

The Effect of Operating Expenses on Operating Income and the Capital Adequacy Ratio on the Financing to Deposit Ratio at Sharia Commercial Banks in Indonesia

Pengaruh Biaya Operasional terhadap Pendapatan Operasional dan Capital Adequacy Ratio terhadap Financing to Deposit Ratio pada Bank Umum Syariah di Indonesia

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ABSTRACT

This study aims to analyze the effect of Operating Costs to Operating Income (BOPO) and the Capital Adequacy Ratio (CAR) on the Financing to Deposit Ratio (FDR) of Islamic Commercial Banks in Indonesia during the 2021–2025 period. The study uses an associative quantitative approach utilizing quarterly time series data obtained from Islamic Banking Statistics published by the Financial Services Authority. Data analysis was performed using multiple linear regression using STATA software, with the Cochrane-Orcutt method applied to address autocorrelation. The results reveal three main findings. First, BOPO has a negative and significant effect on FDR at the 10% significance level. This indicates that increased operating expenses can limit banks' ability to disburse financing. Second, CAR has no significant effect on FDR. This finding indicates that a high level of capital adequacy does not directly drive increased financing, reflecting banks' prudent attitude in the post-pandemic period. Third, BOPO and CAR simultaneously have a significant effect on FDR. Based on these results, this study concludes that operational efficiency has a more dominant role in explaining the intermediation function of Islamic Commercial Banks compared to capital adequacy.

Keywords: BOPO, CAR, financing to deposit ratio, Islamic commercial banks, STATA

ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh Biaya Operasional terhadap Pendapatan Operasional (BOPO) dan Capital Adequacy Ratio (CAR) terhadap Financing to Deposit Ratio (FDR) pada Bank Umum Syariah di Indonesia selama periode 2021–2025. Penelitian menggunakan pendekatan kuantitatif asosiatif dengan memanfaatkan data time series triwulanan yang diperoleh dari Statistik Perbankan Syariah yang diterbitkan oleh Otoritas Jasa Keuangan. Analisis data dilakukan menggunakan regresi linear berganda melalui perangkat lunak STATA, dengan penerapan metode Cochrane-Orcutt untuk mengatasi autokorelasi. Hasil penelitian menunjukkan tiga temuan utama. Pertama, BOPO berpengaruh negatif dan signifikan terhadap FDR pada tingkat signifikansi 10%. Hal ini menunjukkan bahwa peningkatan beban operasional dapat membatasi kemampuan bank dalam menyalurkan pembiayaan. Kedua, CAR tidak berpengaruh signifikan terhadap FDR. Temuan ini mengindikasikan bahwa tingginya tingkat kecukupan modal tidak



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secara langsung mendorong peningkatan pembiayaan, yang mencerminkan sikap kehati-hatian bank pada periode pasca pandemi. Ketiga, BOPO dan CAR secara simultan berpengaruh signifikan terhadap FDR. Berdasarkan hasil tersebut, penelitian ini menyimpulkan bahwa efisiensi operasional memiliki peran yang lebih dominan dalam menjelaskan fungsi intermediasi Bank Umum Syariah dibandingkan kecukupan modal.

Kata Kunci: BOPO, CAR, financing to deposit ratio, bank umum syariah, STATA

1. Introduction

Islamic banking holds a crucial function within both domestic and global financial frameworks because it executes intermediary operations following Sharia guidelines. This is demonstrated by the capacity of Islamic banks to administer deposits sourced from the public and subsequently redistribute them through multiple financing mechanisms (Madugu et al., 2020). Globally, the sector of Islamic financial services continues to expand swiftly. Based on information from the Islamic Financial Services Board, the total asset value of the worldwide Islamic financial services industry is forecast to reach USD 3.88 trillion by 2024, with Islamic banking remaining dominant within the sector. This demonstrates that Islamic banking continues to act as the principal tool in promoting economic activity founded on Islamic finance principles (Saleem et al., 2025). However, maintaining growth in this sector requires banks to uphold the quality of intermediation, operational efficiency, and capital sufficiency, as these are critical for the proper functioning of intermediary operations.

Within Indonesia, Sharia Commercial Banks hold an important position as key entities in the progression of the national Sharia banking sector. The Financial Services Authority (OJK) clarifies that Sharia Banking Statistics is a publication providing data on the sector's development based on submissions from Sharia Commercial Banks and Sharia Business Units. This publication serves as the main reference for evaluating performance and progress of different Islamic banking financial ratios, including the Financing to Deposit Ratio (FDR), Operating Expenses to Operating Income (BOPO), and other financial metrics (Aisyah et al., 2025). In this study, Sharia Commercial Banks were selected for analysis due to their intermediary role in accordance with Sharia principles, namely gathering funds from society and reallocating them in the form of financing to various economic sectors (Hermansyah, 2025).

The Financing to Deposit Ratio (FDR) serves as one of the principal measures for assessing the intermediary role of Islamic commercial banks. The Financial Services Authority defines FDR as the proportion of financing relative to third-party funds, reflecting how effectively deposits collected by banks are reallocated to the public through financing. According to the December 2023 Islamic Banking Statistics, the FDR of Islamic Commercial Banks was recorded at 98.40%. During the same timeframe, financing extended to non-bank third parties reached Rp200.060 trillion, whereas third-party deposits amounted to Rp203.317 trillion. These figures suggest that the intermediation function of Islamic Commercial Banks is operating at a high level. Nevertheless, a substantial FDR requires careful management due to potential liquidity challenges (Wahyudi, 2020).

A major internal determinant that may influence the Financing to Deposit Ratio (FDR) is the Operating Expense to Operating Income Ratio (BOPO). The Financial Services Authority notes that BOPO is a metric employed to assess a bank's operational performance in managing its business activities by comparing operating costs to generated income (Al Hakim et al., 2024). Elevated BOPO levels indicate a growing operational cost burden, which can hinder the bank's capacity to disburse financing to clients. As of December 2023, the BOPO ratio for Sharia Commercial Banks was documented at 80.32%, highlighting that enhancing operational efficiency remains a significant focus in the management and performance of Sharia Commercial Banks (Astuti, 2022).

The Capital Adequacy Ratio (CAR) represents a fundamental measure to determine a bank's ability to conduct its intermediary operations effectively. The CAR reflects a bank's capital adequacy in covering risks on risk-weighted assets, which can strengthen the bank's capacity to extend financing. However, a high CAR does not always indicate that a bank will be more aggressive in extending financing, as banks may still curb financing expansion if financing risks, liquidity conditions, and economic disruptions increase (Astuti, 2022). Therefore, the relationship between CAR and FDR needs to be empirically tested, particularly for the period from 2021 to 2025, which reflects the post-COVID-19 economic recovery phase and the subsequent growth period.

Earlier research has explored the associations involving the BOPO ratio, CAR, and FDR within the Islamic banking sector. Rahmawati et al. (2025) investigated the impact of Capital Adequacy Ratio (CAR), Non-Performing Financing (NPF), Financing to Deposit Ratio (FDR), Operating Expenses to Operating Income (BOPO), and Net Operating Margin (NOM) on the financial outcomes of Islamic Commercial Banks over the 2015–2019 period. Similarly, Amalia & Diana (2022) assessed how BOPO, CAR, and FDR influenced the earnings of Bank Bukopin Syariah between 2013 and 2020. In a related study, Astuti (2022), examined CAR, FDR, NPF, and BOPO in relation to the profitability of Islamic banks. Additionally, Wahyudi (2020) evaluated how Third-Party Funds (DPK), CAR, BOPO, and NPF affected liquidity levels of Sharia Commercial Banks using FDR as the metric for liquidity.

Several studies indicate that leverage ratios of Islamic banks are widely employed to clarify financial performance and liquidity management. However, a research gap remains because most prior analyses treated FDR as an independent variable to explain profitability indicators like ROA or profit-sharing metrics (Sari et al., 2022). Research explicitly treating FDR as a dependent variable remains scarce, even though FDR functions as a principal measure for assessing intermediation activities in Islamic commercial banks. Moreover, limited studies utilize quarterly aggregated data from Islamic Commercial Banks for 2021–2025, which is significant to demonstrate banking conditions after the pandemic during the recovery and subsequent growth periods (Andersen & Juelsrud, 2024).

Building upon this context, the current research seeks to investigate the influence of BOPO and CAR on FDR at Islamic Commercial Banks in Indonesia for 2021–2025. Specifically, the study aims to evaluate the individual impact of BOPO on FDR, assess CAR's effect on FDR, and determine the combined influence of BOPO and CAR on FDR (Hadiani & Sari, 2023). Accordingly, three research questions are formulated: (1) does BOPO affect FDR at Islamic Commercial Banks in Indonesia; (2) does CAR influence FDR at Islamic Commercial Banks in Indonesia; and (3) do BOPO and CAR jointly impact FDR at Islamic Commercial Banks in Indonesia.

This study contributes both conceptually and practically. From a theoretical perspective, it extends knowledge on intermediation operations in Islamic banking by using FDR as the dependent measure and reinforces the application of financial intermediation theory, operational efficiency theory, and capital adequacy theory in explaining the behavior of Islamic Commercial Banks regarding financing allocation (Yaqin & Zuleika, 2024). Practically, the results are anticipated to provide evaluative insights for managing operational efficiency and capital adequacy within Islamic Commercial Banks to optimize intermediary functions. Moreover, the findings serve as guidance for regulators to comprehend the relationship between operational efficiency, capital structure, and liquidity management at Islamic Commercial Banks in Indonesia.

2. Literature Review and Hypothesis Development

2.1 Operating Expenses to Operating Income Ratio (BOPO)

The BOPO ratio is utilized to assess a bank's performance in terms of operational productivity. It compares the total costs incurred by the bank with the revenue it generates (Yulianti, 2025). From an operational efficiency perspective, a bank is considered effective if it achieves high revenue while maintaining minimal operating expenses. Consequently, a higher OIR correlates with reduced efficiency in the bank's operational functions.

BOPO aligns with the Theory of Efficient Structure, which suggests that financial institutions demonstrating elevated efficiency levels are better positioned to control expenditures and enhance their capacity to manage business operations (Rufaidah et al., 2021). In Islamic Commercial Banks, efficiency in operations directly affects the ability to distribute financing. When BOPO rises, operational expenditures increase, thereby constraining the expansion of financing. Research conducted by Yulianti (2025) identified BOPO as one of the indicators explaining the financial outcomes of Islamic Commercial Banks. Supporting these findings, Setyowiyono et al. (2022) highlighted that BOPO also impacts liquidity, with FDR serving as a measure of liquidity.

2.2 Capital Adequacy Ratio (CAR)

According to Harmadji et al. (2024), explain that CAR quantifies the sufficiency of a bank's capital in covering various risk-weighted assets. In capital adequacy theory, capital acts as a safeguard against potential losses and a base to support business growth. Stronger capital allows a bank to better absorb risks and maintain financing activities.

The CAR relates to the Capital Buffer Theory, which emphasizes the necessity for banks to maintain adequate capital to absorb risks and sustain operations. In intermediation, sufficient capital provides banks with the flexibility to extend financing to clients. A higher CAR also indicates a cautious approach to managing financial risks (Fatimah & Sholihah, 2023). Thus, CAR can influence FDR both by increasing lending capacity and through prudential policies. Astuti (2022) identifies CAR as a key financial metric that plays a major role in explaining the performance of Islamic Commercial Banks. Similarly, Maulla (2022) demonstrated its effect on liquidity in Islamic Commercial Banks.

2.3 Financing to deposit Ratio

According to Hidayat (2018), defines FDR as a measure of the extent to which Islamic banks can allocate funds collected from third parties into financing. It serves as an indicator of a bank's capacity to fulfill its intermediary function. According to financial intermediation theory, banks act as intermediaries connecting parties with surplus funds to those in need (Yuliana & Listari, 2021). From this perspective, FDR indicates how effectively Islamic Commercial Banks perform intermediation.

Financial intermediation theory underscores FDR as a crucial measure for evaluating a bank's success in redistributing third-party funds through Sharia-compliant mechanisms (Hermansyah, 2025). Additionally, Aprillia et al. (2023), note that FDR can also serve as a liquidity indicator, demonstrating a bank's ability to manage capital and allocate financing effectively.

2.4 Hypothesis Development

The Efficiency Structure Theory clarifies that BOPO may affect FDR, since operational effectiveness shapes the bank's capability to carry out financing activities. An elevated BOPO ratio reflects a considerable operating cost pressure, which may weaken the bank's capacity to direct third-party funds into financing. Referring to the Capital Buffer Theory, CAR may affect FDR because bank capital functions as the main basis for absorbing financing risk (Natasya El Sima & Natigor Nasution, 2026). Sufficient capital gives banks wider room to carry out their intermediary roles. Meanwhile, Financial Intermediation Theory explains that BOPO and CAR may jointly affect FDR (Ningrum et al., 2025). Operational effectiveness and capital adequacy are two internal elements that shape the ability of General Sharia Banks to collect public funds and redistribute them through financing schemes. From the explanation above, the hypotheses in this research are arranged as follows:

- H1 : The Operating Expense-to-Operating Income Ratio (BOPO) affects the Financing-to-Deposit Ratio (FDR) of Sharia Commercial Banks in Indonesia over 2021–2025.
- H2 : The Capital Adequacy Ratio (CAR) affects the Financing-to-Deposit Ratio (FDR) of Sharia Commercial Banks in Indonesia over 2021–2025.
- H3 : BOPO and CAR jointly affect the Financing-to-Deposit Ratio (FDR) of Sharia Commercial Banks in Indonesia over 2021–2025.

2.5 Research Conceptual Framework

This conceptual model presents the association of BOPO and CAR with FDR. FDR is placed as the dependent variable because it reflects the intermediary role of Islamic Commercial Banks. BOPO functions as an independent variable that describes bank operational effectiveness, while CAR is positioned as an independent variable representing the bank's capital adequacy level (Kusumaningrum & Maika, 2024).

From a theoretical standpoint, the connections across the variables in this research rely on Financial Intermediation Theory, Efficiency Structure Theory, and Capital Buffer Theory. BOPO and CAR are assumed to affect FDR because both variables represent internal elements that show the ability of Islamic commercial banks to distribute financing.

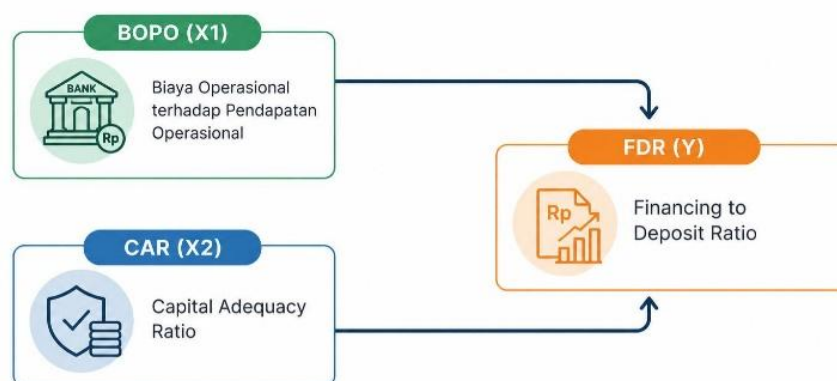


Figure 1 Conceptual Framework

3. Methodology

3.1 Research Design

This research applies a quantitative approach with an associative design (Sugiyono, 2021). The quantitative approach was selected because it enables objective assessment of connections among variables through numerical information processed using statistical techniques. The associative design is intended to examine and assess the effects of the Operating Expense to Operating Income Ratio (BOPO) and the Capital Adequacy Ratio (CAR) on the Financing to Deposit Ratio (FDR) at Sharia Commercial Banks in Indonesia over 2021–2025.

The design of this research was arranged in accordance with its main objective, namely to assess the effect of independent variables on the dependent variable. The independent variables applied in this research consist of the Operating Expense to Operating Income Ratio (BOPO) and the Capital Adequacy Ratio (CAR), whereas the dependent variable observed is the Financing to Deposit Ratio (FDR). Through this design, a broad understanding is expected to be obtained regarding how changes in OCR and CAR contribute to movements in FDR across Islamic Commercial Banks as a whole (Creswell, 2014).

3.2 Types and Sources of Data

This research uses secondary data taken from several official publications issued by relevant institutions. The data consist of quarterly time-series observations covering the first quarter of 2021 to the second quarter of 2025. The data source is obtained from Sharia Banking Statistics released by the Financial Services Authority (OJK). The variables analyzed consist of the Financing to Deposit Ratio (FDR), Operating Expenses to Operating Income (BOPO), and Capital Adequacy Ratio (CAR) for Sharia Commercial Banks in Indonesia, displayed in aggregate form.

3.3 Population and Sample

The population in this research covers all financial ratio data of Sharia Commercial Banks in Indonesia reported in the Sharia Banking Statistics issued by the Financial Services Authority. The population data consist of FDR, BOPO, and CAR recorded in the Islamic banking statistics report. The sample includes all quarterly aggregate data of Sharia Commercial Banks over

2021–2025. The sampling method applied is saturated sampling, since every quarterly observation meeting the criteria of the research period is included as the observation unit. Based on this method, this research contains 18 observations in total (Sekaran & Bougie, 2016).

3.4 Data Collection Methods

The method applied to gather data in this research is documentation. This approach involves compiling information regarding FDR, BOPO, and CAR sourced from the Islamic Banking Statistics released by the Financial Services Authority (OJK). Once collected, the data were arranged into quarterly series, spanning from the first quarter of 2021 to the second quarter of 2025. Unlike surveys, interviews, tests, or experimental techniques, this research relies on information stored in official publications (Ghozali & Kusumadewi, 2023).

3.5 Operational Definitions of Variables

Operational variables are defined to clarify the fundamental concepts behind the research variables, the measurement tools applied, and the data scales employed in this research. The Financing to Deposit Ratio serves as the dependent variable representing the bank's intermediary role, while the two independent variables include BOPO, reflecting operational efficiency, and CAR, indicating the capital adequacy of Sharia Commercial Banks. These variables are expressed as financial ratios and presented as percentages to simplify interpretation and analysis.

3.6 Data Analysis Techniques

Analysis of the data in this research was performed using two statistical approaches: descriptive and inferential methods. Descriptive techniques summarize the main characteristics of the data for each variable, showing minimum, maximum, mean, and standard deviation. Inferential techniques were employed to examine and test the impact of independent variables—specifically, the Operating Expense to Operating Income Ratio (BOPO) and the Capital Adequacy Ratio (CAR)—on the dependent variable, Financing to Deposit Ratio (FDR), using multiple linear regression (Sugiyono, 2021).

The study's hypotheses were evaluated through various statistical procedures, including classical assumption checks, t-tests, F-tests, and R^2 to determine the model's explanatory power. Classical assumption tests assessed whether the regression model meets essential statistical conditions, including normality, multicollinearity, heteroscedasticity, and autocorrelation. The t-test was used to examine the individual impact of each independent variable on the dependent variable. The F-test evaluated the combined effect of the independent variables. Additionally, the coefficient of determination quantified how much variation in the dependent variable could be explained by the independent variables. The significance level was set at 5% ($\alpha = 0.05$), and all data processing was conducted using STATA software (Ghozali & Kusumadewi, 2023).

3.7 Analysis Model

The analytical model used in this study is multiple linear regression. This model was chosen because the study involves two independent variables BOPO and the Capital Adequacy Ratio

(CAR) and one dependent variable the Financing to Deposit Ratio (FDR). Multiple linear regression analysis was used to determine the effect of BOPO and CAR on FDR at Islamic Commercial Banks in Indonesia during the 2021–2025 period. Therefore, the analytical model equation in this study can be formulated as follows:

$$\text{FDR} = \alpha + \beta_1 \text{BOPO} + \beta_2 \text{CAR} + e$$

4. Results and Discussion

4.1 Descriptive Statistics

Table 1 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
FDR (%)	18	78,26	4,313	70,12	84,81
BOPO (%)	18	78,68	3,365	75,78	86,76
CAR (%)	18	24,98	0,909	23,13	26,28

Source: Data processed using STATA MP 15

Based on Table 1, the FDR averaged 78.26 percent, ranging from 70.12 to 84.81 percent. This trend indicates that Sharia Commercial Banks' capacity to allocate third-party funds to financing increased throughout the study period. The BOPO averaged 78.68 percent, ranging from 75.78 to 86.76 percent. This significant difference reflects a notable dynamic in the operational efficiency of Islamic Commercial Banks, particularly during the post-pandemic period and economic recovery. The CAR recorded an average of 24.98 percent with a range of 23.13–26.28 percent. The small standard deviation (0.9093) indicates a stable and consistent capital adequacy level for Sharia Commercial Banks, exceeding the minimum regulatory threshold of 8 percent. This suggests that the limited variation in the CAR may make it difficult for statistical analysis to detect a significant impact on the FDR.

4.2 Test of Classical Assumptions

4.2.1 Normality Test

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
resid	18	0.92369	1.677	1.035	0.15027

Figure 2 STATA Output: Normality Test (Shapiro-Wilk)

A normality test was conducted to determine whether the residuals in the regression model are normally distributed. In this study, the Shapiro-Wilk test was used because it is appropriate for data using fewer than 50 observations. Referring to the examination of the error terms from the first regression specification, the Shapiro-Wilk statistic produced $W = 0.92369$ and $\text{Prob}>z = 0.15027$. Because this p-value exceeds $\alpha = 0.05$, H_0 is retained. Therefore, the model's error terms follow a normal distribution. This finding confirms that the normality requirement is satisfied, allowing the inferential statistical process to continue.

4.2.2 Multicollinearity Test

Variable	VIF	1/VIF
bopo	1.26	0.794903
car	1.26	0.794903
Mean VIF	1.26	

Figure 3 STATA Output: Multicollinearity Test (VIF)

A collinearity assessment was carried out to identify the possibility of strong association across the independent predictors in the regression equation. In this research, collinearity was examined through the VIF approach. The output indicates that BOPO and CAR each recorded a VIF score of 1.26, accompanied by a tolerance score of 0.794903 and an average VIF score of 1.26. Since these scores are far lower than the critical limit of 10, the model is free from collinearity problems. Therefore, BOPO and CAR may be viewed as separate predictors that do not overlap in explaining FDR.

4.2.3 Heteroscedasticity Test

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of fdr

chi2(1)      =      1.10
Prob > chi2   =      0.2936
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Figure 4 STATA Output: Heteroscedasticity Test (Breusch-pagan))

The non-constant error spread assessment aims to examine whether the spread of the error terms in the regression equation remains stable or varies across observations. In this research, the Breusch–Pagan/Cook–Weisberg procedure was applied. The output reports $\chi^2 = 1.10$ with $\text{Prob} > \chi^2 = 0.2936$. Because this p-value is above $\alpha = 0.05$, H_0 is maintained. Thus, the regression equation is not affected by non-constant error spread. This result shows that the error-term spread remains stable, meaning the required regression assumptions are fulfilled.

4.2.4 Autocorrelation Test

Source	SS	df	MS	Number of obs	=	18
Model	818.81694	2	409.40847	F(2, 15)	=	75.39
Residual	81.4575397	15	5.43050265	Prob > F	=	0.0000
				R-squared	=	0.9095
				Adj R-squared	=	0.8975
Total	900.27448	17	52.9573224	Root MSE	=	2.3303

fdr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
bopo	-.4893934	.2508763	-1.95	0.070	-1.024124	.0453367
car	-1.102785	.6254867	-1.76	0.098	-2.435978	.2304083
_cons	145.4553	27.02261	5.38	0.000	87.85798	203.0526
rho	.8507585					

Durbin-Watson statistic (original)	0.847974
Durbin-Watson statistic (transformed)	2.125064

Figure 5 STATA Output: Autocorrelation Test (Durbin-Watson) & Cochrane-Orcutt

The serial correlation examination aims to detect whether error terms in one time point are connected with error terms from the preceding time point in a time-series regression framework. In this research, the Durbin–Watson procedure was applied. The output from the preliminary OLS estimation produced a Durbin–Watson score of 0.8480. This score falls under the lower boundary (dL), which is commonly approximately 1.16 when $n = 18$ and $k = 2$ at the 5% significance threshold. This result signals the occurrence of positive serial correlation in the preliminary model. Such a situation shows that estimation through the OLS approach has not fulfilled the Best Linear Unbiased Estimator (BLUE) requirements; therefore, refinement of the model is necessary to improve the precision of the estimated results.

To address this issue, the main estimation was performed using the Prais-Winsten method (Cochrane-Orcutt AR(1)). The iteration results showed that the process converged to a value of ρ (rho) of 0.8508 after 10 iterations. After data transformation, the Durbin-Watson value increased to 2.1251. This value falls within a range indicating no signs of autocorrelation. Therefore, it can be concluded that the Cochrane-Orcutt method successfully addressed the issue of autocorrelation in the regression model.

4.3 Regression Model Estimation Results

4.3.1 Initial OLS Regression Results

Source	SS	df	MS	Number of obs	=	18
Model	161.238918	2	80.6194589	F(2, 15)	=	7.80
Residual	155.006793	15	10.3337862	Prob > F	=	0.0048
				R-squared	=	0.5099
				Adj R-squared	=	0.4445
Total	316.245711	17	18.6026889	Root MSE	=	3.2146

fdr	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
bopo	-.9255835	.259886	-3.56	0.003	-1.479517	-.3716495
car	-.0862721	.9617033	-0.09	0.930	-2.136094	1.96355
_cons	153.2384	37.95308	4.04	0.001	72.34328	234.1334

Figure 6 STATA Output: Multiple Linear Regression (OLS)

Before correcting for autocorrelation, the initial OLS regression model was used to estimate the effects of BOPO and CAR on FDR. The estimation results show that the BOPO variable has a coefficient of -0.9256 with a t-value of -3.56 and a probability of 0.003 . Meanwhile, the CAR variable had a coefficient of -0.0863 with a t-value of -0.09 and a probability of 0.930 . The model constant was 153.2384 and was significant at the 0.001 probability level. The estimation produced an R-squared score of 0.5099 and an adjusted R-squared score of 0.4445 . These results show that the independent variables have a moderate capacity to account for variation in the dependent variable. In addition, the Prob > F score of 0.0048 confirms that the overall model is statistically meaningful. Nevertheless, the autocorrelation assessment generated a Durbin-Watson score of 0.8480 , which reflects the existence of serial correlation within the model. For this reason, the OLS estimation output was not adopted as the main reference for hypothesis evaluation. The final research conclusions were instead drawn from the Cochrane-Orcutt estimation results, as this model satisfied the required regression assumptions.

4.3.2 Cochrane-Orcutt Estimate (Prais-Winsten AR(1))

Table 2 Results of the Cochrane-Orcutt Model Estimation (Prais-Winsten AR(1))

Variable	Coefficient	Std. Error	t-stat	P> t	Description
BOPO	-0,4894	0,2509	-1,95	0,070	Not Significant
CAR	-1,1028	0,6255	-1,76	0,098	Not Significant
Konstanta	145,4553	27,0226	5,38	0,000	Significant
rho (ρ)	0,8508				
R-squared	0,9095				
Prob > F	0,0000				
DW (transformed)	2,1251				

Source: STATA 15 output (processed), 2026

Based on Table 2, the regression equation derived from the Cochrane-Orcutt model is as follows:

$$FDR = 145,4553 - 0,4894 BOPO - 1,1028 CAR + e$$

4.4 Hypothesis Testing

4.4.1 t-Test (Partial)

The t-test was used to determine the partial effect of each independent variable on the dependent variable. Based on the results of the Cochrane-Orcutt model estimation shown in Table 2, the following test results were obtained.

The influence of BOPO on FDR (H1) reveals that the BOPO predictor exhibits a coefficient of -0.4894 , a t-statistic of -1.95 , and a p-value of 0.070 . At the 5% significance threshold ($\alpha = 0.05$), this p-value exceeds 0.05 ; hence, BOPO does not exert a statistically meaningful impact on FDR. However, at a 10% significance level ($\alpha = 0.10$), the probability value of 0.070 is less than 0.10 , so BOPO is considered to have a significant effect on FDR. A negative coefficient indicates that an increase in BOPO tends to decrease FDR. The results of the study show that the higher a bank's operating costs are relative to its revenue, the lower its ability to channel financing to the public. Therefore, Hypothesis H1 is accepted at a 10% significance threshold, the results indicate that BOPO exerts a negative impact on the Financing-to-Deposit Ratio (FDR) for Sharia Commercial Banks in Indonesia for the 2021–2025 timeframe. This outcome aligns with the Theory of Efficient Structure, which suggests that more streamlined bank operations—as represented by a lower BOPO score—enhance the bank's capacity to redistribute funds. This observation is also in line with findings by Aprillia et al. (2023), which identified a detrimental effect of BOPO on liquidity management in Islamic Commercial Banks.

Regarding the Capital Adequacy Ratio (CAR), its influence on FDR (H2) shows a coefficient of -1.1028 , a t-value of -1.76 , and a p-value of 0.098 . Given that this p-value exceeds the 5% threshold ($\alpha = 0.05$), CAR is determined not to exert a statistically meaningful effect on FDR. Consequently, H2 is rejected, indicating that CAR does not significantly affect FDR in Sharia Commercial Banks in Indonesia over the 2021–2025 period. Although the CAR coefficient is negative, the results imply that elevated capital levels do not automatically lead to greater financing allocations. This can be explained via the Capital Buffer Theory, which posits that banks with higher capital maintain a more cautious approach to extending financing. Such prudence is especially observable in the post-pandemic context, characterized by economic uncertainty and rising credit risk. This finding is consistent with Astuti's (2022), who reported that CAR has no significant effect on intermediation measures in Islamic banking.

4.4.2 F-Test (Simultaneous)

The F-test was conducted to assess whether BOPO and CAR jointly influence the Financing-to-Deposit Ratio (FDR). Based on Cochrane–Orcutt estimation, the F-value $(2,15) = 75.39$ with $\text{Prob} > F = 0.0000$. Since this probability is below $\alpha = 0.05$, H_0 is rejected and H_3 is confirmed. Hence, BOPO and CAR together have a significant impact on FDR at Sharia Commercial Banks in Indonesia during 2021–2025. This aligns with Financial Intermediation Theory, which explains that operational efficiency and capital adequacy collectively enhance a bank's ability to conduct intermediary functions effectively.

4.4.3 Coefficient of Determination (R-squared)

The Cochrane–Orcutt model shows an R^2 of 0.9095, suggesting that 90.95% of the variance in FDR is explained by the model. The adjusted R^2 of 0.8975 further confirms the model's explanatory power after accounting for the number of predictors and degrees of freedom. Although the AR(1) autoregressive term in the Prais–Winsten model contributes to the high R^2 , it does not entirely derive from BOPO and CAR. Therefore, interpretation of the R^2 in Cochrane–Orcutt should be cautious. By comparison, the uncorrected OLS model produced an R^2 of 0.5099, which better reflects the substantive contribution of BOPO and CAR in explaining FDR variation (50.99%).

4.5 Discussion

The findings of this study underscore the importance of factors related to intermediation functions at Islamic commercial banks in Indonesia. The test results show that the BOPO has a negative effect on the FDR. Although the result is not statistically meaningful at the 5% threshold, BOPO becomes meaningful when assessed at the 10% threshold. This shows that the efficiency of bank operations continues to play an important role in shaping the capacity of Islamic banks to distribute financing. When operating expenses carried by the bank become larger, the room for providing financing becomes narrower because a substantial portion of income must be allocated to meet operational costs. This outcome supports the Efficiency Structure Theory, which explains that the efficiency level of operations serves as an important element shaping the performance of financial institutions (Az-Zahra Tarmidi, 2022).

In contrast, the Capital Adequacy Ratio (CAR) does not demonstrate a meaningful influence on the Financing to Deposit Ratio (FDR), either at the 5% or 10% threshold. This result shows that stronger capital adequacy within Sharia Commercial Banks during 2021–2025 is not necessarily followed by higher financing distribution. This condition may be understood through the Capital Buffer Theory, which explains that banks holding stronger capital positions usually adopt a more cautious attitude when expanding financing as a form of risk control, especially in the post-pandemic economic situation. In addition, the limited movement of CAR during the observation period, shown by a standard deviation of 0.909%, implies that changes in this variable were relatively narrow and therefore unable to create a meaningful influence on FDR.

BOPO and CAR jointly show a meaningful simultaneous influence on the Financing to Deposit Ratio (FDR). This result reveals that although CAR does not produce an individual influence, both variables together can still account for changes in FDR. From a practical perspective, the findings of this research imply that the management of Islamic Commercial Banks should give stronger attention to controlling operational expenses as an important strategy for maintaining and improving banking intermediation roles. Strong operational cost management not only supports higher bank profitability but also improves the bank's ability to distribute financing, which represents the core role of Islamic banking.

5. Conclusions and Recommendations

5.1 Conclusion

Referring to the analysis and discussion concerning the influence of BOPO and the Capital Adequacy Ratio (CAR) on the Financing to Deposit Ratio (FDR) at Islamic Commercial Banks in Indonesia during 2021–2025, three main conclusions can be presented. First, BOPO has a negative and meaningful influence on FDR at the 10% threshold, with a coefficient of -0.4894. This result shows that a rise in the comparison between operating expenses and operating income may weaken the bank's capacity to distribute financing to society. This outcome is in line with the Efficiency Structure Theory, which explains that operational cost management is an important factor in shaping the intermediation capacity of a financial institution (Sari et al., 2022). Therefore, the first hypothesis (H1) is accepted at the 10% threshold.

Second, CAR does not produce a meaningful influence on FDR at Islamic Commercial Banks in Indonesia during 2021–2025. The CAR variable records a coefficient of -1.1028 with a p-value of 0.098, which exceeds the 5% threshold. This result shows that stronger capital adequacy does not automatically encourage higher financing distribution. This outcome is consistent with the Capital Buffer Theory, which explains that banks with stronger capital positions usually apply a more prudent approach when expanding financing, especially in an economic condition still affected by post-COVID-19 pandemic uncertainty. Therefore, H2 is rejected.

Third, BOPO and CAR were simultaneously found to have a significant effect on the Financing to Deposit Ratio (FDR). This is indicated by an $F(2,15)$ value of 75.39 with a Prob > F value of 0.0000. This finding indicates that although CAR has no partial effect, that analysis confirms that internal bank characteristics, such as operational effectiveness and capital strength, jointly impact a bank's capacity to carry out its intermediation responsibilities.

Consequently, the third hypothesis (H3) is supported. Overall, findings reveal that operational efficiency, as reflected by BOPO, has a more substantial influence in explaining intermediation functions at Sharia Commercial Banks than capital adequacy, as measured by CAR. These insights suggest that prudent management of operational costs is a key element for Sharia Commercial Banks to sustain and enhance their ability to distribute financing to clients.

5.2 Recommendations

Based on the study outcomes, several practical suggestions can be proposed to relevant stakeholders. First, Sharia Commercial Banks' management should prioritize improving operational efficiency to strengthen banking intermediation. Actions could include implementing digital upgrades, optimizing operational expense control, and enhancing staff competencies. A more streamlined BOPO ratio is expected to allow the bank greater capacity for financing distribution.

Second, for the Financial Services Authority as the supervisory body, oversight should not be limited to capital adequacy but should also incorporate attention to operational effectiveness. Additionally, policies promoting the strategic use of capital through productive financing should be continuously refined to ensure Islamic banking intermediation operates efficiently.

Third, future researchers are encouraged to utilize panel datasets from individual Islamic banks and consider including further variables such as NPF, DPK, inflation, and other macroeconomic indicators. Moreover, applying advanced analytical technique.

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