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The Influence of Green Financing and Return Dynamics on Environmental, Social, and Governance Performance: Evidence from Indonesia's Islamic Banking Sector

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Abstract

This study aimed to examine the influence of green financing and return dynamics on ESG performance in Indonesia's Islamic banking sector. The issue was important considering the growing role of Islamic banks in promoting sustainable finance and strengthening institutional resilience within dynamic financial markets. A quantitative method was adopted based on secondary weekly data from six Islamic banks in Indonesia during 2020–2025 (1,878 observations). ESG score was the dependent variable, while green financing and weekly return were independent variables. The analysis applied GARCH model to estimate the association between the variables and to capture volatility persistence over time. The results showed that green financing had a positive and statistically significant effect on ESG performance. Islamic banks that consistently allocated funds to green financing tended to achieve higher and more stable ESG scores. In contrast, short-term return fluctuations did not significantly affect ESG performance, suggesting that sustainability practices were driven more by long-term strategic commitments than by temporary market dynamics. GARCH estimation confirmed the persistence of ESG volatility over time. The results showed that green financing served as a key driver of sustainability performance in Islamic banking and supported long-term institutional stability. Important insights were provided for bank management and regulators to strengthen the integration of sustainable financing strategies in line with Islamic finance principles.

Kata Kunci:
Keuangan Syariah; Syariah; Tata Kelola; Maqāṣid al-Syarī'ah; Stabilitas Keuangan

Abstrak

Studi ini meneliti apakah pembiayaan hijau dan dinamika pengembalian memengaruhi kinerja ESG di sektor perbankan syariah Indonesia. Isu ini penting mengingat peran yang semakin besar dari bank syariah dalam mendorong keuangan berkelanjutan dan memperkuat ketahanan kelembagaan di tengah pasar keuangan yang dinamis. Penelitian ini menggunakan pendekatan kuantitatif berdasarkan data sekunder mingguan dari enam bank syariah di Indonesia selama tahun 2020–2025 (sejumlah 1.878 observasi). Skor ESG merupakan variabel dependen, sementara pembiayaan hijau dan pengembalian mingguan adalah variabel independen. Analisis dilakukan dengan menerapkan model GARCH untuk mengestimasi hubungan antar variabel dan menangkap ketahanan volatilitas dari waktu ke waktu. Hasilnya menunjukkan bahwa pembiayaan hijau berpengaruh positif dan signifikan secara statistik terhadap kinerja ESG. Bank syariah yang secara konsisten mengalokasikan dana untuk pembiayaan hijau cenderung mencapai skor ESG yang lebih tinggi dan lebih stabil. Sebaliknya, fluktuasi pengembalian jangka pendek tidak memiliki dampak yang signifikan terhadap kinerja ESG, menunjukkan bahwa praktik keberlanjutan lebih didorong oleh komitmen strategis jangka panjang daripada dinamika pasar sementara. Estimasi GARCH juga mengonfirmasi keberlanjutan volatilitas ESG dari waktu ke waktu. Temuan ini menyiratkan bahwa pembiayaan hijau berfungsi sebagai pendorong utama kinerja keberlanjutan dalam perbankan syariah dan mendukung stabilitas kelembagaan jangka panjang. Hasil ini memberikan wawasan penting bagi manajemen bank dan regulator untuk memperkuat integrasi strategi pembiayaan berkelanjutan sesuai prinsip keuangan syariah.

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INTRODUCTION

As the world's largest archipelagic nation, Indonesia faces immense opportunities and challenges in balancing economic development with environmental sustainability.[1] Economic activities have traditionally relied on linear models characterized by resource extraction, production, consumption, and disposal, with a population exceeding 270 million people and abundant natural resources. This linear model has caused significant environmental degradation, including deforestation, pollution, waste accumulation, and greenhouse gas emissions.[2] As global demand for sustainable practices grows, Indonesia faces an urgent need to transition to more innovative, sustainable economic models to achieve a green economy while maintaining the growth trajectory.[3]

In recent years, sustainability has become a major focus in the global financial industry, including the Islamic banking sector.[4] Increased attention to Environmental, Social, and Governance (ESG) issues has been driven by regulatory requirements and investor preferences that increasingly prioritize ethical, responsible, and environmentally friendly business practices.[5] Islamic banking, which operates on the principles of *maqāṣid al-sharī'ah* and social sustainability, is often seen as closer to the concept of ESG because both emphasize justice, benefit, and prudent risk management.[6] However, empirical evidence on how ESG performance and green financing affect return volatility remains limited, specifically in Indonesia, which is expanding the national green agenda.[7]

Islamic banking has been consistently developed structurally. The Financial Services Authority (OJK) reports total Islamic banking assets to be IDR 980.3 trillion by the end of 2024, with a year-on-year increase of 9.9%. This is 7.72% of total banking assets in the country. The upward trend continued in 2025 with 11.34% annual growth, surpassing IDR 1,028 trillion. This shows Islamic banking is a sector of the national financial industry.

ESG performance has been shown to improve financial performance,[8] reduce capital costs,[9] and enhance corporate reputation and value.[10] In volatile markets, the performance

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has been found to mitigate risk and volatility, as reported in studies conducted during the COVID-19 pandemic.[11] The development of green financing schemes as instruments to support environmentally friendly projects has become an important agenda for the global financial system and Islamic banks.[12] Green financing is believed to promote energy efficiency and emission reduction and strengthen financial stability through sustainability-based risk management.[13]

The green financing of Indonesia has grown rapidly. In 2023, total green financing reached IDR 2,050 trillion, representing an annual growth of 28.13% compared to the previous year. This growth shows the integration of sustainability principles into the country's financial ecosystem. For Islamic banks, the growth of green financing is more than compliance, and the concept is a positive method to pursue the integration of environmental goals with Islamic financial intermediaries.

In the Indonesian context, the transition toward sustainable finance and green economic practices can be understood within the framework of *maqāṣid al-sharī'ah*, which emphasizes the protection of fundamental human interests (*ḥifẓ al-dīn, al-nafs*, *al-'aql, al-nasl*, and *al-māl*).[14] As contemporary thought evolves, some scholars have added *ḥifẓ al-bī'ah* as a sixth objective (*maqāṣid al-sittah*).[15] Environmental preservation and responsible resource management are directly related to the protection of life and wealth, while ensuring the sustainability of future generations.[16] Therefore, the implementation of ESG principles and green financing in Indonesian Islamic banking is driven by global regulatory

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demands and rooted in the objectives of sharia to realize public benefit and maintain a sustainable balance of life in national development.[17]

Various studies showing a connection between financial performance and investigations on return volatility, particularly in Indonesian Islamic banking, are rare.[18] Most previous analyses have focused on non-financial companies and global stock markets. Few studies have examined the contribution of green financing to the stability of the Islamic banking sector.[19] Volatility is an important indicator for assessing market risk, specifically for investors seeking stability in Shariah-based financial instruments.[20] Another gap is the lack of integration between modern ESG methods and the principles of *maqāṣid al-sharī'ah*, even though Islamic banks have an ethical mandate compatible with sustainability frameworks. [21]

The limitations can be segmented into three distinct gaps. The national frameworks and industry expansions' impacts on the volatility of national green financing can be studied. However, the studies on financial performance metrics in relation to the green financing system lack empirical grounding. The static regression methodologies used by the studies do not capture the time-varying nature of the system's risks and persistent volatility. The lack of empirical grounding on the integration of the modern ESG-inspired sustainability frameworks and the maqāṣid al-sharī'ah principles of financial stability is complicating the gaps. The refinement of the gaps shows the importance of a systematic, integrative procedural framework. Considering the gaps, the determinants of ESG performance in the Islamic banking sector are analyzed by examining the role of green financing and the return dynamics. This study contributes to the literature by modeling ESG performance as a dynamic variable within GARCH framework to capture volatility persistence and structural adjustments over time. Modern sustainability metrics are bridged with maqāṣid al-sharī'ah principles, particularly the protection of wealth (ḥifẓ al-māl) and ethical governance by identifying green financing as a key driver of ESG enhancement. The results are expected to provide theoretical enrichment for the Islamic sustainable finance literature and practical guidance for policymakers and Islamic banking institutions to strengthen long-term sustainability strategies. This study is supported by the latest structural changes in the financial sector of the country, particularly the Islamic banking assets surpassing IDR 1, 000 trillion, with the national green financing growing over 28% annually. This is the first time the sustainability of the expansion of Indonesian Islamic banking and the subsequent return dynamics are tested using a GARCH-based volatility framework.

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RESEARCH METHODS

This study adopted a quantitative time-series method to examine the determinants of ESG performance in the Islamic banking sector. The analysis focused on the dynamic relationship among green financing, weekly return fluctuations, and ESG performance. This study used aggregated national-level Islamic banking indicators. The dataset consisted of 1,878 weekly observations, ensuring a consistent frequency and enabling dynamic volatility modeling over time. ESG performance was measured using a composite ESG score that reflected the environmental, social, and governance dimensions disclosed in publicly available sustainability reports. Green financing represented the total allocation of funds directed toward environmentally sustainable projects and served as a proxy for institutional commitment to sustainable investment. Weekly return was calculated using the logarithmic difference formula $\ln(P_t P_{t-1})$, where $P_t$denotes the Islamic banking performance index at time t. All variables were cosistent with a weekly frequency to maintain econometric consistency.

Given the possibility of volatility clustering and time-dependent variability in ESG scores, this study applied GARCH (1,1) model to capture the conditional heteroskedasticity. The mean equation modeled ESG performance as a function of green financing and weekly returns. Meanwhile, the variance equation captured volatility persistence through lagged residuals and conditional variance terms. The use of GARCH framework was justified because ordinary least squares estimation produced inefficient estimates in the presence of heteroskedasticity. In contrast, the models were designed to capture the dynamic volatility behavior of time-series data. Parameters were estimated using Maximum Likelihood Estimation under the assumption of conditional normality. The diagnostic procedures included ARCH-LM testing to confirm heteroskedasticity, Jarque–Bera testing of normality, and assessing volatility persistence by examining the significance of GARCH coefficients. An additional robust regression using S-estimation was conducted to verify the stability of the green financing coefficient and ensure robustness against potential outliers.

Despite the methodological strengths, this study had some limitations. The use of aggregated national-level data did not capture bank-level heterogeneity, and ESG measurements relied on composite scoring systems that varied across reporting standards. Moreover, GARCH (1,1) specification captured volatility persistence without accounting for the asymmetric volatility effects. Future studies extended the framework using panel-GARCH models and incorporated macroeconomic control variables to enhance explanatory power and theoretical integration.

RESULT AND DISCUSSION

Descriptive Statistics

This section presents the results of the study and discussions. Adequate data must support the results. This study should address the problems and objectives stated in the introduction.

Table 1. Descriptive Statistics

	Weekly_Return	Esg_Score	Green_Financing
Mean	0.002271	50.20000	271.9015
Median	0.003400	51.00000	267.8750
Maximum	0.158600	76.00000	499.8000
Minimum	-0.157800	22.00000	50.50000
Skewness	-0.136101	-0.161948	0.055948
Kurtosis	3.014089	2.410933	1.816266
Jarque-Bera	5.813375	0.470738	11.06257
Probability	0.154656	0.790279	0.420134
Sum	4.265600	1255.000	510631.0
Observations	1878	1878	1878

Source: Statistical Data Processing by the author (2026)

Based on Table 1 descriptive statistics show that the weekly return variable has a mean of 0.002271 and a median of 0.003400. In general, the weekly returns of Islamic banking are positive, with the median being slightly higher than the average. The total number of observations used is 1,878, reflecting consistent observations throughout the study period. ESG score variable has an average of 50.20000 and a median of 51.00000. The closeness between the mean and median shows that ESG data distribution is relatively balanced around the midpoint. The number of observations is also 1,878 since ESG data are fully available and can be thoroughly analyzed. The green financing variable has a mean of 271.9015 and a median of 267.8750. The relatively small difference between the mean and median suggests that the distribution of green financing is fairly stable around the midpoint. As with the other variables, the number of green financing observations is 1,878. Therefore, the analysis is conducted using the same sample size across all variables.

Normality Test of Data

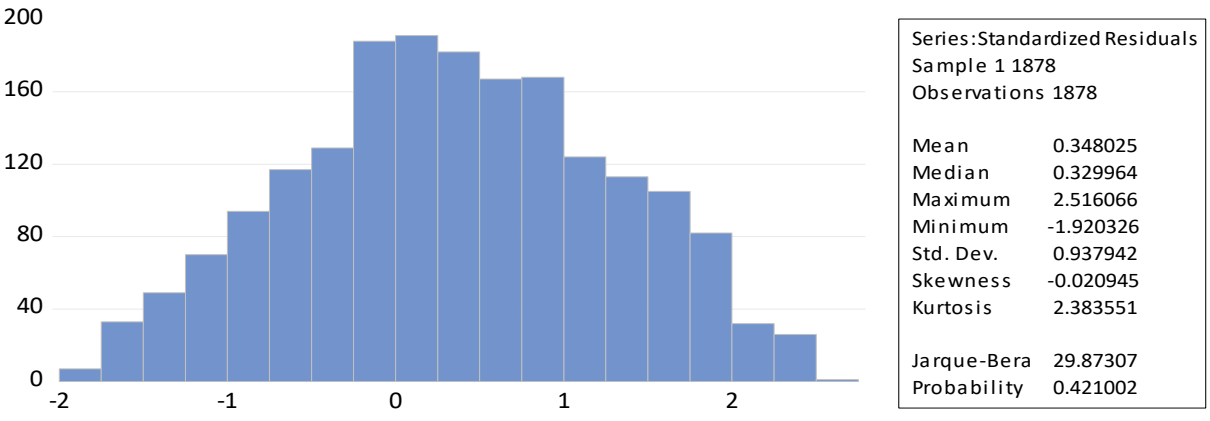

Figure 1. Normality Test

Source: Statistical Data Processing by the author (2026)

Based on the Normality Test and the analysis of the residual statistics, the standardized residuals appear to exhibit a normal distribution. The mean is close to zero, and the skewness is very small, which is indicative of a symmetric distribution. The kurtosis of 2.38 is less than 3, showing a platykurtic distribution with a lower peak than the bell curve. The Jarque-Bera test reports a probability value of more than 5% (p = 0.421002), where the null hypothesis of normality cannot be rejected. Therefore, the distribution of the residuals is not significantly deviating from normality. Even though residual normality is not an absolute necessity, the concept is supplementary evidence for the model, keeping the relationship between ESG performance, green financing, and the return volatility of the Islamic banking sector of Indonesia elucidated.

Table 2. Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.694131	Prob. F(2,1875)	0.4996
Obs*R-squared	1.389454	Prob. Chi-Square(2)	0.4992
Scaled explained SS	1.396429	Prob. Chi-Square(2)	0.4975

Source: Data processed by the author (2026)

The Breusch–Pagan–Godfrey test shows probability values greater than 0.05, implying that the null hypothesis of homoskedasticity cannot be rejected. Therefore, no heteroskedasticity problem is detected in the model.

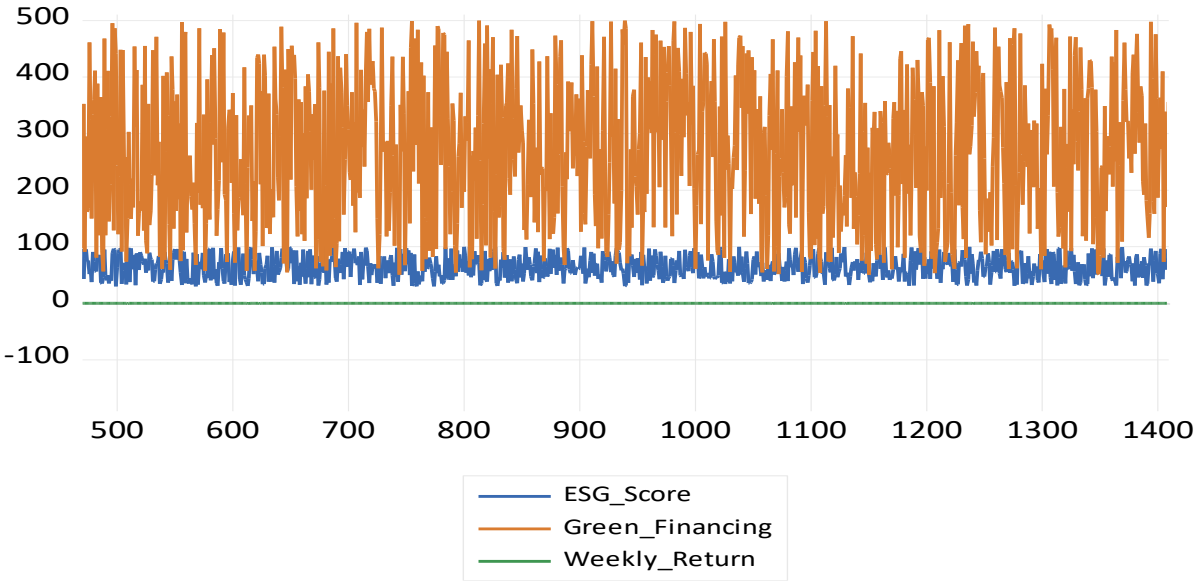

Figure 2. Movements in ESG Score, Green Financing, and Weekly Return
Source: Data processed by the author (2026)

Based on Figure 2, improvements in ESG performance and green financing tend to correlate with the stability of weekly returns in Islamic banking. ESG Score and Green Financing show relatively consistent fluctuations over the observation period. Meanwhile, the volatility of weekly returns remains at a lower range and does not exhibit sustained

extreme spikes. Sustainability practices, through ESG and increased green financing, can serve as risk mitigation mechanisms, reducing return volatility. These results support the hypothesis that ESG performance and green financing can help reduce return volatility while strengthening financial stability in Indonesia's Islamic banking sector.

Table 3. Correlation test

	ESG_SCORE	GREEN_FINANCING	WEEKLY_RETURN
ESG_SCORE	1.000000000000000	0.720843732883212	0.375592998405994
GREEN_FINANCING	0.720843732883212	1.000000000000000	0.556782043820580
WEEKLY_RETURN	0.375592998405994	0.556782043820580	1.000000000000000

Source: Data processed by the author (2026)

The correlation matrix in Table 3 shows positive relationships among the variables. ESG score shows a moderate positive correlation with weekly return (0.376), while green financing exhibits a stronger association (0.557). The correlation between ESG and green financing (0.721) suggests complementary movement between sustainability performance and financing activities.

Robustness Test Using S-Estimation

To ensure the validity of the previous estimation results despite the possibility of outliers or extreme values in the variables, a robust regression with the S-estimation method is used. This method is designed to provide more stable parameter estimates that are less influenced by extreme values, making the significance test results for independent variables more reliable. In this test, green financing and weekly returns are examined in relation to ESG score, with standard errors adjusted using a Huber-type I covariance matrix. This analysis aims to determine the significance of green financing on ESG performance, even after accounting for potential outliers in Islamic banking data.

Table 4. Robustness Test

Variable	Coefficient	Std. Error	z-Statistic	Prob.
GREEN_FINANCING	0.185683	0.005253	35.34598	0.0000
WEEKLY_RETURN	1.290306	0.319214	0.404214	0.6861

Robust Statistics

R-squared	0.458799	Adjusted R-squared	0.459577
Scale	36.48479	Deviance	1331.140
R-squared statistic	1250.716	Prob(R-squared stat.)	0.000000

Non-robust Statistics

Mean dependent var	64.53194	S.D. dependent var	20.37339
S.E. of regression	34.90576	Sum squared resid	2285741.

Source: Statistical Data Processing by the author (2026)

Based on the S-estimation results, green financing has a highly significant effect on ESG scores in Islamic banking, with a coefficient of 0.185 and a p-value of less than 0.01. This shows that the greater the bank's commitment to green financing, the higher ESG score. Conversely, the weekly return variable is not significant (p = 0.6861) since fluctuations in the variable do not directly affect ESG performance. These results emphasize that green financing is the primary driver of ESG performance in Islamic banking. The efforts of banks to channel sustainable financing are more decisive in improving ESG scores than changes in weekly returns. This result supports the understanding that green financing practices enhance sustainability performance and maintain the stability and quality of ESG investments.

GARCH Test Results

Table 5. GARCH Test Results

Variable	Coefficient	Std. Error	z-Statistic	Prob.
GREEN_FINANCING	0.192625	0.003191	60.36946	0.0000
WEEKLY_RETURN	24.69248	16.14505	1.529414	0.1262
Variance Equation				
C	41.18906	56.61503	0.727529	0.4669
RESID(-1)^2	0.006432	0.008846	-0.727065	0.4672
GARCH(-1)	0.972614	0.042150	23.07517	0.0000
R-squared	1.922793	Mean dependent var		64.53194
Adjusted R-squared	1.924351	S.D. dependent var		20.37339
S.E. of regression	34.83998	Akaike info criterion		9.942913
Sum squared resid	2277135.	Schwarz criterion		9.957658
Log likelihood	9331.396	Hannan-Quinn criterion.		9.948344
Durbin-Watson stat	1.681013			

Source: Statistical Data Processing by the author (2026)

According to GARCH analysis, there is a statistically significant positive relationship between green financing and ESG scores, with a coefficient of 0.1926 and a p-value less than 0.01. Out of the four factors, green financing is the only one showing a positive relationship with ESG performance of banks. The same cannot be said for weekly return since the variable is not statistically significant (p = 0.1262). This shows that ESG scores are not influenced by fluctuations in weekly returns. Regarding the variance equation, GARCH(-1) has a significant coefficient of 0.9726, showing that past volatility patterns are related to ESG volatility. The same volatility is observed when historical periods show high results related to ESG. Conversely, $RESID(-1)^2$ is not significant since current ESG volatility is present and not affected by past shocks. Green financing has a statistically positive relationship with high ESG performance and ongoing volatility dynamics. This does not apply to weekly returns since the variable is not statistically significant. The only weakness of the data and results is that there is a statistical relationship.

The result can be better understood through *maqāṣid al-sharī'ah*, particularly the principle of *ḥifẓ al-māl* (protection of wealth), and the broader goal of improving justice and social well-being. The important role of green financing in improving ESG performance shows Islamic banks' dedication to protecting wealth. According to Mohammed and Taib[22] , performance measurement in Islamic banking should go beyond profit to include *maqāṣid-based* outcomes such as ethical governance, social responsibility, and sustainable development. In this context, green financing acts as a tool to implement *maqāṣid al-sharī'ah*, following financial activities with environmental care and societal benefits over the long term.[23] Abdullah also stated that innovations in Islamic finance incorporated maqāṣid principles to ensure wealth was preserved, and harm (*mafsadah*) was avoided.[24] ESG stability shown by GARCH analysis suggests that sustainability practices in green financing help improve structured and consistent institutional behavior, supporting the Islamic moral economy model proposed by Avdukic and Asutay.[25] Therefore, the positive and stable connection between green financing and ESG performance is statistically significant and embodies Islamic ethical principles of financial governance.[26] Enhancing green financing efforts can be seen as an institutional move to achieve *maqāṣid*-driven performance, while ensuring financial resilience and maintaining public trust in Islamic banking.

The results show that green financing plays a crucial role in improving ESG performance in Islamic banks. This is consistent across various estimation methods through robust regression using the S-estimation method and GARCH model, confirming that the relationship is not influenced by outliers or volatility in the data. Islamic banks' commitment to channeling green financing is reflected in higher ESG scores.[27] The positive relationship between green financing and ESG performance is consistent with the views of Adabize and Mozzilo[28], where the variable is a strategic tool for promoting sustainable practices in the

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financial sector.[29] In Islamic banking, this result is more relevant because the principles of justice, sustainability, and social responsibility are embedded in the core values of Sharia.[30] Increasing green financing is a response to regulatory or market demands,[31] reflecting a consistent commitment to fulfilling social and environmental roles.[32] However, the results show that weekly returns do not significantly affect ESG scores.[33] In this context, short-term financial fluctuations do not affect ESG performance.[34] The results support Anisha, Isnaini, Zehua, and Esa,[35] where ESG reflects long-term strategic policies rather than short-term market dynamics responses.[36] Therefore, Shariah banks with a strong ESG commitment can maintain the quality of sustainability performance.[37]

Further GARCH analysis shows volatility persistence in ESG scores, as evidenced by a significant GARCH(-1) coefficient. This suggests that the volatility pattern of ESG continues over time. The results are consistent with Benuzzi, Bax, and Oehler and Neuss, where consistent ESG assessment systems and reporting practices lead to relatively stable ESG scores following historical patterns.[38] In this context, green financing helps maintain a consistent and stable ESG performance in Islamic banks.[39] Even though weekly returns do not directly affect ESG scores, the descriptive and visual results show that the stability and green financing are associated with lower return volatility.[40] These results support the view that ESG serves as a risk-mitigation mechanism. Institutions with good performance tend to face lower market risk and return volatility.

Green financing is a key driver of improvement and stability in ESG performance among Islamic banks. Meanwhile, short-term return fluctuations do not directly affect ESG scores. These results reinforce the argument that sustainability practices and green financing enhance ESG performance and improve companies' long-term financial stability. Therefore, this study provides empirical evidence that strengthening green financing can be an effective strategy for maintaining sustainability and reducing risks in dynamic financial markets.

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CONCLUSION

In conclusion, this study analyzed the determinants of ESG performance in the Islamic banking sector and examined the role of green financing and return dynamics within GARCH framework. The result clearly addressed the objective, where green financing was a significant and robust driver of ESG performance, while weekly return fluctuations did not directly influence the score. This showed that sustainability performance in Islamic banking was shaped primarily by strategic financial allocation to environmentally responsible activities rather than short-term market movements. The significant GARCH coefficient further reported the persistence of ESG volatility, suggesting that ESG performance followed a structured path-dependent dynamic over time. In this context, green financing functioned as a sustainability instrument and structural stabilizer that supported ESG quality consistency. These results reinforced the argument that ESG performance reflected a long-term institutional commitment consistent with *maqāṣid al-sharīʿah* principles, particularly the protection of wealth (*ḥifẓ al-māl*) and ethical governance.

This study contributed theoretically by strengthening the integration of modern ESG frameworks with Islamic economic principles and empirically by positioning the concept as a dynamic outcome variable rather than a predictor of financial performance. However, future studies should extend the analysis by using bank-level panel data, incorporating macroeconomic control variables, and exploring asymmetric volatility models such as EGARCH or TGARCH to capture potential nonlinear dynamics. Further theoretical refinement is needed to develop a maqāṣid-based ESG measurement framework that comprehensively reflects Islamic sustainability values. The results affirm that strengthening green financing strategies is essential for improving ESG performance and ensuring long-term sustainability in the Islamic banking industry.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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