

The Impact of Green Banking on the Stability and Profitability of Islamic Banking in Indonesia

Muhamad Haris*, Nurwahidin, Veithzal Rivai Zainal

Universitas Indonesia, Indonesia

Email: aa.mab46@gmail.com*, nurwahidin@ui.ac.id, veithzal47@gmail.com

Keywords:

Green Banking; Green Financing;
Stability; Profitability; Sharia
Bank

Abstract

Green financing is a key instrument in the implementation of green banking, supporting environmental sustainability while also having the potential to influence banks' financial performance. This study analyzed the impact of green banking on the stability and profitability of Islamic banks in Indonesia. The sample comprised 17 Islamic commercial banks, yielding 97 bank-year observations over the 2019–2025 period. Annual data were obtained from the annual and sustainability reports of each bank. Green banking was proxied by the ratio of green financing to total financing, whereas bank stability and profitability were measured using the equity-to-total-assets (ETA) ratio and return on assets (ROA), respectively. The study employed fixed-effects panel data regression with standard errors clustered at the bank level. The results indicated that green financing had a positive and significant effect on bank stability but a negative and statistically insignificant effect on profitability. Banks with stronger capital adequacy and greater operational efficiency also exhibited higher levels of stability and profitability. These findings suggest that the benefits of green financing are reflected initially in enhanced bank resilience, whereas its effect on profitability may take longer to materialize. Therefore, Islamic banks should expand green financing in a prudent manner while continuing to strengthen their capital base, improve operational efficiency, and enhance financing risk management.

INTRODUCTION

Climate change and environmental degradation have attracted increasing global attention, prompting governments, industries, and financial institutions to adopt practices that prioritize sustainability. Global challenges, including climate change, ozone layer depletion, greenhouse gas emissions, and environmental pollution, have become increasingly urgent, underscoring the need for a green economic growth framework to mitigate the adverse effects of unsustainable industrialization. Environmental risks have become critical considerations in corporate and institutional management because changes in ecosystem conditions and environmental degradation can significantly affect long-term operational stability and sustainability (Khomsatun et al., 2025). According to the World Economic Forum (2024), four of the ten highest-ranked global risks over the next decade are environmental in nature: extreme weather events, critical changes to Earth's systems, biodiversity loss, and natural resource shortages. Furthermore, the 2023 World Risk Index (WRI) reported that the Philippines had the highest disaster risk score (46.86), followed by Indonesia (43.50) and India (41.52). These rankings have remained relatively stable in recent years, indicating persistent vulnerability in these countries. Indonesia's high level of disaster risk further highlights the importance of

addressing climate-related risks, as they may affect not only environmental sustainability and community resilience but also impose substantial economic costs.

One strategy for addressing these challenges is the adoption of sustainable finance principles across economic sectors, including the banking industry, where Islamic banking plays an important role in supporting sustainable economic development. In Indonesia, the Financial Services Authority (OJK) has encouraged the implementation of sustainable finance through various policies and regulatory initiatives, including the Sustainable Finance Roadmap Phase I (2015–2019), OJK Regulation No. 51/POJK.03/2017 concerning the Implementation of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies, the Sustainable Finance Roadmap Phase II (2021–2025), the Indonesian Green Taxonomy, the Indonesian Taxonomy for Sustainable Finance (TKBI) Versions 1–3, and the implementation of Climate Risk Management and Scenario Analysis (CRMS). Within this regulatory framework, Islamic banks, as financial intermediaries, play a strategic role in directing financing toward sectors that support climate change mitigation, renewable energy, and the sustainable management of natural resources. This role is particularly relevant because Islamic banking inherently incorporates ethical values and sustainability principles into its business model (Ningsih et al., 2020). The implementation of green banking may further strengthen Islamic banking by enhancing institutional reputation, reducing exposure to environmental risks, and promoting a sustainable financing portfolio (Putri et al., 2024). From an Islamic perspective, the principles of *maqāṣid al-sharīʿah* provide the normative foundation for ensuring that banking activities pursue not only financial returns but also social welfare and environmental stewardship. Accordingly, green banking represents the practical implementation of several objectives of *maqāṣid al-sharīʿah*, particularly the protection of life (*al-nafs*), progeny (*al-nasl*), and wealth (*al-māl*). Through this integration, Islamic banking seeks to achieve a balance between financial performance and broader social and environmental objectives while mitigating environmental risks that may threaten the public interest (Nurmalia, 2021).

Despite its potential benefits, the implementation of green banking in Islamic banking faces several challenges, including limited human resource capacity, implementation costs, and the gap between the ideals of *maqāṣid al-sharīʿah* and business realities. An additional challenge concerns its impact on bank performance, particularly bank stability and profitability. Bank stability is a fundamental pillar for maintaining public confidence and safeguarding the resilience of the national financial system and is therefore essential for achieving sustainable development objectives. At the same time, profitability remains a key indicator of the ability of Islamic banks to generate earnings efficiently and sustain long-term operations, particularly given their relatively small market share compared with conventional banks. An important question, therefore, is whether the implementation of green banking enhances or constrains the profitability of Islamic banks. Accordingly, examining the relationship between green banking and the stability and profitability of Islamic banking is of considerable theoretical and practical importance (Irfany et al., 2024; Jan et al., 2019; Julia & Kassim, 2020).

Several previous studies have examined the impact of green banking and sustainable finance on bank stability and profitability. Their findings suggest that green financing has a positive and significant effect on profitability, particularly among smaller banks (Sutrisno et al., 2024). However, the same study found that green financing did not have a significant effect

on bank stability, whereas the capital adequacy ratio (CAR) and cost-to-income ratio (CIR) had significant effects on both profitability and stability. In contrast, Riyanti et al. (2025) reported that green lending had a significant negative effect on bank profitability. Evidence from Nigeria further showed that investments in social projects, environmental initiatives, and sustainability enhanced corporate goodwill and bank profitability, indicating that both goodwill and environmental awareness had positive and significant effects on financial performance (H. Inegbedion, 2024). Likewise, Mirza et al. (2023) found a positive relationship between green lending to small and medium-sized enterprises (SMEs) and bank performance, measured by the net interest margin (NIM), across the BRIC countries (Brazil, Russia, India, and China). These findings suggest that financing environmentally sustainable SMEs may contribute to both higher profitability and greater financial stability. Although green banking has been widely discussed in both national and international literature, empirical studies focusing specifically on Islamic banking in Indonesia remain limited. Most previous research has concentrated on sustainable finance practices in conventional banks. In Indonesia, the promotion of green banking is consistent with the Financial Services Authority's (OJK) sustainable finance agenda. Nevertheless, empirical evidence regarding the extent to which green banking contributes to the stability and profitability of Islamic banks remains limited.

Green banking refers to the integration of environmental, social, and governance (ESG) considerations into banking operations, products, and services to support sustainable development while maintaining the financial performance of banking institutions. The concept emerged in response to growing global awareness of sustainability and corporate social responsibility amid escalating environmental challenges. Green banking encompasses a range of initiatives, including green financing for environmentally sustainable projects, digital banking services that reduce paper and energy consumption, and internal policies promoting energy efficiency and carbon emission reduction (Anggraini et al., 2022). Green financing is one of the principal instruments of green banking and serves as an important driver of sustainable economic development by directing financial resources toward environmentally and socially responsible activities. According to OJK (2026), green financing refers to the allocation of funds to activities that contribute to environmental protection, greenhouse gas emission reduction, resource efficiency, climate change adaptation, and sustainable development.

In banking practice, financing classified as green financing is defined by the Financial Services Authority (OJK). OJK classifies sustainable financing activities under Sustainable Business Activities (Kegiatan Usaha Berkelanjutan [KUB]), which comprise Environmentally Sustainable Business Activities (Kegiatan Usaha Berwawasan Lingkungan [KUBL]) and Socially Sustainable Business Activities (Kegiatan Usaha Berwawasan Sosial [KUBS]). These classifications are based on OJK Regulation No. 51/POJK.03/2017 concerning the Implementation of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies. The Sustainable Business Activities Classification (Klasifikasi Kegiatan Usaha Berkelanjutan [KKUB]) consists of 12 financing categories: renewable energy, energy efficiency, pollution prevention and control, sustainable natural resource management, biodiversity conservation, environmentally friendly transportation, water and wastewater management, climate change adaptation, environmentally friendly products, green buildings, other environmentally sustainable business activities, and inclusive financing for micro, small,

and medium-sized enterprises (MSMEs). In this study, green banking was evaluated using green financing data classified according to the OJK framework.

Bank stability refers to the ability of an Islamic bank to perform its financial intermediation function on a sustainable basis while applying profit-sharing principles and Shari'ah-compliant risk management, thereby contributing to sustainable economic development (Nugroho et al., 2019). Conceptually, bank stability is reflected not only in profitability but also in the institution's resilience to financing, liquidity, market, operational, and reputational risks. Several indicators are commonly used to assess bank stability. One widely used measure is the Z-score, which captures the distance from insolvency risk (Sutrisno, Widarjono, & Hakim, 2024). Another important indicator is the capital adequacy ratio (CAR), which measures a bank's ability to absorb potential losses arising from risk-weighted assets (Habib et al., 2022). A higher CAR indicates stronger capital resilience. In addition, the equity-to-total-assets (ETA) ratio measures the proportion of equity relative to total assets and reflects a bank's capacity to absorb losses and maintain financial resilience (Beck et al., 2013). Because the ETA ratio provides a direct measure of capital strength, it was used in this study as the primary proxy for bank stability.

Islamic banks were established not only to meet society's financial needs but also to promote an economic system based on justice, balance, and public welfare (*maṣlaḥah*) (Aditama, 2021). In addition to fulfilling their social objectives, Islamic banks are expected to generate sustainable financial returns. Profitability refers to an Islamic bank's ability to generate earnings from its operating activities while adhering to Shari'ah principles and is therefore a key indicator of financial performance, operational efficiency, and long-term sustainability (Farihah & Setiawan, 2020). Profitability is commonly evaluated using financial statement information, which reflects the bank's ability to expand its business, improve financial performance, and maintain operational competitiveness. Among the available profitability measures, return on assets (ROA) is the most widely used because it assesses the bank's ability to generate earnings from its total asset base (Sutrisno, Widarjono, & Hakim, 2024). A higher ROA indicates more efficient asset utilization and stronger profitability. Accordingly, ROA was employed in this study as the primary measure of Islamic bank profitability.

In research analyzing the relationship between green banking and the stability and profitability of Islamic banking, it is necessary to consider internal bank-specific factors that may influence financial performance. Therefore, this study uses several Islamic banking financial performance indicators as control variables, namely the Capital Adequacy Ratio (CAR), the Financing-to-Deposit Ratio (FDR), the Operating Expenses-to-Operating Income Ratio (*Biaya Operasional terhadap Pendapatan Operasional [BOPO]*), Non-Performing Financing (NPF), and bank size (SIZE), as measured by total assets.

The Capital Adequacy Ratio (CAR) is a ratio that measures a bank's ability to maintain sufficient capital to absorb potential unexpected losses arising from its operations. Strong capitalization significantly supports financial performance and enhances banks' resilience to various economic and financial shocks (Yahya & Setyono, 2024). In the context of Islamic banking, CAR not only reflects a bank's financial capacity to absorb losses but also strengthens stakeholders' confidence in the institution's financial soundness. Banks with a high CAR have greater flexibility to expand their financing portfolios, including innovative financing

instruments such as green financing, without compromising their operational stability (Rahmat & Oktaviana, 2023).

The Financing-to-Deposit Ratio (FDR) is a ratio that indicates a bank's ability to channel third-party funds collected from the public into productive financing. The higher and more optimal the financing disbursement, the greater the bank's potential to generate profit-sharing income, thereby improving profitability. However, an excessively high FDR may indicate increased liquidity risk because the bank allocates nearly all of its deposit funds to financing while maintaining insufficient liquidity reserves (Said & Ali, 2016). In the context of green banking, the proportion of green financing within the total financing portfolio, as reflected in the FDR, serves as an indicator of a bank's commitment to sustainable finance principles. The larger the proportion of environmentally sustainable financing in the total portfolio, the stronger the sustainability signal conveyed by the bank to the market and its stakeholders (Kusumaningati, 2024).

The Operating Expenses-to-Operating Income Ratio (Biaya Operasional terhadap Pendapatan Operasional [BOPO]) is an indicator that measures a bank's operational efficiency by comparing operating expenses with operating income. In the context of green banking implementation, an important dynamic emerges during the initial stage of adoption. Investments in green banking infrastructure and supporting systems may temporarily increase the BOPO ratio. However, over the long term, digitalization and the operational efficiencies associated with green banking are expected to reduce the BOPO ratio sustainably.

Non-Performing Financing (NPF) is a ratio that measures the proportion of non-performing financing relative to the total financing disbursed by Islamic banks. High levels of non-performing financing not only reduce profitability through increased provisioning requirements but also reflect weaknesses in financing appraisal and risk assessment, ultimately undermining the bank's overall stability. From a green banking perspective, financing environmentally sustainable sectors is expected to have a lower long-term risk profile because these sectors generally demonstrate stronger business sustainability in line with global development policies that increasingly emphasize sustainability. Therefore, the implementation of green banking is theoretically expected to contribute to a reduction in the NPF ratio over the long term.

Bank size is generally measured using the natural logarithm of a bank's total assets (Lestari, 2021). Large banks tend to possess competitive advantages, including broader portfolio diversification, lower information acquisition costs, and easier access to funding sources in financial markets (Nguyen et al., 2023). These advantages generally contribute positively to profitability because large banks are better positioned to achieve economies of scale. In the context of green banking, large banks also tend to have more adequate financial, human, and technological resources to develop the infrastructure required for the comprehensive implementation of green banking.

Environmentally sustainable financing can serve as a long-term risk mitigation strategy by reducing banks' exposure to environmentally sensitive assets while strengthening their corporate reputation. This reduction in risk inherently enhances banks' resilience. Accordingly, the adoption of green banking, particularly through green financing, represents a strategic approach to strengthening the stability of Islamic banking. By directing financing toward sustainable sectors, banks can proactively mitigate climate-related and environmental risks

that, if left unmanaged, could deteriorate asset quality and increase the likelihood of non-performing financing in the future. Although the study by Sutrisno et al. (2024) found that, statistically, green credit has not yet had a significant direct effect on bank stability in Indonesia, these findings do not necessarily imply that green financing plays no role in strengthening banking stability. Conceptually, green financing remains a mechanism with the potential to enhance banking stability through improvements in asset quality, capital resilience, and risk management. Therefore, the first hypothesis is formulated as follows:

H₁ : Green Banking has a positive and significant impact on the stability of Islamic banking in Indonesia

Disclosure of green banking practices serves as a positive signal to the market and stakeholders that a company manages its business with full responsibility toward environmental aspects (Khomsatun et al., 2025). Green banking practices can create goodwill or a positive image for banks, which in turn attracts customers and investors who are concerned about sustainability issues, thereby potentially increasing the bank's profitability. Several previous studies have shown that the provision of green credit has a positive impact on profitability (ROA and ROE), as environmentally conscious financing helps build customer loyalty and minimizes the concentration of non-performing loan risk in traditional sectors (Sutrisno et al., 2024). However, during the early stages of the transition, banks may face pressure on profit margins due to the high costs of implementing green projects and the complexity of assessing financing feasibility, causing green loans to have a negative impact on short-term ROA (Riyanti et al., 2025). To test this, the second hypothesis is formulated as follows:

H₂ : Green Banking has a positive and significant impact on the profitability of Islamic banking in Indonesia

The CAR reflects a bank's ability to provide adequate capital to cover unexpected losses. Strong capitalization is crucial for supporting financial performance and the resilience and stability of the banking sector in the face of shocks. The CAR is calculated by comparing a bank's capital to its risk-weighted assets. Research findings indicate that capital (CAR) has a major impact on a bank's profitability and stability (Sutrisno et al., 2024). Other studies on Islamic banks in Indonesia confirm that the CAR has a positive and significant effect on the profitability and stability of the Islamic banking sector (Said & Ali, 2016). Based on this, the third hypothesis is formulated as follows:

H_{3a} : Capital has a positive and significant impact on the stability of Islamic banking in Indonesia

H_{3b} : Capital has a positive and significant impact on the profitability of Islamic banking in Indonesia

The FDR is a liquidity proxy that indicates a bank's ability to channel third-party deposits into financing. In the context of green banking, the share of green financing in the total FDR serves as an indicator of a bank's commitment to the principles of sustainable finance. An FDR value in the 80%–100% range indicates that the bank has successfully channeled funds effectively while maintaining a balance between its intermediation function and liquidity security (Nurdiani et al., 2023). The higher and more optimal the financing channeling, the greater the potential for the bank's profit-sharing income, which leads to increased profitability (Said & Ali, 2016). Based on this, the fourth hypothesis is formulated as follows:

H_{4a} : Liquidity has a positive and significant impact on the stability of Islamic banking in Indonesia

H_{4b} : Liquidity has a positive and significant impact on the profitability of Islamic banking in Indonesia

The BOPO measures a bank's efficiency in managing its operating expenses relative to its operating revenue. The lower the BOPO ratio, the more efficient the bank's performance, which directly and significantly impacts the bank's profitability (Kusumaningati, 2024). Research findings indicate that operational efficiency has a major impact on a bank's profitability and stability (Sutrisno et al., 2024). In Kusumaningati's (2024) study, which examined the factors influencing the profitability of Islamic banks in Indonesia, the BOPO was found to have a significant negative effect on ROA. This finding confirms that banks capable of effectively reducing their operating expenses have a greater ability to generate profits from each unit of revenue earned. Based on this, the fifth hypothesis is formulated as follows:

H_{5a} : Operating Risk has a negative and significant impact on the stability of Islamic banking in Indonesia

H_{5b} : Operating Risk has a negative and significant impact on the profitability of Islamic banking in Indonesia

NPF is the ratio of non-performing financing to total financing. NPF reflects the quality of a bank's assets in managing its financing portfolio. The lower the NPF rate, the better the bank's financial performance and stability, as the bank does not need to set aside large loss reserves, thereby allowing net income to be maintained at an optimal level. (Hidayat, 2023). Research by Kusumaningati (2024) confirms that the NPF has a significant negative effect on the profitability of Islamic banks. High levels of non-performing financing not only erode profits through provisioning requirements but also reflect a weak financing eligibility assessment system, which ultimately undermines the bank's overall stability. Based on this, the sixth hypothesis is formulated as follows:

H_{6a} : Financing risk has a negative and significant impact on the stability of Islamic banking in Indonesia

H_{6b} : Financing risk has a negative and significant impact on the profitability of Islamic banking in Indonesia

Large banks tend to have a competitive advantage and lower information-gathering costs, which can affect profitability; however, on the other hand, large banks may face inefficiencies due to complex bureaucracy. Previous research has found that bank size (assets) has a positive effect on bank profitability and stability (Kusumaningati, 2024). This is consistent with the argument that larger banks have greater capacity to absorb risk and exploit growth opportunities. In the context of green banking, large banks generally have more adequate human, financial, and technological resources to build the infrastructure needed to comprehensively implement green banking. Based on this, the seventh hypothesis is formulated as follows:

H_{7a} : Bank size has a positive and significant impact on the stability of Islamic banking in Indonesia

H_{7b} : Bank size has a positive and significant impact on the profitability of Islamic banking in Indonesia

METHOD

This study employed a quantitative approach using panel data regression analysis to examine the effects of green banking, the Capital Adequacy Ratio (CAR), the Financing-to-Deposit Ratio (FDR), the Operating Expenses-to-Operating Income Ratio (Biaya Operasional terhadap Pendapatan Operasional [BOPO]), Non-Performing Financing (NPF), and bank size on the stability and profitability of Islamic banks. Panel data regression was selected because it combined time-series data (2019–2025) and cross-sectional data from 17 Islamic commercial banks, allowing the analysis to capture both temporal variations and differences across banks while providing more efficient estimates than conventional regression methods.

Population, Sample and Data

The population in this study consists of all Islamic banks (Islamic commercial banks, Islamic business units, and Islamic microfinance banks) that are registered and licensed by the Financial Services Authority (OJK) from 2019 until 2025. The research sample was determined using purposive sampling, which involves selecting samples based on specific criteria to align with the research objectives. The sample criteria for this study are as follows:

1. Sharia banks in the form of sharia commercial banks (BUS) that consistently published annual reports and sustainability reports during the study period;
2. Banks with complete data on the study variables, namely green banking indicators (green financing) and financial performance ratios (ROA, ETA, CAR, FDR, BOPO, NPF and assets) during the study period.

The data used in this study consists of secondary data, sourced from the published annual reports and sustainability reports of each bank, Islamic banking statistics issued by the Financial Services Authority (OJK) and publications from Bank Indonesia. The data was obtained from the official websites of each bank and relevant institutions.

Research Variables

This study includes two dependent variables: stability and profitability. The independent variables consist of green banking (green financing) as the main variable, as well as bank capital, liquidity risk, operational risk, financing risk, and bank assets (bank size). The definitions and measurements of each variable are presented in Table 1 below:

Table 1. Variable and Measurement

No.	Variabel	Code	Measurement	Scale
1	Stability	ETA	$\frac{\text{Total Equity}}{\text{Total Assets}}$	Ratio
2	Profitability	ROA	$\frac{\text{Total Earning After Tax}}{\text{Total Assets}}$	Ratio
3	Green Financing	GF	$\frac{\text{Total Green Financing}}{\text{Total Financing}}$	Ratio
4	Bank Capital	CAR	$\frac{\text{Total Equity}}{\text{Assets-Weighted Risk}}$	Ratio
5	Liquidity Risk	FDR	$\frac{\text{Total Third-party Fund}}{\text{Total Operating Expense}}$	Ratio
6	Operating Risk	BOPO	$\frac{\text{Total Operating Income}}{\text{Total Bad Debt Financing}}$	Ratio
7	Financing Risk	NPF	$\frac{\text{Total Financing}}{\text{Total Financing}}$	Ratio

No.	Variabel	Code	Measurement	Scale
8	Bank Size	BSZ	Ln Total Assets	Ratio

Source: Compiled by the researcher based on literature review and regulatory definitions

Empirical Method

This study employs a quantitative approach, which emphasizes the analysis of numerical data processed using statistical methods to test the formulated hypotheses. The analysis method used is panel data regression, which combines time-series data and cross-sectional data. This approach was chosen because it captures the dynamics of changes over time as well as differences in characteristics among the observation units in this study, thereby yielding more efficient and informative estimates. Given that this study uses two dependent variables, namely ROA and ETA, the panel data regression model is as follows:

1. Model 1

$$ROA_{it} = \beta_0 + \beta_1 GF_{it} + \beta_1 CAR_{it} + \beta_1 FDR_{it} + \beta_1 BOPO_{it} + \beta_1 NPF_{it} + \beta_1 BSZ_{it} + \epsilon_{it}$$

2. Model 2

$$ETA_{it} = \beta_0 + \beta_1 GF_{it} + \beta_1 CAR_{it} + \beta_1 FDR_{it} + \beta_1 BOPO_{it} + \beta_1 NPF_{it} + \beta_1 BSZ_{it} + \epsilon_{it}$$

RESULTS AND DISCUSSION

Descriptive Statistics

The data structure of this study is an unbalanced panel because of differences in data availability across each year of observation. This situation is influenced by changes in Islamic banking entities resulting from mergers and the emergence of new Islamic commercial banks. After filtering the data based on the criteria and completeness of the research variables, a total of 97 observations were obtained, covering 17 Islamic commercial bank entities during the 2019-2025 period. All observations with complete data, including ETA, ROA, GF, NPF, FDR, BOPO, CAR and BSZ were used in the estimation, along with the descriptive statistics summarized in Table 2 below:

Table 2. Descriptive Statistics

No.	Variable	N	Mean	Median	Std. Dev.	Min.	Max.
1	ETA	97	0.1890	0.1297	0.1510	0.0677	0.8889
2	ROA	97	0.0140	0.0143	0.0341	-0.1085	0.1358
3	GF	97	0.2685	0.2187	0.2493	0.0000	1.0000
4	CAR	97	0.4082	0.2414	0.5689	0.1242	3.9050
5	FDR	97	0.8054	0.8230	0.2587	0.0000	1.9673
6	BOPO	97	0.9478	0.8289	0.4935	0.5616	4.2840
7	NPF	97	0.0123	0.0079	0.0133	0.0000	0.0495
8	BSZ	97	16.6761	16.5954	1.1935	13.4809	19.9384

Source: research data (processed).

The average ETA is 18.90%, while the median is 12.97%. The difference between the mean and the median, as well as the maximum value of 88.89%, indicates that a small portion of the observations have a very high capital-to-assets ratio. The average ROA is 1.40%, with a minimum of -10.85% and a maximum of 13.58%. This fairly wide range indicates

heterogeneity in profitability across banks and over time. The data show that there are still banks operating at a loss, while others have already posted profits at fairly high levels.

The proportion of GF averages 26.85% of total financing, with a median of 21.87% and a range of 0%-100%. This variation indicates that the level of sustainable financing integration is not yet uniform among Islamic banks. For the control variables, the average CAR is 40.82%, FDR is 80.54%, BOPO is 94.78%, NPF is 1.23%, and BSZ is 16.6761. The relatively high maximum values of CAR, FDR, and BOPO indicate specific characteristics in some observations, particularly among banks of different scales or at different stages of development. The average BSZ also confirms the existence of considerable variation in bank size within the research sample.

Green Banking and Stability

Model selection indicates that bank-specific effects need to be controlled for. The Chow test rejects the pooled OLS model for the stability equation ($F = 5.182$; $p < 0.001$). The Correlated Random Effects (Mundlak) test also indicates that individual bank characteristics are correlated with the explanatory variables ($F = 6.601$; $p = 0.001$), whereas the inclusion of the year effect is not statistically significant ($F = 1.015$; $p = 0.423$). Therefore, the estimation method used bank fixed effects with robust standard errors grouped at the bank level yielded the results presented in Table 3 below:

Table 3. Fixed-Effects Regression Results: Bank Stability (ETA)

Variable	Coefficient	Robust S.E.	t-statistic	p-value
Green Financing (GF)	0.1372**	0.0621	2.2078	0.0273
Capital Adequacy Ratio (CAR)	0.1870***	0.0276	6.7685	<0.001
Financing to Deposit Ratio (FDR)	0.1239*	0.0683	1.8139	0.0697
BOPO	-0.0932***	0.0259	-3.5934	<0.001
Non-Performing Financing (NPF)	-1.4531	0.9317	-1.5596	0.1189
Bank Size (Ln Assets)	-0.0687***	0.0224	-3.0640	0.0022

$N = 97$; bank entities = 17; within $R^2 = 0,8248$. Bank fixed effects included. Standard errors are clustered by bank. *** $p < 0,01$; ** $p < 0,05$; * $p < 0,10$.

Source: Research data processed by the researcher using panel data regression with bank fixed effects (2025)

The results in Table 3 show that green financing has a positive and significant effect on the stability of Islamic banks, as proxied by the ETA. The coefficient for green financing is 0.1372 with a p-value of 0.0273. In economic terms, a 10% increase in the proportion of green financing leads to a 1.37% increase in stability, holding other internal bank factors constant. Thus, H_1 is supported: Green Banking has a positive and significant effect on the stability of Islamic banking in Indonesia.

These results indicate that strengthening the Green Banking portfolio can have a positive effect, or be aligned with, the strengthening of bank stability. Financing activities that are more adaptive to environmental risks and the energy transition has the potential to improve portfolio quality, enhance risk management processes, and strengthen stakeholder confidence. These results differ from those of Sutrisno et al. (2024), who found no direct effect of green financing

on bank stability. This discrepancy may stem from differences in the research focus, observation period, and stability indicators used.

Control variables also provide important insights. H_{3a} is supported, as the Capital Adequacy Ratio (CAR) has a positive and highly significant effect on the Efficiency Ratio (ETA) (coefficient 0.1870; $p < 0.001$), confirming that capital adequacy is a key pillar of stability. H_{4a} is supported, as FDR has a positive effect at the 10% significance level; thus, higher financing disbursements can strengthen the stability position as long as they remain within controlled liquidity limits. H_{5a} is supported, as BOPO has a negative and significant effect, indicating that operational efficiency can enhance a bank's ability to maintain its stability. H_{6a} is not supported, as NPF has a negative direction but is not statistically significant. H_{7a} is not supported, as bank size has a negative effect on stability; this result may reflect that asset growth is financed more by liabilities or third-party funds than by an increase in equity, causing the equity-to-total-assets ratio to decline. An R^2 value of 0.8248 indicates that the model explains 82.48% of the variation in stability within Islamic banks over time.

Green Banking and Profitability

For the profitability equation, the Chow test also rejected the pooled OLS model ($F = 5.725$; $p < 0.001$), and the Correlated Random Effects (Mundlak) test rejected the assumption of uncorrelated random effects with the explanatory variables ($F = 49.063$; $p < 0.001$). The year effect was not significant overall ($F = 1.406$; $p = 0.225$). Therefore, profitability results were also estimated using bank-specific fixed effects with robust standard errors grouped at the bank level, with the results presented in Table 4 below:

Table 4. Fixed-Effects Regression Results: Bank Profitability (ROA)

Variable	Coefficient	Robust S.E.	t-statistic	p-value
Green Financing (GF)	-0.0274	0.0227	-1.2026	0.2291
Capital Adequacy Ratio (CAR)	0.0161**	0.0074	2.1726	0.0298
Financing to Deposit Ratio (FDR)	-0.0051	0.0042	-1.2106	0.2260
BOPO	-0.0522***	0.0074	-7.0155	<0.001
Non-Performing Financing (NPF)	0.1389	0.1196	1.1616	0.2454
Bank Size (Ln Assets)	-0.0026	0.0046	-0.5619	0.5742

*N = 97; bank entities = 17; within $R^2 = 0,8157$. Bank fixed effects included. Standard errors are clustered by bank. *** $p < 0,01$; ** $p < 0,05$; * $p < 0,10$.*

Source: Research data processed by the researcher using panel data regression with bank fixed effects (2025)

The coefficient for green financing on profitability is -0.0274 with a p-value of 0.2291. The direction of the coefficient indicates a negative or inverse relationship, meaning that a 10% increase in the proportion of green financing is associated with a 0.27% decrease in profitability; however, this relationship is not statistically significant. Thus, H_2 is not supported because Green Banking has not been proven to have a positive and significant effect on the profitability of Islamic banks in Indonesia.

These results indicate that the benefits of Green Banking on profitability have not yet been directly realized during the study period. During the development phase, banks may incur costs related to identifying green projects, enhancing competencies, adjusting systems, monitoring impacts, and establishing competitive financing pricing structures. In addition, benefits such as risk reduction, enhanced reputation, and customer loyalty require a longer time frame before they are reflected in profit performance. The negative direction of these research results is consistent with Riyanti et al. (2025), although in this study the effect was not statistically significant. These findings differ from the positive results reported by Sutrisno et al. (2024), Inegbedion (2024), and Mirza et al. (2023). The impact of green banking on profitability remains dependent on the institutional context, portfolio maturity, and the observation period.

For each control variable, it was found that H_{3b} is supported, where CAR has a positive and significant effect on ROA (coefficient 0.0161; $p = 0.0298$), indicating that adequate capital supports a bank's ability to generate profits and absorb risk. H_{5b} is supported, as BOPO has the strongest and most significant negative effect (coefficient -0.0522; $p < 0.001$), suggesting that operational efficiency can enhance the profitability of Islamic banks. Meanwhile, H_{4b} , H_{6b} , and H_{7b} are not supported; that is, FDR, NPF, and bank size do not have a significant effect on profitability. An R^2 value of 0.8157 indicates that the model explains 81.57% of the variation in profitability within Islamic banks over time.

CONCLUSION

This study analyzed the effect of Green Banking, proxied by the proportion of green financing, on the stability and profitability of Islamic banks in Indonesia using 97 observations from 17 Islamic commercial banks over the 2019–2025 period. Based on the model specification tests, a bank fixed-effects model with standard errors clustered at the bank level was employed to control for unobserved heterogeneity across banks. The results showed that Green Banking had a positive and significant effect on bank stability, as measured by the Equity-to-Total Assets ratio (ETA). These findings indicate that increasing sustainable financing can serve as a strategy to strengthen bank resilience. Conversely, Green Banking had a negative but statistically insignificant effect on profitability, as measured by Return on Assets (ROA), suggesting that the benefits of green financing were reflected primarily in enhanced stability, while its contribution to profitability had not yet become evident in the short term. The Capital Adequacy Ratio (CAR) had a positive effect on both stability and profitability, whereas the Operating Expenses-to-Operating Income Ratio (Biaya Operasional terhadap Pendapatan Operasional [BOPO]) had a negative effect on both. The Financing-to-Deposit Ratio (FDR) exhibited only a marginally positive effect on stability, Non-Performing Financing (NPF) was insignificant in both models, and bank size had a negative effect on stability but no significant effect on profitability.

These findings imply that Islamic banks should expand Green Banking gradually while strengthening environmental risk assessment, project selection, operational efficiency, and capital adequacy. Regulators can facilitate this process by standardizing green finance classification and reporting, improving climate risk data, providing targeted incentives, and developing risk-sharing mechanisms for green projects with long investment horizons. Such measures are essential to ensure that the expansion of Green Banking enhances not only

financial stability but also long-term economic value. This study had several limitations, including an unbalanced panel dataset, the use of green financing as the sole proxy for Green Banking, a relatively short observation period that included structural changes in the Islamic banking industry resulting from mergers, and the exclusion of macroeconomic variables. Future research should employ a more comprehensive Green Banking index, incorporate macroeconomic and governance variables, and apply dynamic panel data models to examine the medium- and long-term effects.

REFERENCES

- Aditama, T. (2021). *Tinjauan maqashid syariah dalam implementasi prinsip keuangan berkelanjutan melalui pelaksanaan wakaf uang oleh perbankan syariah (Studi kasus: PT Bank Syariah Indonesia, Tbk dan LAZNAS BSMU)* [Tesis, Universitas Indonesia].
- Anggraini, S., Fasa, M. I., Suharto, & Fachri, A. (2022). Analisis pengaruh green banking terhadap profitabilitas bank umum syariah Indonesia. *Journal of Business Management and Islamic Banking*, 1(1), 73–88. <https://doi.org/10.14421/jbmib.2022.011-05>
- Beck, T., Demirgüç-Kunt, A., & Merrouche, O. (2013). Islamic vs. conventional banking: Business model, efficiency and stability. *Journal of Banking & Finance*, 37(2), 433–447. <https://doi.org/10.1016/j.jbankfin.2012.09.016>
- Farihah, S. M., & Setiawan, S. (2020). Determinan intellectual capital terhadap profitabilitas di bank syariah: Pengujian mediasi kinerja keuangan dan kinerja nonkeuangan. *Jurnal Samudra Ekonomi dan Bisnis*, 11(2), 151–165. <https://doi.org/10.33059/jseb.v11i2.1996>
- Habib, A., Khan, M. A., & Meyer, N. (2022). The effect of bank liquidity on bank's stability in the presence of managerial optimism. *Journal of Asian Finance, Economics and Business*, 9(8), 183–196. <https://doi.org/10.13106/jafeb.2022.vol9.no8.0183>
- Hidayat, T. (2023). *Analisis pengaruh green financing terhadap profitabilitas pada bank umum syariah* [Skripsi, Universitas Islam Negeri Sultan Syarif Kasim Riau].
- Inegbedion, H. (2024). Green banking and profitability of banks in Nigeria: Opinions and attitudes. *Heliyon*, 10(14), e34303. <https://doi.org/10.1016/j.heliyon.2024.e34303>
- Irfany, M. I., Putri, F. I., & Haq, D. A. (2024). Exploring the impact of green financing on bank stability: Insights from Indonesian Islamic and conventional banks. *El Dinar: Jurnal Keuangan dan Perbankan Syariah*, 12(2), 228–245.
- Jan, A., Marimuthu, M., Mohd, M. P., & Isa, M. (2019). The nexus of sustainability practices and financial performance: From the perspective of Islamic banking. *Journal of Cleaner Production*, 228, 703–717.
- Julia, T., & Kassim, S. (2020). Exploring green banking performance of Islamic banks vs conventional banks in Bangladesh based on Maqasid Shariah framework. *Journal of Islamic Marketing*, 11(3), 729–744.
- Khomsatun, S., Aryani, H. F., & Pramesti, A. I. (2025). Pengungkapan perbankan hijau dan kinerja bank syariah di Indonesia: Eksplorasi hubungan dan peran moderasi regulasi. *Owner: Riset dan Jurnal Akuntansi*, 9(1), 117–129. <https://doi.org/10.33395/owner.v9i1.2578>
- Kusumaningati, D. A. (2024). *Analisis pengaruh variabel green financing, keuangan mikro perusahaan dan keuangan makro terhadap kinerja perbankan* [Skripsi, Universitas Islam Negeri Malang].
- Lestari, H. S. (2021). The effect of liquidity, leverage and bank's size on bank's profitability of Indonesian listed bank. *Jurnal Manajemen*, 12(2), 26. <https://doi.org/10.32832/jm-uika.v12i2.3946>
- Mirza, N., Afzal, A., Umar, M., & Skare, M. (2023). The impact of green lending on banking

- performance: Evidence from SME credit portfolios in the BRIC. *Economic Analysis and Policy*, 77, 843–850. <https://doi.org/10.1016/j.eap.2022.12.024>
- Nguyen, H. P. T., Tran, N. M., & Pham, V. M. (2023). The impact of size on income diversification: An empirical study on commercial banks in Vietnam. *Future Business Journal*, 9(1). <https://doi.org/10.1186/s43093-023-00273-6>
- Ningsih, N. W., Hanif, H., & Iqbal, F. (2020). Green banking terhadap profitabilitas bank umum syariah di Indonesia. *Fidusia: Jurnal Keuangan dan Perbankan*, 3(2). <https://doi.org/10.24127/jf.v3i2.532>
- Nugroho, L., Badawi, A., & Hidayah, N. (2019). Discourses of sustainable finance implementation in Islamic bank (Case studies in Bank Mandiri Syariah 2018). *International Journal of Financial Research*, 10(6), 108–117. <https://doi.org/10.5430/ijfr.v10n6p108>
- Nurdiani, T. W., Arum, R. A., Hasibuan, R. P. A., Silamat, E., & Anantadjaya, S. P. (2023). The effect of return, cost, financing factors and risk on profitability of sharia banks in Indonesia. *JEMSI (Jurnal Ekonomi, Manajemen dan Akuntansi)*, 9(2), 266–275. <https://doi.org/10.35870/jemsi.v9i2.941>
- Nurmalia, G. (2021). Green banking dan rasio kecukupan modal mempengaruhi pertumbuhan laba bank umum syariah di Indonesia. *Fidusia: Jurnal Keuangan dan Perbankan*, 4(2). <https://doi.org/10.24127/jf.v4i2.690>
- Rahmat, A. Y. R. D. M., & Oktaviana, U. K. (2023). Analysis of the effects of green banking and capital adequacy ratio on profitability growth with institutional ownership as a moderating variable. *MALIA*, 14(2), 217–234. <https://doi.org/10.35891/ml.v14i2.3889>
- Riyanti, R. S., Wulandari, P., Prijadi, R., & Tortosa-Ausina, E. (2025). Green loans: Navigating the path to sustainable profitability in banking. *Economic Analysis and Policy*, 85, 1613–1624. <https://doi.org/10.1016/j.eap.2025.01.028>
- Said, M., & Ali, H. (2016). An analysis on the factors affecting profitability level of Sharia banking in Indonesia. *Banks and Bank Systems*, 11(3), 28–36. [https://doi.org/10.21511/bbs.11\(3\).2016.03](https://doi.org/10.21511/bbs.11(3).2016.03)
- Sutrisno, S., Widarjono, A., & Hakim, A. (2024). The role of green credit in bank profitability and stability: A case study on green banking in Indonesia. *Risks*, 12(12), 198. <https://doi.org/10.3390/risks12120198>
- World Economic Forum. (2024). *The global risks report 2024* (19th ed.).
- Yahya, P. P., & Setyono, J. (2024). The role of profitability and liquidity in meeting the feasibility standards of Sharia banking with capital adequacy as a moderating variable in Indonesia. *Jurnal Ilmu Ekonomi Terapan*, 9(2), 235–247. <https://doi.org/10.20473/jiet.v9i2.59952>