83.94	78.328	4.134
Net Operating Margin (NOM)	36	2.40	3.04	2.672	0.122

Source: Authors' calculation based on OJK Sharia Banking Statistics (2022–2024).

CAR recorded an average value of 24.826%, with a minimum of 22.41% and a maximum of 26.28%. Its relatively limited standard deviation of 1.186 percentage points indicates that the aggregate capital position of Islamic Commercial Banks remained comparatively stable throughout the observation period. Nevertheless, the monthly series shows an upward shift between 2022 and the subsequent years, suggesting a strengthening of the aggregate capital buffer after the beginning of the observation period.

FDR had an average value of 78.328%, with a minimum of 68.98% and a maximum of 83.94%. The standard deviation of 4.134 percentage points is substantially larger than that of CAR, indicating greater variation in the degree of financial intermediation. The increase from the lower values observed in early 2022 toward levels exceeding 80% in much of 2023–2024 suggests that Islamic Commercial Banks increasingly allocated third-party funds into financing activities.

Meanwhile, NOM recorded an average of 2.672%, ranging from 2.40% to 3.04%, with a relatively small standard deviation of 0.122 percentage points. Although its overall dispersion was limited, the monthly development of NOM was not completely aligned with movements in either CAR or FDR. This initial observation indicates that an improvement in capitalization or an increase in financing intermediation does not necessarily translate proportionally into an immediate improvement in the net operating margin.

To examine these developments more clearly, Table 2 presents annual averages and year-end values of CAR, FDR, and NOM.

Table 2. Annual Development of CAR, FDR, and NOM

Year	Mean CAR	Mean FDR	Mean NOM	Year-End CAR	Year-End FDR	Year-End NOM
2022	23.402	73.713	2.584	26.28	75.19	2.59
2023	25.529	79.569	2.780	25.41	79.06	2.55
2024	25.547	81.701	2.653	25.30	80.81	2.69

Source: Authors' calculation based on monthly OJK Sharia Banking Statistics.

The annual averages reveal several noteworthy developments. Average CAR increased considerably from 23.402% in 2022 to 25.529% in 2023 and remained relatively stable at 25.547% in 2024. This indicates that aggregate capital adequacy strengthened between 2022 and 2023 but subsequently entered a relatively stable phase.

FDR increased more consistently, from an annual average of 73.713% in 2022 to 79.569% in 2023 and 81.701% in 2024. This development suggests an increasing intensity of financial intermediation, as a larger proportion of third-party funds was converted into financing. The official OJK statistics also show that year-end FDR increased from 75.19% in 2022 to 79.06% in 2023 and 80.81% in 2024.

NOM, however, displays a different pattern. Its annual average increased from 2.584% in 2022 to 2.780% in 2023 but subsequently decreased to 2.653% in 2024. Therefore, although average CAR remained high and FDR continued to increase in 2024, the average operating margin declined. This divergence provides an early indication that the relationship among capitalization, intermediation liquidity, and operating margin is not mechanically linear. Other factors, including financing yields, funding costs, financing quality, earning-asset composition, and operating conditions, may influence the ability of Islamic banks to convert their capital and financing activities into net operating margins.

Preliminary Multiple Linear Regression Analysis

As an initial benchmark, multiple linear regression using Ordinary Least Squares (OLS) was performed on the variables in their observed levels. The benchmark model is specified as follows:

$$NOM_t = \alpha + \beta_1 CAR_t + \beta_2 FDR_t + \varepsilon_t$$

The results are presented in Table 3.

Table 3. Benchmark OLS Regression in Levels

Variable	Coefficient (B)	Std. Error	t-statistic	p-value
Constant	1.4100	0.366	3.854	0.001
CAR	0.0826	0.021	3.965	<0.001
FDR	-0.0101	0.006	-1.682	0.102

Notes: Model statistics: N = 36; R² = 0.363; Adjusted R² = 0.325; F = 9.415; p < 0.001.

Source: Authors' calculation based on OJK Sharia Banking Statistics (2022–2024).

The estimated benchmark equation is:

$$\text{NOM} = 1.4100 + 0.0826(\text{CAR}) - 0.0101(\text{FDR}) + \varepsilon$$

The level regression initially suggests that CAR is positively and statistically associated with NOM. Holding FDR constant, a one-percentage-point increase in CAR is associated with an estimated 0.0826-percentage-point increase in NOM. The coefficient is statistically significant at $p < 0.001$.

In contrast, FDR has a negative coefficient of -0.0101 . Holding CAR constant, a one-percentage-point increase in FDR is associated with an estimated 0.0101-percentage-point reduction in NOM. However, the coefficient is not statistically significant at the 5% level ($p = 0.102$).

The benchmark model has an R^2 of 0.363, indicating that approximately 36.3% of the variation in the level of NOM is statistically associated with CAR and FDR within this specification. The overall F-statistic is also statistically significant ($F = 9.415$; $p < 0.001$).

Nevertheless, these results cannot immediately be treated as final hypothesis evidence because the observations constitute monthly time-series data. A regression between trending or non-stationary financial ratios may generate apparently significant coefficients even when the estimated relationship primarily reflects common movements over time. Therefore, diagnostic and stationarity tests were performed before drawing final conclusions.

Diagnostic Tests of the Benchmark Model

The benchmark regression was evaluated for residual normality, multicollinearity, heteroskedasticity, and serial correlation. The results are summarized in Table 4.

Table 4. Diagnostic Tests of the Benchmark OLS Model

Diagnostic Test	Statistic	p-value / Criterion	Interpretation
Jarque–Bera	0.130	0.937	Normality not rejected
VIF – CAR	2.133	< 5	No serious multicollinearity
VIF – FDR	2.133	< 5	No serious multicollinearity
Breusch–Pagan	14.229	< 0.001	Heteroskedasticity detected
Durbin–Watson	1.550	–	Moderate positive dependence indicated
Breusch–Godfrey, lag 1	1.815	0.178	Serial correlation not statistically detected
Breusch–Godfrey, lag 4	7.573	0.109	Serial correlation not statistically detected

Source: Authors' calculation.

The Jarque–Bera probability of 0.937 indicates that the normality assumption is not rejected in the benchmark model. Furthermore, VIF values of 2.133 for both CAR and FDR indicate that serious multicollinearity is not present, despite a moderate positive relationship between the two financial ratios.

The Breusch–Pagan test, however, produces a statistically significant result ($p < 0.001$), demonstrating that the residual variance is not constant. Hence, the conventional OLS standard errors are potentially inefficient and should not be relied upon without correction.

Although the Durbin–Watson statistic of 1.550 suggests some positive residual dependence, the Breusch–Godfrey tests do not detect statistically significant serial correlation at either one or four lags. Heteroskedasticity therefore represents the clearer violation in the benchmark model. More importantly, the time-series properties of the underlying variables still need to be examined before the level regression can be considered valid for inference.

Stationarity and Cointegration Analysis

The Augmented Dickey–Fuller (ADF) test was applied to examine whether CAR, FDR, and NOM are stationary. The results are presented in Table 5.

Table 5. Augmented Dickey–Fuller Unit-Root Tests

Variable	ADF Statistic – Level	p-value	ADF Statistic – First Difference	p-value	Result
NOM	-2.206	0.204	-4.591	<0.001	I(1)
CAR	-2.242	0.191	-4.123	<0.001	I(1)
FDR	-2.265	0.184	-3.803	0.003	I(1)

Notes: ADF test estimated with one lag.

Source: Authors' calculation.

The unit-root test fails to reject the null hypothesis of non-stationarity for all three variables in their levels. NOM, CAR, and FDR have level p-values of 0.204, 0.191, and 0.184, respectively. Because all three probability values exceed the 5% significance level, the null hypothesis that each series contains a unit root cannot be rejected, indicating that NOM, CAR, and FDR are non-stationary in levels. Thus, conventional regression involving these level series may be susceptible to a spurious-regression problem.

After first differencing, all variables become stationary at the 5% significance level. The ADF statistics for Δ NOM, Δ CAR, and Δ FDR are -4.591, -4.123, and -3.803, with corresponding p-values of <0.001, <0.001, and 0.003, respectively. These results indicate that the null hypothesis of a unit root is rejected for each first-differenced series. Therefore, all three series are treated as integrated of order one, I(1). In other words, although the variables are non-stationary in their original levels, their month-to-month changes are stationary, satisfying the common-order-of-integration condition required before examining whether a cointegrating relationship exists.

Because the variables are non-stationary in levels but stationary after first differencing, an Engle–Granger cointegration test was subsequently performed to determine whether CAR, FDR, and NOM share a stable long-run equilibrium relationship. In this residual-based procedure, the level relationship among NOM, CAR, and FDR was first estimated, after which the residuals from the estimated long-run equation were tested for stationarity. The test produces a statistic of -2.442 with a probability value of 0.515. Because the probability value exceeds the 5% significance level, the null hypothesis of a unit root in the estimated residuals cannot be rejected. This indicates that deviations from the estimated level relationship do not exhibit a statistically stationary adjustment process and, consequently, there is insufficient evidence that CAR, FDR, and NOM are cointegrated over the 2022–2024 observation period.

The absence of statistically significant cointegration implies that the significant CAR coefficient obtained from the benchmark level regression should not be interpreted as evidence of a stable long-run structural relationship. More specifically, the positive and significant CAR coefficient in the level regression may reflect common temporal movements among the non-stationary series rather than a persistent equilibrium relationship between capital adequacy and NOM. Consequently, final hypothesis inference is based on changes in the variables rather than on their non-stationary levels.

Robust Short-Run Regression Analysis

The final specification was estimated using first-differenced variables to examine whether short-run changes in capital adequacy and financing intermediation are associated with short-run changes in NOM. Calendar-month effects were controlled to account for recurring monthly patterns in the financial ratios, and Newey–West heteroskedasticity and autocorrelation consistent (HAC) standard errors were applied to provide robust statistical inference.

The final model is expressed as:

$$\Delta \text{NOM}_t = \alpha + \beta_1 \Delta \text{CAR}_t + \beta_2 \Delta \text{FDR}_t + \text{Calendar-Month Effects} + \varepsilon_t$$

The estimation results are reported in Table 6.

Table 6. Robust First-Difference Regression Results

Variable	Coefficient	HAC Std. Error	t-statistic	p-value	Decision
ΔCAR	-0.0185	0.0351	-0.527	0.604	H1 Not Supported
ΔFDR	-0.0212	0.0156	-1.359	0.189	H2 Not Supported

Notes: Model information: N = 35; Calendar-month effects = included; $R^2 = 0.570$; Adjusted $R^2 = 0.303$. Joint Wald test for ΔCAR and ΔFDR : F = 2.007; p = 0.159.

Source: Authors' calculation based on OJK Sharia Banking Statistics (2022–2024).

The coefficient of ΔCAR is -0.0185 and is not statistically significant ($p = 0.604$). Therefore, the first hypothesis is not supported in the final robust specification. The result indicates that a monthly increase in capital adequacy is not systematically followed by an increase in NOM within the same period.

The coefficient of ΔFDR is -0.0212 with a probability value of 0.189. Although its direction is negative, the coefficient is also statistically insignificant at the 5% level. Thus, the second hypothesis is not supported. Changes in the proportion of third-party funds channeled into financing do not independently explain contemporaneous changes in NOM after the time-series characteristics of the data are taken into account.

The joint Wald test produces an F-statistic of 2.007 with $p = 0.159$. Therefore, ΔCAR and ΔFDR are also not jointly significant at the 5% level. This finding suggests that short-run movements in the two financial ratios alone are insufficient to explain changes in the operating margin of Indonesian Islamic Commercial Banks.

Post-Estimation Diagnostics

Post-estimation diagnostics were conducted on the final model to assess the remaining residual characteristics.

Table 7. Post-Estimation Diagnostics of the Final Model

Diagnostic Test	Statistic	p-value	Interpretation
Durbin–Watson	2.279	–	No material first-order positive autocorrelation
Breusch–Godfrey, lag 3	2.064	0.559	Serial correlation not detected
Breusch–Pagan	32.623	0.002	Heteroskedasticity remains
Jarque–Bera	7.453	0.024	Strict normality rejected

Source: Authors' calculation.

The Durbin–Watson statistic of 2.279 and the insignificant Breusch–Godfrey result ($p = 0.559$) indicate that serial correlation is no longer a material problem in the final model. The Breusch–Pagan test remains statistically significant, indicating that residual heteroskedasticity persists. This condition provides the primary justification for using Newey–West HAC standard errors in the final inference.

The Jarque–Bera test rejects strict residual normality at the 5% significance level. Therefore, the statistical results should be interpreted cautiously, particularly because the observation period consists of only 36 monthly observations. Nevertheless, the use of HAC standard errors reduces reliance on conventional homoskedastic OLS standard errors and provides more robust inference under the detected residual conditions.

Discussion

The Relationship between Capital Adequacy Ratio (CAR) and Net Operating Margin (NOM)

The final analysis finds that short-run changes in CAR are negatively but not statistically significantly associated with changes in NOM. The coefficient of -0.0185 and p-value of 0.604 provide insufficient statistical evidence that monthly changes in capital adequacy independently determine changes in the operating margin of Islamic Commercial Banks during 2022–2024.

This result requires a distinction between capital strength and income generation. CAR reflects the capacity of a bank's capital to absorb risks relative to risk-weighted assets. A strong capital position improves financial resilience and creates capacity for business expansion. However, capital itself does not automatically generate operating income. The extent to which additional capital contributes to NOM depends on whether the available capital supports productive earning assets, the yield generated by those assets, financing quality, and the costs associated with obtaining and managing funds.

The descriptive results illustrate this distinction. Average CAR increased sharply from 23.402% in 2022 to 25.529% in 2023, while average NOM also increased from 2.584% to 2.780%. At the level of the variables, this common movement explains why the preliminary OLS regression initially produces a significant positive CAR coefficient.

However, the pattern changes between 2023 and 2024. Average CAR remained almost unchanged, increasing slightly from 25.529% to 25.547%, whereas average NOM decreased from 2.780% to 2.653%. Thus, a high or increasing capital ratio does not necessarily correspond to a higher operating margin in every period. Once the common trends in the variables are removed through first differencing, the apparent positive level relationship disappears.

The finding is consistent with Khasanah and Stiawan (2023), who examined Islamic Commercial Banks during 2017–2022 and found that CAR did not have a statistically significant effect on NOM. Their study similarly suggests that capital adequacy alone is not sufficient to explain variations in the operating margin.

There are several possible economic explanations. First, a high CAR may reflect a substantial capital buffer rather than aggressive utilization of capital for income-generating assets. Banks with strong capital positions may maintain conservative financing strategies, meaning that additional capital does not immediately increase operating income. Second, an increase in CAR may arise from changes in the denominator, namely risk-weighted assets, rather than from a direct increase in productive financing. Third, the return generated from additional capital may require a longer period before appearing in operating income.

The difference between the positive significant coefficient in the benchmark regression and the insignificant coefficient in the final model also carries an important methodological implication. If the analysis had stopped at conventional multiple regression in levels, the study would have concluded that CAR significantly improves NOM. However, the ADF and cointegration tests show that such an inference is not statistically reliable. The significant level relationship appears to be partly associated with the temporal movement of the series rather than with a stable short-run relationship.

Therefore, the findings should not be interpreted as indicating that capital adequacy is unimportant. Adequate capitalization remains fundamental to banking resilience, risk absorption, and the ability to support business expansion. Rather, the empirical evidence indicates that changes in capital adequacy do not automatically translate into immediate changes in net operating margin.

From a managerial perspective, the implication is that maintaining a high CAR should be accompanied by effective allocation of capital toward productive and appropriately risk-adjusted earning assets. Capital accumulation without efficient deployment may strengthen solvency without necessarily improving operating margins.

The Relationship between Financing to Deposit Ratio (FDR) and Net Operating Margin (NOM)

The final model also finds that ΔFDR has a negative but statistically insignificant coefficient. The coefficient of -0.0212 indicates that an increase in financing intermediation is directionally associated with a lower contemporaneous change in NOM, but the probability value of 0.189 indicates that the relationship is not statistically established at the 5% level.

FDR reflects the intensity with which funds collected from depositors are converted into financing. Theoretically, increasing the proportion of funds allocated to productive financing may

increase income from earning assets and subsequently improve NOM. However, this mechanism depends on several intermediate conditions. Financing must generate adequate yields, financing quality must remain controlled, funding costs must be manageable, and the return generated from financing must exceed the related operating and risk costs.

The descriptive data again demonstrate why the relationship is more complex than a simple linear effect. Average FDR increased consistently from 73.713% in 2022 to 79.569% in 2023 and 81.701% in 2024. However, NOM did not continue increasing over the same period. Instead, average NOM increased in 2023 but declined to 2.653% in 2024 even as FDR continued to increase.

This divergence indicates that a higher level of financing intermediation does not automatically produce a proportionately higher operating margin. An increase in financing may contribute to operating income, but its margin contribution depends on financing yields, customer risk, financing composition, funding costs, and the timing of income recognition.

The present result differs from Khasanah and Stiawan (2023), who found that FDR had a statistically significant relationship with NOM using bank-level observations for 2017–2022. The difference may reflect important methodological and contextual distinctions. Their study used annual bank-level observations across Islamic Commercial Banks, whereas the present study examines aggregate monthly movements in the BUS industry during the post-2021 period. The present analysis also explicitly accounts for non-stationarity and temporal dependence before testing the final relationship.

Accordingly, the two findings do not necessarily contradict one another. Cross-bank differences in FDR may explain differences in NOM over longer periods even when month-to-month changes in aggregate industry FDR do not generate a statistically detectable contemporaneous change in aggregate NOM.

The relationship may also involve temporal lags. Financing extended in a particular month may not immediately produce its full operating return within the same month. Profit-sharing arrangements, installment structures, financing maturation, impairment recognition, and changes in funding costs may cause the impact on operating margins to appear gradually. A contemporaneous short-run specification therefore captures only one dimension of the relationship.

Furthermore, existing research has also modeled the relationship in the opposite direction. Atmojo and Nurfahmiyati (2021), for example, examined CAR, BOPO, and NOM as determinants of FDR using OJK time-series data. This illustrates that liquidity, capitalization, and operating margins may be jointly determined within bank management rather than operating through a strictly one-way causal mechanism.

The managerial implication is therefore not that increasing FDR is undesirable. Rather, banks should focus on the quality and margin productivity of intermediation, rather than maximizing the financing ratio itself. An expansion of financing contributes positively to financial performance only when the additional financing generates adequate risk-adjusted returns and does not create disproportionate funding or credit costs.

Simultaneous Relationship of CAR and FDR with NOM

The joint Wald test indicates that changes in CAR and FDR are not jointly significant in explaining contemporaneous changes in NOM ($F = 2.007$; $p = 0.159$). Therefore, the empirical evidence does not support the proposition that short-run movements in capitalization and financing intermediation jointly determine monthly changes in the operating margin during the 2022–2024 period.

This finding should not be interpreted as evidence that capital and liquidity are irrelevant to Islamic banking performance. Instead, it indicates that NOM reflects a broader operating mechanism than can be represented by CAR and FDR alone.

NOM is directly related to net operating income generated from productive assets. Consequently, variations in NOM may also depend on factors such as financing yields, cost of

funds, composition of earning assets, non-performing financing, profit-sharing arrangements, operating efficiency, competitive pricing, and macroeconomic conditions. Two banks or periods with similar CAR and FDR may therefore generate substantially different margins depending on the quality and pricing of their productive assets.

The result also highlights an important distinction between capacity, intermediation, and margin realization. CAR represents the financial capacity to absorb risk, while FDR reflects the intensity of intermediation. NOM, however, represents the outcome of how successfully earning assets generate net operating income. Strong capital and active financing are therefore enabling conditions, but they do not guarantee margin realization.

Overall Interpretation of the Findings

The analysis generates three principal findings. First, the descriptive evidence indicates that Indonesian Islamic Commercial Banks maintained strong capitalization while steadily increasing financial intermediation during 2022–2024. Average CAR increased substantially between 2022 and 2023 and remained relatively stable in 2024, while FDR continued to increase throughout the observation period.

Second, conventional regression in levels initially indicates a positive and statistically significant relationship between CAR and NOM, whereas FDR appears negative and insignificant. However, all three variables are non-stationary in levels and no statistically significant cointegration relationship is identified. Consequently, the statistically significant CAR coefficient in the benchmark model cannot be considered robust evidence of a stable relationship.

Third, after transforming the variables into stationary first differences and using robust statistical inference, neither CAR nor FDR is statistically significant in explaining short-run changes in NOM. Both coefficients are negative, but their probability values exceed the 5% significance threshold. The joint Wald test similarly fails to establish a significant simultaneous relationship.

These results demonstrate the importance of distinguishing between long-horizon co-movement and statistically robust short-run relationships. Capital adequacy, financing intermediation, and operating margins may move together over several years without monthly changes in one variable necessarily generating immediate proportional changes in another.

The findings therefore provide a more nuanced interpretation of Islamic banking performance. Capital strength and financial intermediation remain essential dimensions of banking soundness, but their contribution to operating margins depends on how effectively capital and collected funds are transformed into productive, appropriately priced, and well-managed earning assets.

From a scientific perspective, the findings also demonstrate why time-series characteristics should be evaluated before conventional regression coefficients are interpreted. Had the analysis relied solely on the benchmark OLS results, the study would have reported a statistically significant positive effect of CAR on NOM. After accounting for unit roots, lack of cointegration, heteroskedasticity, and temporal characteristics, this apparent relationship is no longer statistically supported. Such a distinction improves the reliability and reproducibility of the empirical conclusions.

Accordingly, the evidence from the 2022–2024 period does not support the hypotheses that short-run changes in CAR and FDR significantly determine changes in NOM, either individually or jointly. Instead, the findings suggest that net operating margin is likely shaped by a broader combination of asset productivity, financing quality, funding structure, pricing, operational efficiency, and macro-financial conditions that should be incorporated in future empirical models.

CONCLUSION

This study examined the relationship between Capital Adequacy Ratio (CAR), Financing to Deposit Ratio (FDR), and Net Operating Margin (NOM) in Indonesian Islamic Commercial Banks

using monthly data for the 2022–2024 period. The descriptive results show that Islamic Commercial Banks maintained relatively strong capital adequacy and experienced increasing financing intermediation during the observation period, while NOM displayed a more fluctuating pattern.

The initial regression in levels indicated that CAR had a positive and statistically significant relationship with NOM, while FDR had a negative but statistically insignificant relationship. However, further time-series testing showed that CAR, FDR, and NOM were non-stationary in levels and did not exhibit a significant cointegration relationship. Therefore, the level regression was not used as the basis for final hypothesis inference.

After the variables were transformed into first differences and estimated using calendar-month effects and Newey–West HAC standard errors, both CAR and FDR showed negative but statistically insignificant coefficients. The joint test also indicated that changes in CAR and FDR were not simultaneously significant in explaining short-run changes in NOM. Accordingly, the first and second hypotheses were not supported in the final robust model.

These findings indicate that strong capital adequacy and higher financing intermediation do not automatically translate into immediate improvements in the net operating margin of Islamic Commercial Banks. NOM is likely influenced by a broader combination of factors, including financing quality, earning-asset productivity, funding costs, financing composition, operational efficiency, and macroeconomic conditions. Therefore, bank management should not focus solely on maintaining high CAR or increasing FDR, but should also ensure that available capital and collected funds are allocated efficiently into productive and well-managed financing activities.

This study is limited by the relatively small sample of 36 monthly observations, which may reduce statistical power and constrain the ability of the model to capture more complex or longer-term dynamics among CAR, FDR, and NOM. Future research is encouraged to extend the observation period, incorporate bank-level panel data, and include additional determinants such as Non-Performing Financing, operating efficiency, cost of funds, bank size, inflation, and economic growth to provide a more comprehensive explanation of NOM performance in Islamic banking.

Acknowledgment

The author expresses profound gratitude to all colleagues, research peers, and individuals who provided invaluable support, guidance, and constructive feedback throughout the data analysis and manuscript preparation process.

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