



Capital Adequacy, Credit Risk, and Efficiency in Islamic Bank Profitability

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Abstract. Islamic commercial banks have gained prominence in Indonesia's financial system, yet their profitability still lags behind conventional banks. Understanding the financial determinants that influence the profitability of these institutions is critical for improving their competitiveness and ensuring sustainable growth. This study investigates the effects of Capital Adequacy Ratio (CAR), Non-Performing Financing (NPF), Operating Costs to Operating Income (BOPO), and Financing to Deposit Ratio (FDR) on bank profitability, measured by Return on Assets (ROA). This research adopted a quantitative approach using secondary data from the annual financial statements of 12 Islamic commercial banks registered with the Financial Services Authority (OJK) of Indonesia, covering the years 2019 to 2023. Multiple linear regression analysis was applied after conducting descriptive statistics and classical assumption tests, including normality, multicollinearity, heteroscedasticity, and autocorrelation. The regression model was used to examine the relationship between the four independent variables (CAR, NPF, BOPO, FDR) and ROA. The findings show that CAR and FDR have a significant positive effect on ROA, indicating that strong capital adequacy and efficient liquidity management improve profitability. In contrast, NPF and BOPO negatively affect ROA, demonstrating that high credit risk and operational inefficiency diminish bank performance. The regression model explains 72.3% of the variance in ROA, confirming the robustness and relevance of the selected variables in determining profitability. The results are consistent with agency and liquidity preference theories and highlight the distinctive challenges faced by Islamic banks, such as compliance-related costs and limitations in accessing conventional financial instruments. Operational efficiency, credit quality, and liquidity management emerge as critical strategic areas.

Keywords: Islamic Banking; Return on Assets; Capital Adequacy Ratio; Non-Performing Financing; Operational Efficiency; Liquidity Management

1. Introduction

The banking sector significantly contributes to a nation's economic growth by channeling funds from units with excess capital to those experiencing financial shortfalls within the financial system (Afzal et al., 2021; Beyers et al., 2022; Blanco-Alcántara et al., 2022; Swamy, 2017). Banks facilitate capital flow, mitigate financial risks, and support

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economic activities across various sectors, making them indispensable for growth and stability (Ferri & Liu, 2005; Jeet & Aspal, 2020; Kumar & Agrawal, 2023). In Indonesia (Khomsatun et al., 2020; Ryandono et al., 2022), the banking system comprises both conventional and Islamic banks. While conventional banks rely on interest-based practices, Islamic banks operate under *sharia* principles, prohibiting *riba* (interest), *gharar* (uncertainty), and *maysir* (speculation). Instead, Islamic banking emphasizes ethical and equitable financial practices, utilizing profit-sharing mechanisms such as *mudharabah* (profit-sharing), *murabahah* (cost-plus sales), and *musyarakah* (partnership). This ethical approach aligns with Indonesia's predominantly Muslim population and the increasing global demand for sustainable finance (Ballester et al., 2024; Cormack et al., 2020; Werner, 2016).

Despite the rapid growth of Islamic banks in Indonesia, challenges persist in achieving optimal profitability. Reports from the Financial Services Authority (OJK) indicate that while Islamic banking has expanded at an average growth rate of 60% per year (Hidayat et al., 2021; Jasman & Murwaningsari, 2022; Tobing & Wijaya, 2020), its profitability, as measured by Return on Assets (ROA), lags behind conventional banks. Several factors contribute to this gap, including operational inefficiencies, higher compliance costs, and conservative investment practices due to adherence to *sharia* principles. ROA, a critical measure of bank performance, reflects the efficiency with which banks utilize their assets to generate profits. Key financial ratios, such as the Capital Adequacy Ratio (CAR), Non-Performing Financing (NPF), Operating Costs to Operating Income (BOPO), and Financing to Deposit Ratio (FDR), are widely regarded as determinants of ROA (Aimon et al., 2024; Daoud & Kammoun, 2024; Kharabsheh & Gharaibeh, 2023; Wahyuni & Handayani, 2022).

Previous studies on these factors have yielded mixed results. For instance, while CAR is typically associated with financial stability and profitability, some studies report a negative or insignificant relationship with ROA (Alzwi et al., 2024; Nkwaira & Van der Poll, 2023; Richa Verma & Krishnakumar, 2023). Similarly, the effects of NPF, BOPO, and FDR on profitability remain inconsistent, indicating the presence of a research gap. This gap necessitates a comprehensive investigation to understand how these variables influence the profitability of Islamic commercial banks, particularly in the context of Indonesia (Setiawan et al., 2024; Siswanti et al., 2024). By addressing this gap, the current study contributes novel insights into the dynamics of Islamic banking performance, providing empirical evidence from an extended dataset covering the period from 2019 to 2023.

This research aims to examine the effects of CAR, NPF, BOPO, and FDR on ROA in Islamic commercial banks in Indonesia. The study seeks to answer critical questions: How do CAR, NPF, BOPO, and FDR individually and collectively impact ROA? To what extent can these factors explain the variations in profitability among Islamic banks? Through this inquiry, the research argues that managing these key financial ratios effectively can significantly enhance the performance and competitiveness of Islamic banks. By integrating updated financial data and addressing gaps in previous research, this study offers valuable insights for policymakers, practitioners, and researchers striving to improve the financial stability and profitability of Islamic banking institutions in Indonesia (El-Masry et al., 2016; Halim et al., 2023; Wahab, 2018).

2. Methods

This research aims to analyze the effects of Capital Adequacy Ratio (CAR), Non-Performing Financing (NPF), Operating Costs to Operating Income (BOPO), and Financing



to Deposit Ratio (FDR) on Return on Assets (ROA) of Islamic commercial banks in Indonesia from 2019 to 2023. The methodology integrates data collection, theoretical model development, and robust analytical techniques to ensure valid and reliable results.

This study utilizes secondary data, sourced from the annual financial statements of 12 Islamic commercial banks registered with the Indonesian Financial Services Authority (Otoritas Jasa Keuangan, (OJK)). The choice of secondary data is driven by its accessibility, reliability, and alignment with the study's focus on financial ratio variables. The period from 2019 to 2023 captures significant variations in financial performance, including the impacts of economic fluctuations during the COVID-19 pandemic (Chand et al., 2024; Nguyen, 2025; Shang et al., 2024). The variables under examination include CAR, NPF, BOPO, FDR, and ROA. CAR reflects a bank's ability to absorb risks and maintain financial stability (Dibra & Bezo, 2021; Rahman et al., 2020), while NPF measures credit risk. BOPO indicates operational efficiency, FDR assesses liquidity management, and ROA serves as the dependent variable, representing profitability. The financial data were retrieved from publicly available reports on bank websites and the OJK database, ensuring consistency and reliability. Selection criteria for the banks include the availability of complete data for the study period and classification as Islamic commercial banks, guaranteeing uniformity in operational principles and compliance with sharia law.

The study employs a multiple linear regression model to evaluate the relationship between the independent variables (CAR, NPF, BOPO, and FDR) and the dependent variable (ROA). The regression equation is expressed as:

$$ROA = \alpha + \beta_1 CAR + \beta_2 NPF + \beta_3 BOPO + \beta_4 FDR + \epsilon$$

Where α represents the intercept, β_1 to β_4 are coefficients indicating the marginal effects of the independent variables, and ϵ is the error term accounting for unobserved factors. This model is theoretically grounded in agency theory, which links operational efficiency to profitability, and liquidity preference theory, which underscores the significance of liquidity management in enhancing financial performance. CAR and NPF are included based on their established importance in mitigating risks and maintaining credit quality, as emphasized by previous studies such as Aledeimat and Bein (2025).

The research adopts a quantitative approach due to its suitability for analyzing numerical data and uncovering relationships among variables. Descriptive statistics are used to summarize the data, including mean, median, standard deviation, and range, which provide insights into the distribution and variability of the financial ratios across the study period. To ensure the validity of the regression model, classical assumption tests are conducted. The normality test assesses whether residuals follow a normal distribution, typically using the Kolmogorov-Smirnov method. Multicollinearity is evaluated through Variance Inflation Factors (VIF), where values below 10 indicate the absence of multicollinearity. Heteroskedasticity is tested using the Breusch-Pagan method to confirm that residual variances are constant (Pires et al., 2024), and autocorrelation is assessed using the Durbin-Watson statistic (Foglia et al., 2020), with acceptable values ranging between 1.5 and 2.5.

Regression analysis forms the core of the methodology, enabling the study to determine the significance and direction of relationships between the independent variables and ROA. Hypothesis testing is carried out to assess the significance of each predictor: CAR is hypothesized to positively affect ROA due to its role in risk absorption,



while NPF is expected to negatively influence ROA as higher credit risk reduces profitability. BOPO is anticipated to have a negative impact on ROA, reflecting the detrimental effect of operational inefficiency, and FDR is hypothesized to positively affect ROA when maintained within optimal ranges. Statistical techniques such as the t-test are used to evaluate the individual significance of predictors, the F-test assesses the overall model fit, and R-squared (R^2) measures the proportion of variation in ROA explained by the independent variables.

The research follows a systematic process to ensure accurate and reliable results. It begins with problem identification, focusing on the low profitability of Islamic banks and identifying CAR, NPF, BOPO, and FDR as critical predictors. Data collection involves retrieving financial reports from bank websites and the OJK database, followed by data cleaning to address missing or inconsistent values. Descriptive analysis provides an initial overview of the data, identifying trends and anomalies. Classical assumption tests are conducted to validate the regression model, ensuring that it satisfies statistical requirements. Multiple regression analysis is then performed to examine the effects of the independent variables on ROA, and the findings are interpreted within the context of the theoretical and empirical literature reviewed earlier. Finally, the results and recommendations are compiled into a structured report, providing actionable insights for stakeholders in the Islamic banking sector. By combining robust data collection methods, theoretical modeling, and rigorous statistical analysis, this methodology ensures the reliability and validity of the study. The findings will contribute valuable insights into the factors influencing profitability in Indonesian Islamic banks, helping to enhance their operational efficiency, risk management, and financial performance.

3. Results and Discussion

This section presents the findings of the study, offering an in-depth discussion of the statistical results, their alignment with theoretical expectations, and their implications for Islamic commercial banks in Indonesia. The findings provide valuable insights into the roles of Capital Adequacy Ratio (CAR), Non-Performing Financing (NPF), and Operating Costs to Operating Income (BOPO), and Financing to Deposit Ratio (FDR) in influencing Return on Assets (ROA), a critical measure of profitability.

3.1. Overview of Results

The statistical analysis was conducted using multiple linear regression to assess the relationships between CAR, NPF, BOPO, FDR, and ROA. Descriptive statistics provided initial insights into the distribution of these variables across the dataset. The results of the multiple regression analysis reveal significant relationships between the independent variables (CAR, NPF, BOPO, FDR) and the dependent variable (ROA). The model's R-squared value of 0.72 indicates that 72% of the variance in ROA is explained by the independent variables, demonstrating the model's robustness. The overall significance of the model, as confirmed by the F-statistic ($p < 0.001$), underscores the relevance of these variables in explaining the profitability of Islamic commercial banks.

The regression model explains 72.3% of the variance in ROA, indicating a strong explanatory power. The F-statistic confirms the overall significance of the model. Individually, all predictors are statistically significant, with CAR and FDR positively influencing ROA, while NPF and BOPO negatively impact it.



3.2. Capital Adequacy Ratio (CAR) and ROA

The positive and significant relationship between CAR and ROA ($\beta=0.048$, $p=0.001$) demonstrates that well-capitalized banks are more profitable. CAR reflects a bank's ability to absorb risks and maintain financial stability, enabling it to withstand economic fluctuations and pursue growth opportunities. This finding aligns with the work of Nguyen (2025), who found that higher CAR values enhance profitability by providing a buffer against potential losses and supporting sustainable operations.

However, the relationship between CAR and ROA is nuanced. While sufficient capital adequacy is critical for risk management, excessive CAR may indicate underutilized resources, which could limit income generation. This observation resonates with Siller (2013) who found that overly conservative capital allocations can constrain profitability in certain banking contexts. For Islamic banks, maintaining an optimal CAR is particularly important due to their limited access to conventional liquidity instruments and their reliance on sharia-compliant financial products.

3.3. Non-Performing Financing (NPF) and ROA

The results show a significant negative relationship between NPF and ROA ($\beta=-0.175$, $p=0.002$), consistent with the hypothesis that higher credit risk diminishes profitability. NPF reflects the quality of a bank's financing portfolio; an increase in NPF signals deteriorating credit quality, higher provisioning requirements, and reduced income. This finding corroborates the conclusions of Daoud and Kammoun (2024) emphasized that effective credit risk management is essential for maintaining profitability.

Islamic banks face unique challenges in managing NPF due to the structure of their financing products. For example, *murabahah* contracts (Alshubiri & Al Ani, 2023), which involve fixed cost-plus sales, are particularly susceptible to default risks during economic downturns. Additionally, the prohibition of speculative investments (*gharar*) under sharia law limits the banks' ability to diversify risk. To mitigate the adverse effects of NPF, Islamic banks must adopt robust credit assessment processes, employ proactive monitoring systems, and enhance their risk management capabilities. Technological advancements, such as AI-driven credit scoring, could also play a crucial role in improving credit quality.

3.4. Operating Costs to Operating Income (BOPO) and ROA

The regression results indicate a highly significant negative relationship between BOPO and ROA ($\beta=-0.068$, $p<0.001$), underscoring the critical importance of operational efficiency in driving profitability. BOPO measures the proportion of operating costs relative to operating income, with higher values indicating inefficiencies. This finding aligns with the work of Suriamanda & Zarkasyi (2020) who identified BOPO as a key determinant of profitability in Islamic banking.

The average BOPO value of 82.32% observed in this study highlights the efficiency challenges faced by Indonesian Islamic banks. These challenges are exacerbated by additional compliance costs, such as sharia audits, specialized training programs, and adherence to strict regulatory requirements. High BOPO ratios reduce net income, making it difficult for banks to compete with more efficient conventional institutions. To address these challenges, Islamic banks must adopt strategies to streamline their operations. The use of digital technologies, such as core banking systems and automated reporting tools,



can significantly reduce costs and enhance efficiency. Additionally, Islamic banks should consider adopting best practices from the conventional banking sector while tailoring them to comply with sharia principles. For example, process optimization and cost-sharing mechanisms could help reduce BOPO ratios and improve overall profitability.

3.5. *Financing to Deposit Ratio (FDR) and ROA*

FDR shows a positive and significant impact on ROA ($\beta=0.041$, $p=0.020$ \beta = 0.041, $p = 0.020$ $\beta=0.041$, $p=0.020$), confirming the hypothesis that balanced liquidity management enhances profitability. FDR reflects the proportion of deposits allocated to financing activities, with higher ratios indicating more active utilization of resources for income generation. This finding is consistent with the work of Priyadi *et al* (2021), who demonstrated that maintaining FDR within an optimal range (80%–100%) is critical for maximizing profitability.

The average FDR of 78.65% in this study suggests that most Islamic banks effectively balance their liquidity and financing needs. However, deviations from the optimal range can have negative consequences. Low FDR values indicate underutilization of funds, which limits income generation, while excessively high FDR values can expose banks to liquidity risks. To optimize FDR, Islamic banks should enhance their liquidity management practices and expand their portfolios of sharia-compliant financial instruments, such as sukuk and commodity *murabahah*. These instruments provide banks with opportunities to generate income while adhering to Islamic financial principles.

3.6. *Comparison with Prior Studies*

The findings of this study align with and expand upon the existing literature. The positive relationship between CAR and ROA supports the conclusions of Doğan (2024) and Fiana (2025), who emphasized the importance of capital adequacy in maintaining financial stability and profitability. Similarly, the negative impact of NPF is consistent with Muhammad *et al* (2020) and Widarjono (2018) highlighting the critical role of credit risk management in Islamic banking.

The strong negative relationship between BOPO and ROA confirms the observations of Wahyuni and Handayani (2022), who identified operational efficiency as a key driver of profitability. However, this study contributes new insights by emphasizing the compounded effects of compliance-related costs on BOPO, a factor less explored in conventional banking studies. The positive impact of FDR on ROA aligns with the findings of Priyadi (2021) and Erina (2019), while also highlighting the importance of liquidity management in maintaining profitability.

3.7. *Contributions to the Field*

This study makes significant contributions to the understanding of profitability in Islamic banking. By analyzing multiple financial ratios simultaneously, it provides a comprehensive view of the factors influencing ROA in Islamic commercial banks. The findings highlight the unique challenges faced by Islamic banks, including higher compliance costs, credit risk exposure, and liquidity management constraints.

The study also offers practical implications for bank managers, policymakers, and regulators. For practitioners, the findings emphasize the importance of operational efficiency, effective credit risk management, and balanced liquidity utilization. Policymakers can use these insights to design targeted interventions, such as incentives



for technology adoption and frameworks for risk-sharing instruments, to support the sustainable growth of Islamic banking. Additionally, regulators, such as the Otoritas Jasa Keuangan (OJK), can use these findings to refine capital adequacy and liquidity requirements, ensuring that they align with the unique needs of Islamic banks.

4. Conclusions

Based on the multiple regression analysis of financial data from 12 Islamic commercial banks in Indonesia during the period 2019–2023, this study confirms that four key financial indicators—Capital Adequacy Ratio (CAR), Non-Performing Financing (NPF), Operating Costs to Operating Income (BOPO), and Financing to Deposit Ratio (FDR)—significantly influence the Return on Assets (ROA), the primary indicator of profitability. The results reveal that CAR and FDR exert a positive impact on ROA, emphasizing the importance of strong capital buffers and optimal liquidity utilization in boosting profitability. Conversely, NPF and BOPO exhibit a negative relationship with ROA, underlining the detrimental effects of credit risk and operational inefficiency. The model demonstrates strong explanatory power, with an R-squared value of 72.3%, indicating that these four variables collectively account for a substantial proportion of the variance in bank profitability.

From a theoretical standpoint, the findings reinforce core financial frameworks such as Agency Theory, which highlights operational efficiency as a determinant of reduced agency costs, and Liquidity Preference Theory, which underscores the strategic management of liquidity to sustain financial stability. The study also reflects the unique nature of Islamic banking, wherein institutions are bound by sharia principles that prohibit interest (riba), speculation (gharar), and excessive uncertainty. This ethical constraint, while reinforcing social trust and sustainability, introduces additional compliance costs and operational complexities. Therefore, Islamic banks are encouraged to adopt digital tools and efficiency-driven innovations, provided they align with Islamic principles. Measures such as automation, AI-based risk analysis, and cost-sharing initiatives can be adapted to reduce BOPO and enhance ROA without compromising sharia compliance.

However, this research is limited by its exclusive use of secondary quantitative data, which may not fully capture qualitative dimensions such as customer satisfaction, management strategies, or product innovation in Islamic financial institutions. Additionally, the study focuses solely on Indonesian Islamic banks during a five-year window, potentially limiting its generalizability across different economic or regulatory contexts. Future research is recommended to employ mixed-method approaches—combining quantitative financial analysis with interviews or case studies—to uncover deeper insights into performance drivers. Comparative studies involving Islamic banks from other countries could also reveal cross-regional best practices, contributing to the global advancement of sharia-compliant banking systems.

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