Unisia
2023, Vol. 41, No. 2, 413-440
https://doi.org/10.20885/unisia.vol41.iss2.art9

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Determinants of Profitability in Indonesian Islamic Banks: Insights on Financial Performance

Nadia Humairah [1], Yuli Andriansyah[1,2], & Fatou Badjie[3]

[1]Program Studi Ekonomi Islam (S1), Fakultas Ilmu Agama Islam, Universitas Islam Indonesia, Yogyakarta, Indonesia
[2]Program Studi Ilmu Ekonomi (S3), Fakultas Bisnis dan Ekonomi, Universitas Islam Indonesia, Yogyakarta, Indonesia
[3]Department of Accounting, University of the Gambia, Serekunda, Gambia

ABSTRACT

This study examines the factors influencing profitability in Islamic banks in Indonesia, focusing on leverage, firm size, capital adequacy, and liquidity. As Islamic banks operate under Sharia principles that emphasize ethical financial practices and risk-sharing, understanding these determinants is crucial for enhancing financial performance while adhering to regulatory and ethical standards. The study aims to provide insights into how these financial metrics interact to shape profitability, as measured by Return on Assets (ROA). A quantitative research approach was employed, utilizing secondary data from Islamic banks in the period between 2007 and 2018 in Indonesia. Multiple regression analysis was conducted to assess the relationships between the independent variables—leverage, firm size, capital adequacy, and liquidity—and the dependent variable, ROA. In addition, diagnostic tests were performed to ensure the validity and reliability of the model. The results reveal that leverage and liquidity positively and significantly impact profitability, highlighting their roles in operational expansion and financial stability. Conversely, firm size has a significant negative effect, suggesting that larger institutions face operational inefficiencies. Capital adequacy, while essential for stability, does not directly influence profitability, indicating potential underutilization of capital. These findings align with and extend prior research, emphasizing the unique dynamics of Islamic banking. This study contributes to the understanding of Islamic finance by offering empirical evidence specific to Indonesia, a major market for this sector. The findings underscore the need for efficient resource allocation, robust liquidity management, and strategies to address inefficiencies in larger banks. These insights provide valuable guidance for practitioners and policymakers aiming to optimize financial performance in Islamic banking.

ARTICLE HISTORY
Received: June 6, 2023
Revised: September 27, 2023
Accepted: October 27, 2023
Published: December 31, 2023

Publisher's Note: Universitas Islam Indonesia stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Contact: Yuli Andriansyah ✉ yuliandriansyah@uii.ac.id

Keywords
capital adequacy, firm size, Islamic bank, leverage, liquidity, profitability, return on assets

Citation: Humairah, N., Andriansyah, Y., & Badjie, F. (2023). Determinants of Profitability in Indonesian Islamic Banks: Insights on Financial Performance. *Unisia, 41*(2), 413-440. https://doi.org/10.20885/unisia.vol41.iss2.art9

INTRODUCTION

The Islamic banking sector has grown significantly in recent decades, underpinned by its adherence to Sharia principles that emphasize ethical financial practices, justice, and social welfare. These banks operate distinctively by prohibiting interest (*riba*), speculative transactions (*gharar*), and impermissible business activities, and instead rely on profit-sharing and asset-backed financing models (Jaafar & Brightman, 2022; Sairally, 2013). As the global financial system becomes more integrated, Islamic banking has gained prominence not only in Muslim-majority countries but also in regions where ethical finance is increasingly valued (Mohamad & Saravanamuttu, 2015; Mukhlisin & Fadzly, 2020; Vahed & Vawda, 2008).

The development of Islamic banking in Indonesia began with the establishment of Bank Muamalat Indonesia (BMI) in 1992, marking a significant shift towards a banking system that aligns with Islamic principles (Afif et al., 2022; Nurdany, 2016). This shift was driven by increasing demand for financial services that comply with Sharia law, particularly in a country with the largest Muslim population in the world (Nidyanti & Siswantoro, 2019). Over the years, the Islamic banking sector has expanded, with regulatory frameworks playing a crucial role in supporting its growth. The enactment of the Islamic Banking Law in 2008 provided a structured legal environment, enabling Islamic banks to operate more competitively alongside conventional banks (Widarjono, 2018). This law strengthened governance and operational standards, encouraging further adoption of Islamic financial services.

Despite its steady expansion, Islamic banking in Indonesia continues to face challenges, particularly in terms of market share and competition with conventional banks. During 2022, the assets of the Islamic finance industry have reached IDR2,375.84 trillion, an increase from 2021 of IDR2,050.44 trillion or grew 15.87% higher than 2021 which amounted to 13.82% year on year (yoy) (Otoritas Jasa Keuangan, 2023). The coexistence of Islamic and conventional banks within a dual banking system has created a highly competitive financial landscape, requiring Islamic banks to continuously innovate and enhance their service offerings to attract more customers (Insani et al., 2019). Nevertheless, the resilience of Islamic banks has been evident, particularly during financial crises. Studies have shown that Islamic banks tend to be more stable than

conventional banks due to their risk-sharing principles and the prohibition of interest-based transactions (Nuryazidi, 2018). This stability was particularly highlighted during the COVID-19 pandemic, where Islamic banks demonstrated superior asset quality and profitability compared to their conventional counterparts (Iska & Nengsih, 2022). As regulatory support and consumer awareness continue to grow, Islamic banking in Indonesia is poised to play an increasingly vital role in the country's financial sector.

Financial performance in the banking sector is often evaluated using profitability metrics such as Return on Assets (ROA). Profitability reflects a bank's ability to efficiently utilize its assets to generate earnings (Menicucci & Paolucci, 2016; Trujillo-Ponce, 2013), a crucial aspect of operational health. Previous studies found factors like leverage, firm size, capital adequacy, and liquidity to significantly influence profitability (Kartikasari & Merianti, 2016; Margono & Gantino, 2021; Pattiruhu & Paais, 2020). However, the relationship between these variables and profitability is complex and inconclusive. For instance, while some studies suggest that leverage positively impacts profitability by enabling higher asset utilization (Mu'avidayana et al., 2022; Vijayalakshmi & Manoharan, 2014), others argue that excessive leverage may increase financial risk, undermining profitability (Akhtar et al., 2022; Andreani & Putra, 2019). Similarly, firm size is thought to confer economies of scale (Eckert et al., 2022; Kuncová et al., 2016), yet evidence also shows that larger firms may suffer inefficiencies due to bureaucratic complexities (Faruq et al., 2013; Mori, 2017). Thus, understanding these dynamics within the context of Islamic banking in Indonesia is essential, as it combines both traditional financial analysis with compliance to unique ethical mandates.

The primary research problem lies in identifying and understanding the determinants of profitability in Indonesia's Islamic banking sector. Despite its remarkable growth, there are concerns about its profitability compared to conventional banks, which may deter its competitiveness and ability to attract investment. Previous studies focused on conventional banks and highlighted profitability drivers to be financial leverage, size, and liquidity. However, applying these findings to Islamic banks presents challenges due to the sector's distinct operational and regulatory frameworks. For example, Islamic banks' avoidance of interest-bearing products necessitates alternative financial structures that may influence the traditional leverage-profitability relationship. Addressing these discrepancies requires a tailored approach that accounts for the principles governing Islamic financial institutions. Consequently, adopting a multidimensional analytical framework that incorporates financial, operational, and regulatory factors.

Furthermore, previous research on the impact of bank's specific variables on profitability offers insights into diverse banking contexts. Studies such as Msomi (2022), Sari et al. (2022), and Senan et al. (2021) emphasize that while leverage and liquidity are

critical to financial performance, their significance can vary based on market dynamics and operational efficiency. Meanwhile, some studies argue that firm size often positively impacts profitability due to economies of scale (Blatter & Fuster, 2022; Eckert et al., 2022; Odalo et al., 2016), though excessive size may lead to diminishing returns (Močnik & Širec, 2015; Septhasari & Surjadi, 2022). In contrast, other studies show that capital adequacy, often regarded as a stability indicator, does not always translate to profitability improvements, particularly in Islamic banking (Ningtyas & Pratama, 2022; Nugrohowati et al., 2022), where capital use aligns with Sharia principles. These findings provide a foundation for further exploration, highlighting both the potential benefits and limitations of these variables in predicting profitability.

Building on these observations, it becomes evident that the relationship between these variables and profitability in Islamic banking is mediated by several factors, including regulatory constraints, market conditions, and operational models. For example, liquidity management in Islamic banks differs significantly from conventional banks, as Islamic banks rely on Sharia-compliant instruments like Sukuk. This difference influences how liquidity impacts profitability, as demonstrated by Setiawati et al. (2017), who noted that liquidity's effect is contingent on market-specific factors. Similarly, Ratnasari & Budiyanto (2016) found that firm size and leverage could exhibit inverse relationships with profitability depending on organizational efficiency and risk management strategies. While these studies shed light on specific dynamics, the Indonesian Islamic banking sector's unique regulatory and operational landscape remains underexplored.

The literature underscores a notable gap in understanding how these variables collectively influence profitability in Islamic banks within Indonesia's unique financial and regulatory ecosystem. While prior research provides valuable insights into individual determinants, the interactions among leverage, firm size, capital adequacy, and liquidity within a unified model specific to Islamic banks are not thoroughly examined. Moreover, existing studies often overlook the role of external factors, such as macroeconomic stability and industry-specific challenges, which are crucial for a holistic analysis. Addressing this gap is essential for developing robust strategies that enhance Islamic banking's financial and operational resilience.

This study aims to bridge this gap by systematically analyzing the impacts of leverage, firm size, capital adequacy, and liquidity on the profitability of Indonesian Islamic banks from 2007 to 2018. By integrating theoretical and empirical perspectives, it offers a nuanced understanding of how these variables interact within the sector's unique framework. The study's novelty lies in its focus on a relatively under-researched area, combining traditional financial analysis with Sharia-compliance considerations. Additionally, the research adopts a comprehensive approach that evaluates these

variables' individual and collective effects, providing actionable insights for policymakers and practitioners. The findings are expected to enhance decision-making processes, ensuring the sector's sustainability and alignment with its ethical mandate. This study contributes to the broader literature by elucidating the complex dynamics of profitability in Islamic banking and proposing tailored solutions to improve financial performance within this critical sector.

LITERATURE REVIEW

Influence of Leverage on Profitability (ROA) in Islamic Banks

The relationship between leverage, specifically the debt-to-equity ratio, and profitability in Islamic banks, as measured by Return on Assets (ROA), is a topic of significant scholarly interest. Unlike conventional banks, Islamic banks operate under Sharia principles, which prohibit interest-based transactions, influencing their capital structure decisions. Research by Sheikh and Qureshi (2017) indicates that in Islamic banks, profitability and tangibility are negatively correlated with leverage, whereas bank size has a positive correlation. This suggests that as leverage increases, ROA tends to decline, likely due to the heightened financial risks associated with higher debt levels. Similarly, Siddik et al. (2017) found that capital structure negatively affects bank performance, further supporting the notion that excessive leverage can constrain profitability. These findings highlight the importance of balancing debt financing in Islamic banks to maintain financial stability while adhering to ethical banking principles.

Additionally, several studies emphasize the role of external and internal factors in shaping the leverage-profitability relationship in Islamic banking. Harun et al. (2020) argue that corporate governance and social responsibility play a crucial role in capital structure decisions, affecting a bank's ability to manage financial risks effectively. Meanwhile, research by Bitar et al. (2018) suggests that smaller, highly liquid, and more profitable Islamic banks tend to maintain higher capital ratios, reinforcing the argument that lower leverage may enhance profitability. Furthermore, regional studies indicate that macroeconomic conditions and regulatory environments significantly influence how leverage impacts financial performance. For instance, Khan et al. (2018) found a negative relationship between the debt-to-equity ratio and profitability in Pakistan, a finding echoed by Khokher & Alhabshi (2019) in their analysis of Islamic banks with high growth opportunities. These insights suggest that while leverage can provide essential capital for expansion, it must be carefully managed to avoid adverse effects on profitability, particularly in the context of Islamic banking's unique financial framework.

Influence of Firm Size on Profitability (ROA) in Islamic Banks

The relationship between firm size and profitability, particularly return on assets (ROA), in Islamic banks is a significant area of research, as it provides insights into the operational efficiency and financial stability of these institutions. Nawaz & Haniffa (2017) found that larger Islamic banks tend to achieve better financial performance due to their ability to leverage intellectual capital, optimize resources, and expand their market reach. Similarly, Zarrouk et al. (2016) highlighted that larger banks often maintain superior asset quality and capital adequacy, reinforcing the positive correlation between firm size and profitability. This suggests that economies of scale play a crucial role in enhancing financial performance, allowing larger Islamic banks to distribute fixed costs more effectively and improve overall efficiency.

Additionally, corporate governance and financial risk management are key determinants in the relationship between firm size and profitability. Harun et al. (2020) emphasized that larger Islamic banks tend to implement stronger governance frameworks, which contribute to increased profitability by improving transparency and operational oversight. Moreover, Setiawan (2021) found that larger banks have a higher capacity to manage financing risks, further supporting their ability to sustain profitability in uncertain economic conditions. However, Widarjono & Sidiq (2022) noted that while larger banks have greater financing capabilities, their profitability can be affected by high non-performing financing (NPF) levels, highlighting the need for effective risk management strategies. These findings suggest that while firm size generally enhances ROA in Islamic banks, maintaining financial stability requires a balanced approach that integrates governance, risk management, and operational efficiency.

Influence of Capital Adequacy on Profitability (ROA) in Islamic Banks

The impact of capital adequacy on profitability, particularly return on assets (ROA), in Islamic banks is a key area of research that highlights its role in financial stability and operational resilience. Capital adequacy, commonly measured by the Capital Adequacy Ratio (CAR), represents a bank's capacity to absorb financial shocks and sustain long-term profitability. Studies by Bateni et al. (2014) suggest that more profitable banks tend to maintain higher capital adequacy ratios, indicating a positive correlation between CAR and ROA. Similarly, Noman et al. (2015) found that capital adequacy, alongside liquidity and bank size, significantly enhances profitability by boosting investor confidence and ensuring financial security. In the Indonesian context, Almunawwaroh & Marliana (2018) reaffirmed this positive relationship, emphasizing that CAR plays a crucial role in supporting profitability in Islamic banking institutions.

The relationship between CAR and profitability is further explored by Aktaş et al. (2015), who identified profitability, leverage, and liquidity as key determinants of capital adequacy in banks. Amelia (2019) also confirmed that CAR has a significant effect on ROA, reinforcing the importance of a strong capital base for Islamic financial institutions. Additionally, Havidz and Setiawan (2015) noted that while CAR may not directly influence bank efficiency, it remains a vital factor in ensuring financial stability and long-term profitability. Recent studies, such as Rizal (2022), highlight that during economic downturns, including the COVID-19 pandemic, higher CAR levels help Islamic banks maintain financial resilience and sustain profitability. Overall, the evidence suggests that capital adequacy is a fundamental factor influencing the financial performance of Islamic banks, requiring careful management to optimize profitability while ensuring stability and regulatory compliance.

Influence of Liquidity on Profitability (ROA) in Islamic Banks

Liquidity plays a crucial role in the profitability of Islamic banks, particularly in terms of return on assets (ROA). Effective liquidity management ensures that banks can meet their short-term obligations while optimizing profitability. Beck et al. (2013) found that Islamic banks generally maintain higher asset quality and capitalization, contributing to enhanced liquidity and financial stability. This positive liquidity-profitability relationship is further supported by Mennawi (2020), who emphasizes that holding a portion of liquidity in short-term securities, such as Sukuk, can improve financial performance. Similarly, Alzoubi (2017) highlights that banks with greater liquidity are better equipped to manage obligations, reinforcing the idea that liquidity management is a key determinant of ROA. These findings suggest that maintaining a stable liquidity position allows Islamic banks to mitigate risks while capitalizing on profitable opportunities.

However, striking a balance between liquidity and profitability remains a challenge. Sudarsono & Shiddiqi (2022) argue that while Islamic banks prioritize liquidity for risk mitigation, excessive liquidity holdings can limit profit-generating opportunities. This concern is echoed by Rahman & Banna (2016), who examine liquidity risk management in Islamic banks and highlight the constraints imposed by Sharia compliance. Meanwhile, Hosen et al. (2021) find that the impact of liquidity on profitability is influenced by other factors, such as financing-to-deposit ratios (FDR) and capital adequacy ratios (CAR). These studies collectively underscore the complexity of liquidity management in Islamic banking, indicating that while liquidity positively influences profitability, it must be carefully integrated with broader financial strategies to achieve optimal ROA.

Research Gaps and Implications for Future Studies

Despite the extensive literature on profitability determinants in conventional and Islamic banks, several gaps remain. One notable gap is the limited focus on the combined effects of leverage, firm size, capital adequacy, and liquidity within a unified model specific to Islamic banks. Most existing studies examine these variables in isolation, overlooking their potential interactions and cumulative impact on profitability. Additionally, the role of external factors, such as macroeconomic conditions and industry-specific challenges, is often underexplored, limiting the generalizability of findings.

Another significant gap is the lack of studies addressing the unique regulatory and operational constraints faced by Islamic banks. For instance, liquidity management in Islamic banks relies on instruments like sukuk, which differ from conventional tools in terms of risk and return profiles. Understanding how these differences affect profitability requires further investigation. Addressing these gaps is essential for developing more robust and context-specific insights into the determinants of profitability in Islamic banking.

METHOD

Research Design

The study utilizes a descriptive and explanatory research design, aimed at identifying relationships between the independent variables (leverage, firm size, capital adequacy, and liquidity) and the dependent variable (profitability). Descriptive statistics are used to summarize and characterize the data, while inferential statistics, specifically multiple regression analysis, are employed to test hypotheses and establish causality. The study's design allows for a systematic examination of how financial and operational metrics influence ROA in Islamic banks, considering the unique constraints and opportunities presented by Sharia compliance.

Population and Sampling

The population of this study includes all Islamic banks operating in Indonesia during the period from 2007 to 2018. Islamic banks were chosen due to their critical role in the Indonesian financial system and their distinctive operational principles, which differ from conventional banks. To ensure a comprehensive analysis, the study adopts a saturated sampling technique, which includes all members of the population that meet the inclusion criteria. This method ensures that the analysis captures the full spectrum of variability within the sector, enhancing the generalizability of the findings.

Data Sources

The study relies on secondary data obtained from publicly available financial statements of Islamic banks, regulatory reports, and databases maintained by the Financial Services Authority (OJK) and Bank Indonesia, for 2007-2018. These sources provide detailed information on the banks' financial performance, including metrics such as total assets, equity, debt, capital adequacy ratios, and liquidity ratios. Data reliability is ensured through cross-referencing and validation against multiple sources, while completeness is maintained by including only banks with consistent data over the study period.

Variable Definitions and Measurement

The analysis focuses on four independent variables—leverage, firm size, capital adequacy, and liquidity—and one dependent variable, profitability (ROA). Each variable is operationalized as in Table 1.

Table 1

Variable Definitions

No	Variable	Description
1	Leverage (Debt-to-Equity Ratio - DER):	It is the ratio of total debt to total equity and reflects the extent to which banks utilize borrowed funds to finance their operations and generate profits. Higher DER values indicate greater reliance on debt, which can either amplify returns or increase financial risk
2	Firm Size (Total Assets	Firm size is measured by the natural logarithm of total assets. This transformation reduces the skewness of the data and allows for a more accurate representation of the relationship between bank size and profitability. Larger banks may benefit from economies of scale, but they may also face challenges such as bureaucratic inefficiencies
3	Capital Adequacy (Ratio - CAR	CAR is calculated as the ratio of a bank's capital to its risk-weighted assets. This metric assesses a bank's financial stability and its ability to absorb potential losses. While higher CAR values are associated with greater stability, they may not always translate to higher profitability due to potential underutilization of capital.
4	Liquidity (Financing-to-Deposit Ratio - FDR)	Liquidity is measured by the ratio of financing extended to deposits collected. This ratio indicates a bank's ability to meet its short-term obligations while maintaining sufficient funds for lending. Optimal liquidity management is crucial for sustaining profitability without compromising financial stability.
5	Profitability (Return on Assets - ROA	ROA is the dependent variable and is calculated as the ratio of net income to total assets. It represents the efficiency with which a bank utilizes its assets to generate earnings. ROA is widely regarded

No	Variable	Description
		as a reliable indicator of financial performance in the banking industry

Source: Authors' definition.

Analytical Techniques

The study employs a series of statistical techniques to analyze the data and test the research hypotheses:

1. Descriptive Statistics:
   Descriptive statistics are used to summarize the key characteristics of the data, including means, standard deviations, and ranges. This initial step provides a clear overview of the variables and identifies any potential anomalies or outliers.
2. Assumption Testing:
   Before conducting regression analysis, the study performs assumption testing to ensure the validity and reliability of the results. These tests include:

   - Normality Test: Assesses whether the data follows a normal distribution.
   - Multicollinearity Test: Evaluates the degree of correlation among independent variables to prevent redundancy.
   - Heteroscedasticity Test: Checks for consistent variance in the error terms of the regression model.
   - Autocorrelation Test: Identifies any correlation between residuals across observations.
3. Multiple Regression Analysis:
   Multiple regression analysis is the primary inferential technique used to examine the relationship between the independent variables and ROA. The model is specified as:

   $$ROA=\beta_0 + \beta_1 DER + \beta_2 Firm\ Size + \beta_3 CAR + \beta_4 FDR + \epsilon$$

Where β_0 is the intercept, β_1, β_2, β_3, and β_4 are the coefficients for leverage, firm size, capital adequacy, and liquidity, respectively, and ϵ represents the error term.

4. Hypothesis Testing:
   Hypotheses are tested using t-statistics and p-values to determine the significance of individual predictors. Additionally, F-tests assess the overall model significance, while the coefficient of determination (R^2) indicates the proportion of variability in ROA explained by the independent variables.

RESULTS

Descriptive Statistics

The descriptive statistics provide an initial overview of the variables analyzed in the study, including leverage, firm size, capital adequacy, liquidity, and profitability (ROA). The analysis reveals variability across Islamic banks in Indonesia during the 2007–2018 period, highlighting differences in operational and financial strategies. Leverage (measured by the Debt-to-Equity Ratio, DER) shows a range indicating the extent to which banks utilize external financing relative to equity. Firm size, as represented by the natural logarithm of total assets, demonstrates that larger institutions dominate the sector, reflecting their capacity to mobilize resources. Capital adequacy (CAR) averages within the regulatory benchmarks, indicating a generally stable financial health across the sample. Liquidity (FDR) varies widely, suggesting differing approaches to managing short-term obligations and loan disbursement. The dependent variable, ROA, indicates moderate profitability, emphasizing the need to investigate the factors driving these outcomes.

Table 1

Descriptive Statistics

Statistic	Y	X1	X2	X3	X4
Mean	0.014915	12.09048	3.69427	0.130585	0.882039
Median	0.0178	12.88185	3.964517	0.137	0.869
Maximum	0.0256	16.54467	4.532351	0.165	1.8435
Minimum	0.0017	0.016361	2.223168	0.0124	0.4978
Std. Dev.	0.007189	4.40739	0.69431	0.029091	0.171613
Skewness	-0.37211	-2.12006	-0.69904	-2.8927	3.7531
Kurtosis	1.491325	6.295544	2.128775	12.51539	23.15915
Jarque-Bera	5.424101	55.27519	5.201179	237.6926	886.9074
Probability	0.0664	0	0.07423	0	0
Sum	0.6861	556.1622	169.9364	6.0069	40.5738
Sum Sq. Dev.	0.002326	874.1289	21.69298	0.038084	1.325293
Observations	46	46	46	46	46

Source: Primary data. Authors' estimation.

Classical Assumption Tests

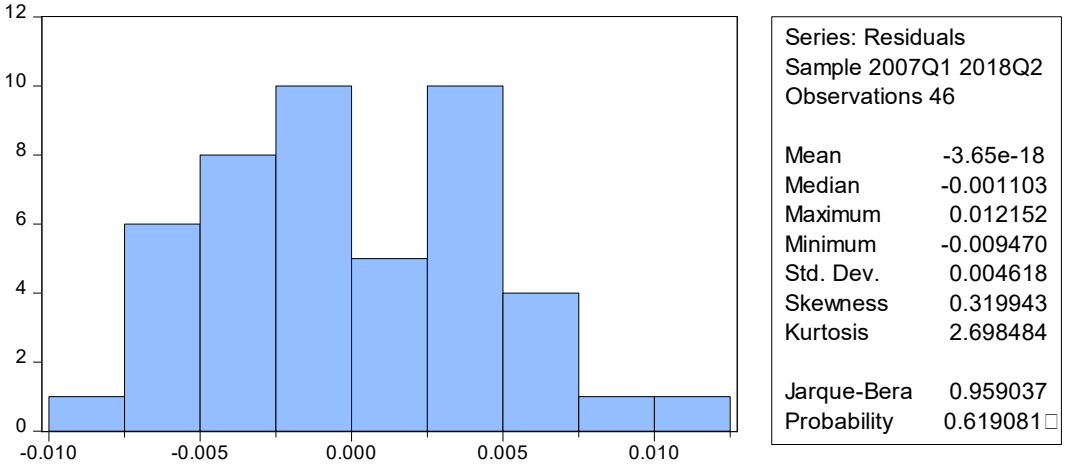
Normality Test

The normality test aims to determine whether the regression model's residuals are normally distributed. Generally, two methods can be used to assess normality: examining the residual histogram and comparing numerical values in the table. The numerical comparison involves two approaches: (1) comparing the Jarque-Bera (JB) value with a significance level (α) of 5%. If the JB value is smaller than the chi-square

table value, the null hypothesis (H0) is accepted, indicating a normal distribution; (2) comparing the probability value with α. If the probability value is greater than α, H0 is accepted, confirming normal distribution. In this study, both methods were employed using a significance level of 5% (0.05). The normality test results in Figure 1 indicate a probability value of 0.619081 (61.9081%) and a JB value of 0.959037, both exceeding the 5% threshold. Consequently, H0 is accepted, confirming that the regression model's residuals follow a normal distribution.

Figure 1

Normality Test Results



Source: Primary data. Authors' estimation.

Multicollinearity Test

The multicollinearity test aims to determine whether there is a correlation between independent variables in the regression model. A regression model is considered free from multicollinearity issues if the Variance Inflation Factor (VIF) value is below 10 or if VIF equals 0 and the tolerance (TOL) value is 1. When these conditions are met, the null hypothesis (H0) is accepted, indicating no multicollinearity in the regression model. The results of the multicollinearity test in this study (Table 2) show that all independent variables have Centered VIF values below 10, confirming that H0 is accepted and the regression model does not suffer from multicollinearity issues.

Table 2

Multicollinearity Test Results

Description Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	4.20E-05	82.64174	NA
X1	4.50E-08	14.6246	1.682431
X2	1.85E-06	51.39464	1.716598
X3	0.000812	28.54126	1.321548

Description Variable	Coefficient Variance	Uncentered VIF	Centered VIF
X4	1.81E-05	28.75763	1.026927

Source: Primary data. Authors' estimation.

Heteroskedasticity Test

A good regression model should be free from heteroscedasticity issues. The heteroscedasticity test is conducted to determine whether there is a variance inconsistency across observations in the regression model. In this study, the Breusch-Pagan method was employed to detect potential heteroscedasticity. The test results (Table 3) indicate that the chi-square probability value is 0.5599, which is greater than the significance level (α) of 5% or 0.05. Since the probability value exceeds α, the null hypothesis (H0) is accepted, confirming that the regression model used in this study does not exhibit heteroscedasticity issues.

Table 3

Heteroskedasticity Test Results

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.711919	Prob. F(4,41)	0.5885
Obs*R-squared	2.99E+00	Prob. Chi-Square(4)	0.5599
Scaled explained SS	2.02E+00	Prob. Chi-Square(4)	0.7329

Source: Primary data. Authors' estimation.

Autocorrelation Test

The autocorrelation test is conducted to determine whether a regression model exhibits autocorrelation issues. Autocorrelation arises when sequential observations over time are correlated with one another, which is a common issue in time-series data but less frequent in cross-sectional data. To examine the presence of autocorrelation in this study, the Breusch-Godfrey Serial Correlation LM Test was performed. The results in Table 4 indicate a chi-square probability value of 0.0002, which is lower than the significance level (α) of 5% or 0.05. Since the probability value is below α, the null hypothesis (H0) is rejected, confirming the presence of autocorrelation in the regression model.

Table 4

Autocorrelation Test Results

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	8.41	Prob. F(4,37)	0.0001
Obs*R-squared	21.9	Prob. Chi-Square(4)	0.0002

Source: Primary data. Authors' estimation.

To address the autocorrelation issue, corrective measures were applied using the Newey-West and Kenneth (HAC) method, which is commonly utilized to rectify both

autocorrelation and heteroscedasticity problems. After applying this method, the revised Breusch-Godfrey test results show a chi-square probability value of 0.0793, which exceeds the 5% significance level ($\alpha = 0.05$). Since the probability value is greater than α, the null hypothesis (H0) is accepted, indicating that the regression model no longer exhibits autocorrelation issues.

Table 4

Corrected Autocorrelation Test Results

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.412459	Prob. F(2,38)	0.1032
Obs*R-squared	5.069976	Prob. Chi-Square(2)	0.0793

Source: Primary data. Authors' estimation.

Regression Analysis Results

The results of the t-test analysis provide insight into the impact of each independent variable on profitability. The regression coefficient for leverage (X1) is 0.000767, indicating a positive relationship with profitability. The probability value of 0.0008 is below the significance level of 5% (0.05), leading to the rejection of H0 and confirming that leverage significantly influences profitability. Meanwhile, the regression coefficient for firm size (X2) is -0.008707, suggesting a negative impact on profitability. With a probability value of 0.0000, which is lower than the significance threshold, H0 is rejected, indicating that firm size has a significant but negative effect on profitability.

Regarding capital adequacy (X3), the regression coefficient is 0.011456, showing a positive relationship with profitability. However, its probability value of 0.6898 exceeds the 5% threshold, meaning H0 is accepted, and capital adequacy does not significantly affect profitability. In contrast, liquidity (X4) has a regression coefficient of 0.010353, indicating a positive relationship with profitability. Since its probability value is 0.0195, which is below the 5% significance level, H0 is rejected, confirming that liquidity significantly impacts profitability. These findings suggest that while leverage and liquidity positively influence profitability, firm size negatively affects it, and capital adequacy does not exert a significant impact.

Table 5

Regression Test Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.027187	0.006484	4.192852	0.0001
X1	0.000767	0.000212	3.611635	0.0008
X2	-0.008707	0.001361	-6.398445	0.0000
X3	0.011456	0.028497	0.401984	0.6898
X4	0.010353	0.004258	2.431155	0.0195

Source: Primary data. Authors' estimation.

The F-test evaluates whether all independent variables collectively influence profitability. The probability value for the F-statistic is 0.000000, which is significantly lower than the 5% significance level. This result leads to the rejection of H0, confirming that leverage, firm size, capital adequacy, and liquidity collectively exert a significant impact on profitability. This finding suggests that, as a whole, these variables explain variations in profitability, underscoring the importance of considering multiple financial factors in assessing firm performance.

The coefficient of determination (R^2) is used to measure the explanatory power of the regression model. The adjusted R^2 value is 0.547181, indicating that 54.72% of the variation in profitability can be explained by the independent variables—leverage, firm size, capital adequacy, and liquidity. The remaining 45.28% is attributed to other factors not included in the model. This suggests that while the selected variables significantly influence profitability, additional factors should be explored to enhance the explanatory power of the model.

In summary, the regression analysis reveals that leverage and liquidity positively impact profitability, while firm size has a negative effect, and capital adequacy does not significantly contribute. The F-test confirms that all independent variables jointly influence profitability, highlighting the importance of a comprehensive financial strategy. The adjusted R^2 value suggests that the model explains a substantial portion of profitability variation, though other factors may also play a role. These findings provide valuable insights into financial management strategies for optimizing profitability in firms.

DISCUSSION

This study investigates the determinants of profitability (ROA) in Islamic banks in Indonesia, focusing on leverage, firm size, capital adequacy, and liquidity as key factors. The findings demonstrate that leverage and liquidity positively and significantly influence profitability, while firm size has a significant but negative relationship with ROA. Interestingly, capital adequacy does not exhibit a statistically significant impact. These results highlight the complex interplay between financial variables in shaping the performance of Islamic banks, which operate under unique principles and regulatory frameworks.

Leverage and Profitability

The findings of this study indicate that leverage has a positive and significant effect on the profitability of Islamic banks, as measured by ROA. The regression coefficient for leverage is 0.000767, with a probability value of 0.0008, which is below the 5% significance level, leading to the rejection of H0 and the acceptance of $H\alpha$. This result

aligns with previous research by Vintila & Duca (2012), which found that leverage significantly influences profitability, particularly return on equity (ROE). Similarly, Barus & Leliani (2013) reported that leverage has a positive and significant impact on profitability, reinforcing the argument that debt financing can contribute to higher financial performance. The rationale behind this finding is that leverage allows banks to finance their operations using external funds, leading to increased activities and, subsequently, higher profitability.

However, contradictory findings exist in the literature. Ratnasari & Budiyanto (2016) and Atmaja et al. (2018) found that leverage negatively affects profitability, indicating that a higher debt ratio can burden financial institutions with excessive liabilities, reducing overall returns. Mennawi (2020) also highlights that excessive leverage can lead to financial distress, increasing costs and limiting profitability. These conflicting results suggest that the impact of leverage on profitability is influenced by various factors, including financial management practices, economic conditions, and risk exposure. The differences in these findings emphasize the importance of strategic leverage management, particularly for Islamic banks that operate under strict Sharia principles.

For Islamic banks in Indonesia, the positive effect of leverage on profitability has important implications for financial management. Since Islamic banks do not engage in conventional interest-based lending, they rely on alternative financing structures such as mudarabah and musharakah, which can be influenced by leverage decisions. Effective leverage management allows Islamic banks to expand their investment activities while maintaining financial stability. However, given the potential risks associated with excessive leverage, banks must implement prudent financial strategies to balance profitability with sustainability. Policymakers and regulators should also ensure that leverage levels remain within safe limits to prevent financial instability while allowing Islamic banks to maximize their growth potential.

Firm Size and Profitability

The findings of this study indicate that firm size has a significant negative effect on the profitability of Islamic banks, as measured by ROA. The regression coefficient for firm size is -0.008707, with a probability value of 0.0000, which is below the 5% significance level, leading to the rejection of H0 and the acceptance of $H\alpha$. This result aligns with previous research by Kartikasari & Merianti (2016), who found that firm size negatively and significantly impacts profitability. Similarly, Fitriyah (2021), Jao & Palagung (2011), and Vintila & Duca (2012), reported that firm size negatively affects earnings management and ROE, reinforcing the idea that as banks grow larger, their profitability may decline due to increasing operational costs and inefficiencies.

However, conflicting results exist in the literature. Studies conducted by Ambarwati et al. (2015), Akbar (2013), and Atmaja et al. (2018) suggest that firm size positively and significantly affects profitability. Their findings indicate that larger banks benefit from economies of scale, improved risk management, and greater market influence, which ultimately lead to higher profitability. This contradiction highlights that the impact of firm size on profitability is context-dependent and may vary based on factors such as management efficiency, regulatory frameworks, and economic conditions.

For Islamic banks in Indonesia, the negative relationship between firm size and profitability has important implications. As banks expand, their operational costs tend to rise, which can strain profitability if not managed efficiently. This suggests that simply increasing assets does not guarantee higher returns unless banks implement cost-effective strategies and enhance governance structures. Policymakers and banking executives should focus on optimizing operational efficiencies and leveraging technological advancements to mitigate the adverse effects of increased size on profitability. Additionally, maintaining a balance between growth and financial performance is essential to ensure long-term sustainability in Indonesia's Islamic banking sector.

Capital Adequacy and Profitability

The findings of this study indicate that capital adequacy has a positive but insignificant effect on the profitability of Islamic banks, as measured by ROA. The regression coefficient for capital adequacy is 0.011456, with a probability value of 0.6898, which is greater than the 5% significance level. This result leads to the acceptance of H0 and the rejection of Hα, meaning that while capital adequacy contributes positively to profitability, its effect is not statistically significant. Similar findings have been reported by Prasanjaya & Ramantha (2013), Akbar (2013), and Mawardi (2005), who also found that capital adequacy positively impacts profitability but does not significantly influence financial performance in Islamic banks. These results suggest that while maintaining sufficient capital is essential for financial stability, it does not directly translate into higher profitability.

However, several prior studies contradict this finding, indicating that capital adequacy significantly affects profitability. Research conducted by Dao & Nguyen (2020), Setiawati et al. (2017), Onuora (2019), and Olalekan & Adeyinka (2024) found a strong positive relationship between capital adequacy and bank profitability. Their findings suggest that well-capitalized banks are better equipped to absorb financial shocks, enhance investor confidence, and support lending activities, all of which contribute to higher profitability. The discrepancy between these studies and the

current research may be due to differences in banking regulations, economic conditions, or the efficiency of capital utilization across different financial institutions.

For Islamic banks in Indonesia, the insignificant effect of capital adequacy on profitability has important implications. This finding suggests that banks may not be optimizing their capital in ways that enhance profitability. One possible explanation is that Islamic banks focus more on compliance with regulatory capital requirements, such as maintaining a CAR above 8%, as mandated by Bank Indonesia, rather than strategically utilizing their capital for profit-generating activities (Akbar, 2013). Additionally, excessive capital reserves may lead to inefficiencies, as funds that could be used for investment remain idle. To improve profitability, Islamic banks in Indonesia should focus on enhancing capital efficiency, diversifying their investment portfolios, and leveraging their capital for productive financing activities while maintaining compliance with Sharia principles and regulatory requirements.

Liquidity and Profitability

The findings of this study indicate that liquidity has a significant positive impact on the profitability of Islamic banks, as measured by Return on Assets (ROA). The regression results show a coefficient of 0.010353 with a significance probability of 0.0195, which is lower than the 5% threshold. These results suggest that higher liquidity levels contribute to improved profitability, leading to the rejection of H0 and the acceptance of $H\alpha$. This finding aligns with previous research by Sudarsono et al. (2019), which also found that liquidity positively affects profitability. Similarly, Akbar (2013) identified a significant relationship between liquidity and profitability, although his study suggested a negative correlation. The positive relationship in this study suggests that banks with higher liquidity are better positioned to meet financial obligations, enhance customer trust, and optimize asset utilization, ultimately leading to increased profitability.

However, some prior studies contradict this finding, arguing that liquidity does not significantly affect profitability. Research by Ambarwati et al. (2015), Muarif et al. (2021), Pratiwi & Muthohar (2021), Ratnasari & Budiyanto (2016), and Setiawati et al. (2017) concluded that liquidity is not a primary determinant of profitability. These studies argue that Islamic banks often fail to maximize third-party funds in financing activities, leading to inefficient capital allocation. Instead of utilizing their liquid assets effectively, some banks focus on maintaining high liquidity ratios without translating them into profitable ventures. This discrepancy highlights that while liquidity is essential for financial stability, its impact on profitability depends on how efficiently banks manage and deploy their liquid assets.

For Islamic banks in Indonesia, the significant positive impact of liquidity on profitability has critical implications. It suggests that well-managed liquidity can

enhance financial performance and customer confidence, as banks with sufficient liquid assets are perceived as more reliable. Given the nature of Islamic banking, where financial activities must comply with Sharia principles, effective liquidity management becomes even more crucial. Islamic banks should focus on optimizing their liquid assets by channeling them into profitable yet compliant investments, such as mudarabah and musharakah financing. By doing so, banks can maintain financial stability while ensuring sustainable profitability. Additionally, strengthening risk management frameworks to balance liquidity and profitability will be essential for the long-term success of Islamic banking in Indonesia.

Interaction Effects and Implications

The findings of this study indicate that leverage, firm size, capital adequacy, and liquidity collectively have a significant impact on the profitability of Islamic banks, as measured by Return on Assets (ROA). The Adjusted R-squared value of 0.547181 (or 54.72%) suggests that these independent variables explain 54.72% of the variation in profitability, while the remaining 45.28% is influenced by other factors not included in this model. Additionally, the F-statistic probability value of 0.000000, which is lower than the 5% significance level, confirms that these variables together have a statistically significant effect on profitability. These results align with previous studies by Ratnasari and Budianto (2016), Setiawati et al. (2017), Ambarwati et al. (2015), and Akbar (2013), which also found that leverage, firm size, capital adequacy, and liquidity significantly influence profitability in financial institutions. The positive association between these factors and profitability suggests that financial management strategies that optimize these variables can contribute to better financial performance.

For Islamic banks in Indonesia, these findings underscore the importance of balancing financial stability and profitability through effective management of leverage, firm size, capital adequacy, and liquidity. Given the nature of Islamic banking, where financial activities must comply with Sharia principles, banks need to ensure that their leverage levels remain sustainable, capital is adequately managed to support growth, and liquidity is optimally utilized for profitable investments. The significant impact of these factors on profitability highlights the need for Islamic banks to adopt a strategic approach to financial management, ensuring that they maintain financial stability while maximizing returns. Strengthening regulatory frameworks and risk management policies will also be crucial to mitigating financial risks while enhancing profitability in the long run.

The findings suggest that the interaction between leverage, firm size, capital adequacy, and liquidity significantly influences profitability in Islamic banks. These variables do not operate in isolation but interact dynamically to shape financial

outcomes. For instance, the benefits of leverage may be amplified or diminished by the bank's liquidity position, while the impact of firm size may depend on the institution's capital adequacy. Understanding these interactions is crucial for developing holistic strategies to enhance profitability in Islamic banks. Policymakers and practitioners should adopt an integrated approach that considers the interplay between these factors. For example, leveraging advanced data analytics and scenario modeling could provide deeper insights into how changes in one variable affect others, enabling more informed decision-making.

Practical Implications for Islamic Banking

The study's findings have several practical implications for Islamic banks seeking to enhance profitability:

1. Leverage Management: Islamic banks should optimize debt utilization by carefully evaluating the trade-offs between financial leverage and risk exposure. Developing tailored debt instruments that align with Sharia principles can further enhance flexibility and profitability.
2. Efficiency Improvements: Larger banks should prioritize operational efficiency to counteract the negative effects of size. This could include investing in digital technologies, streamlining processes, and adopting lean management practices.
3. Capital Deployment: Islamic banks should explore innovative ways to deploy excess capital into productive, Sharia-compliant investments. This includes expanding the range of available financial products and exploring new markets for sukuk issuance.
4. Liquidity Optimization: Effective liquidity management strategies, such as diversifying funding sources and utilizing advanced forecasting tools, can help Islamic banks maintain financial stability while maximizing returns.
5. Integrated Risk Management: Adopting a comprehensive risk management framework that accounts for the interplay between leverage, size, capital, and liquidity can enhance financial performance and resilience.

CONCLUSION

This study provides a comprehensive analysis of the determinants of profitability in Islamic banks in Indonesia, focusing on leverage, firm size, capital adequacy, and liquidity. The findings reveal that leverage and liquidity significantly and positively influence profitability, while firm size has a significant but negative effect. Capital adequacy, although essential for stability, does not exhibit a direct impact on profitability. These results underscore the unique dynamics of Islamic banking, which

operates under Sharia principles requiring alternative financial structures and compliance mechanisms.

The implications of these findings are profound. Leverage and liquidity management emerge as critical levers for enhancing profitability, while larger institutions must address inefficiencies associated with scale. The limited impact of capital adequacy suggests the need for optimized deployment of excess capital into productive, Sharia-compliant investments. By integrating these insights, policymakers and practitioners can develop strategies to improve financial performance while maintaining ethical and regulatory standards.

This study contributes to the growing body of literature on Islamic banking by providing empirical evidence specific to Indonesia, a major market for Islamic finance. It highlights the interplay of financial variables in shaping profitability within the constraints of Sharia compliance. Future research could build on this foundation by exploring external influences, such as macroeconomic conditions, or by applying similar frameworks in other regions to deepen the understanding of profitability drivers in Islamic banking.

Limitations of the Study

While this research offers valuable insights into the profitability determinants of Islamic banks, it has several limitations. The study relies solely on secondary data, which may not capture qualitative factors, such as managerial decisions, customer preferences, or organizational culture, that can significantly influence financial performance. Moreover, the focus on Islamic banks in Indonesia limits the generalizability of findings to other markets, where regulatory environments and operational structures may differ.

Another limitation is the time frame of the study, which spans from 2007 to 2018. Although this period provides a robust dataset, it may not fully reflect more recent developments in the Islamic banking sector, such as the adoption of fintech solutions or changing consumer behaviors. Additionally, the study does not account for macroeconomic factors like inflation, exchange rates, or global financial crises, which can significantly impact banking profitability.

Finally, while the statistical methods employed are rigorous, the study does not explore potential interactions or mediating effects between the independent variables. For instance, the relationship between leverage and profitability could be moderated by liquidity or firm size. Addressing these interactions could provide a more nuanced understanding of profitability determinants in Islamic banks.

Recommendations for Future Research

Future research should address the limitations of this study to deepen the understanding of profitability in Islamic banking. Mixed-method approaches

combining quantitative and qualitative data could provide richer insights into how managerial practices, customer behavior, and organizational culture influence financial performance.

Expanding the scope to include Islamic banks in different regions or conducting cross-country comparisons could help identify universal and context-specific determinants of profitability. This would also facilitate a better understanding of how varying regulatory frameworks and market conditions shape financial outcomes.

Additionally, incorporating external variables such as macroeconomic indicators, industry competition, and technological advancements could offer a more comprehensive perspective. Exploring the role of fintech and digital transformation in enhancing efficiency and profitability in Islamic banks is particularly timely and relevant.

Finally, future studies should consider interaction effects and mediating variables to capture the complex dynamics between financial metrics. For instance, examining how liquidity moderates the impact of leverage on profitability could yield actionable insights for policymakers and practitioners. By addressing these areas, future research can contribute significantly to the growing field of Islamic banking and finance.

Author Contributions

Conceptualization: N.H. & Y.A.; Data curation: N.H.; Formal analysis: N.H., Y.A., & F.B.; Funding acquisition: N.H. & Y.A.; Investigation: N.H. & Y.A.; Methodology: N.H. & Y.A.; Project administration: N.H.; Resources: Y.A.; Software: N.H. & Y.A.; Supervision: Y.A.; Validation: N.H., Y.A., & F.B.; Visualization: N.H. & Y.A.; Writing – original draft: N.H. Y.A., & F.B.; Writing – review & editing: N.H., Y.A., & F.B. All the authors have read and agreed to the published version of the manuscript.

Funding

This study received no direct funding from any of the institutions.

Institutional Review Board Statement

This study was approved by the Program Studi Ekonomi Islam (S1), Universitas Islam Indonesia, Yogyakarta, Indonesia.

Informed Consent Statement

Informed consent was not required for this study.

Data Availability Statement

The data presented in this study are available upon request from the corresponding author. The data are not publicly available because of the institution's policies.

Acknowledgments

The authors thank the Program Studi Ekonomi Islam (S1), Universitas Islam Indonesia, Yogyakarta, Indonesia, for administrative support for the research on which this article was based.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used ChatGPT, DeepL, Grammarly, and PaperPal to translate from Bahasa Indonesia into American English and improve the clarity of the language and readability of the article. After using these tools, the authors reviewed and edited the content as needed and took full responsibility for the content of the published article.

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