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The sustainability imperative: evaluating the effect of ESG on corporate financial performance before and after the pandemic

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Abstract
The COVID-19 pandemic has reshaped corporate financial stability, emphasizing the role of Environmental, Social, and Governance (ESG) performance in enhancing resilience and value creation. This study investigates the relationship between ESG factors and corporate financial performance, measured by Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q, among firms listed on the Indonesia Syariah Stock Index (ISSI) and the Borsa Malaysia Shariah Index. Utilizing panel regression analysis, the study examines how ESG components influenced firm performance before and after the pandemic while controlling for macroeconomic and industry-specific factors. The dataset, retrieved from the Refinitiv database, covers the period from 2010 to 2022, offering a long-term perspective on ESG-financial linkages. The findings reveal a dynamic shift in ESG impact over time. Prior to the pandemic, social (S) and governance (G) factors positively influenced profitability and market valuation, while environmental (E) scores were largely insignificant. However, post-pandemic, the effect of social factors turned negative, governance influence weakened, and ESG integration exhibited a weak but positive correlation with operational efficiency. Additionally, macroeconomic variables such as GDP growth and industry munificence played an increasingly significant role in shaping firm value, underscoring the evolving economic determinants of ESG relevance. These findings suggest that the financial impact of ESG is context-dependent and subject to macroeconomic shifts. The study underscores the need for adaptive ESG strategies that align with financial sustainability objectives, providing crucial insights for corporate managers, investors, and policymakers navigating post-pandemic economic uncertainties.

Keywords ESG performance · Financial resilience · Sustainability · ROA · ROE · Tobin's Q · Macroeconomic factors · Corporate governance

1 Introduction

The COVID-19 pandemic has profoundly reshaped the global economic landscape, exposed systemic vulnerabilities and prompted businesses to reassess their strategic priorities. In this evolving context, the sustainability imperative, the integration of Environmental, Social, and Governance (ESG) principles into corporate strategy has gained unprecedented significance. Firms with robust ESG commitments have demonstrated greater adaptability and resilience in times of crisis, reinforcing the notion that ESG integration is not merely an ethical obligation but a strategic necessity for long-term financial stability [1].

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The relationship between ESG performance and corporate financial performance (CFP) has been extensively debated in academic literature yet remains inconclusive [2]. Some studies suggest that ESG engagement enhances corporate reputation, reduces operational risks, and improves access to capital, ultimately driving superior financial outcomes (Resource-Based View) [3]. Firms that strategically integrate ESG principles can leverage sustainability as a competitive advantage, reinforcing operational efficiency and stakeholder trust. Stakeholder theory [4] further supports this perspective, asserting that corporations must address the interests of multiple stakeholders, including investors, employees, regulators, and society at large, rather than solely maximizing shareholder value. In doing so, companies with strong ESG performance foster long-term relationships that contribute to financial sustainability [5].

Conversely, other scholars argue that ESG investments may impose additional financial burdens, particularly in capital-intensive industries, thereby negatively affecting short-term profitability [6]. In some cases, firms that overemphasize ESG initiatives without clear strategic alignment may experience inefficiencies, leading to diminishing financial returns. Additionally, the Signalling Theory [7] suggests that firms with high ESG scores send positive signals to investors, thereby influencing market perceptions and stock valuations. However, the extent to which ESG initiatives translate into tangible financial gains remains contingent upon industry characteristics, regulatory environments, and macroeconomic conditions.

The Legitimacy Theory [8] provides another critical lens for understanding ESG adoption, emphasizing that firms seek societal approval by aligning with environmental and social norms. Companies that fail to integrate ESG practices risk reputational damage, reduced investor confidence, and regulatory scrutiny. This theory is particularly relevant in the post-pandemic era, where businesses are increasingly expected to demonstrate corporate responsibility beyond financial performance. The evolving nature of ESG-financial performance linkages highlights the need for a context-specific analysis, particularly in emerging markets where regulatory frameworks and investor priorities differ from those in developed economies.

Despite the growing emphasis on ESG, empirical evidence remains inconsistent and context dependent. Before the pandemic, governance (G) and social (S) factors were found to have a positive impact on financial performance [9], while environmental (E) factors had a more ambiguous effect [10]. However, the post-pandemic period introduced new challenges, financial constraints, shifting investor expectations, and regulatory changes, that have reshaped the ESG-financial performance dynamic. For instance, firms that prioritized social responsibility before the pandemic may now face profitability constraints, while governance mechanisms have become increasingly critical in navigating economic uncertainty.

This study seeks to examine the evolving relationship between ESG performance and corporate financial outcomes before and after the pandemic, with a particular focus on firms listed on the Indonesia Syariah Stock Index (ISSI) and Borsa Malaysia Shariah Index (BMSI). Both ISSI and BMSI provide a unique setting to study the relationship between ESG performance and financial outcomes in Islamic financial markets [11]. Unlike conventional indices, Shariah-compliant firms inherently follow ethical investment principles that emphasize social responsibility, risk-sharing, and ethical governance, which align with ESG objectives [12]. However, the extent to which ESG factors influence financial performance in these markets remains underexplored, particularly in response to economic shocks such as the COVID-19 pandemic. By incorporating panel data regression analysis, this research provides empirical insights into the sectoral and macroeconomic factors influencing ESG-financial linkages in Islamic financial markets. Given the unique governance structures and ethical investment principles inherent in Shariah-compliant firms, this study offers a nuanced perspective on sustainability-driven financial performance. The findings contribute to both academic discourse and managerial decision-making, highlighting the strategic relevance of ESG integration in an era of global economic uncertainty.

This study offers a novel contribution by providing a comparative pre- and post-pandemic analysis of ESG-financial linkages within Islamic capital markets—an area that remains underexplored in existing literature. By employing panel data regression analysis, this research provides empirical insights into the sectoral and macroeconomic factors influencing ESG integration in Shariah-compliant firms. Unlike conventional firms, Islamic businesses operate under distinct ethical guidelines that emphasize responsible investing, risk-sharing, and social welfare. Understanding how these principles interact with ESG commitments and financial performance in times of crisis is crucial for policymakers, investors, and corporate leaders seeking to enhance sustainability-driven financial strategies.

2 Theoretical background and literature review

The association between ESG (Environmental, Social, Governance) and corporate financial performance (CFP) performance and CFP has been of growing interest among academics in recent years. The integration of ESG issues is increasingly perceived as a strategic option to create value in the long term, to reduce risk and to bolster corporate [13]. Nevertheless, empirical evidence on the ESG–CFP link is mixed and depends on contingencies, including regulatory frameworks, industry forces and macroeconomic shocks [14, 15]. To offer a coherent conceptual structure, this study integrates four theoretical perspectives—Stakeholder Theory, Resource-Based View (RBV), Trade-Off Theory, and Signalling Theory—which together inform the hypotheses, analytical model, and interpretation of findings.

2.1 Stakeholder theory: aligning ESG engagement with financial performance

Stakeholder Theory [4] provides the foundational rationale for H1, asserting that firms must balance the interests of multiple stakeholders—investors, employees, customers, communities, and regulators—to sustain long-term performance. Companies that are involved in ESG, are contributing actively to the relationship with their stakeholders, by minimizing conflicts, building trust and enhancing transparency. For example, a robust corporate governance declines regulatory risks [16], and social responsibility programs increase customer loyalty and employee satisfaction [17]. Such engagement can contribute to long-term financial outcomes, in the reduction of operational risk [18, 19], capital cost saving, and firm reputation [20]. The current study extends Stakeholder Theory by testing its relevance not only in general corporate contexts but also within Islamic financial markets, where ethical alignment and stakeholder orientation are structurally embedded.

H1: ESG performance has a positive impact on corporate financial performance.

2.2 Trade-off theory: economic cycles and temporal variation in ESG impact

The Trade-Off Theory [6] emphasizes financial limitations, which ESG investments can cause. While ESG intervention strengthens corporate image and long-term fiscal durability [21], it could incur significant financial burdens, especially in sectors with considerable capital exposure including manufacturing, energy and infrastructure. Companies thus will need to weigh up whether or not they will do more in the long run by sticking with ESG policies even if it becomes light-headed in the short run. For example, a mining company investing in carbon capture technology or in cleaner waste disposal could face high initial outlay which will impact profitability in the short term. Nevertheless, in the long run, such investments may result in regulatory benefits, enhanced operational efficiency [22], or greater investor confidence [23]. In other words, this theory suggests the necessity for organizations to strike a balance between ESG demanding while maintaining their financial sustainability, so that investments a company makes to promote sustainability will not go to the detriment of its financial performance. Thus, the second hypothesis is developed in reference to the Trade-Off Theory as below:

H2: The relationship between ESG and financial performance varies between pre- and post-pandemic periods.

2.3 The resource-based view

The Resource Based View [3] argues that companies can achieve a competitive advantage through the possession of resources that are rare, valuable, and inimitable. ESG is the nebulous element that can provide differentiation and drive value creation over the long-term. Environmental: Companies investing in environmental innovation [24], employee welfare [25], and ethical governance structures create capabilities other competitors cannot imitate. For instance, companies making investments in sustainable supply chains or renewable energy infrastructure are not just following regulations but embedding long-term cost savings and brand differentiation into their business. ESG becomes a strategic resource upgrading the operational resilience and investor attractiveness and as a result leading to better financial performance [26]. Accordingly, the third hypothesis is developed as below:

H3: Governance factors have a stronger positive impact on financial performance than environmental and social factors.

2.4 The signalling theory

The Signalling Theory [7] explains how ESG could affect both investors' perceptions and the company's stock prices. Companies with high ESG commitments indicate financial strength [27], ethical leadership and a long-term sustainability focus [28], which attracts investors and institutional funds and reach commitments and can enhance their attractiveness to investors and institutional funds. Investors are increasingly more reliant on ESG ratings to reflect corporate stability and risk management [29]. Companies with strong ESG disclosures and transparent sustainable reports are more likely to attract investors who are keen on ESG investing, and the latter could bring additional capital and higher valuations to stock prices [30]. In an increasingly sustainability-focused financial environment, companies that are proactively incorporating ESG strategies are more likely to gain access to green financing options, lower their cost of capital, and keep investor trust. To this end, the fourth hypothesis is developed below:

H4: ESG performance influences financial resilience more significantly in Islamic financial markets compared to conventional markets.

The above four theories offer a robust framework for the analysis of the ESG-CFP relationship. For example, Stakeholder Theory highlights the role of stakeholder involvement in financial resilience and the Resource-Based View (RBV) underscores ESG as a strategic resource that offers a source of competitive advantage. The Trade-Off Theory recognises the concerns on the financial costs associated with ESG Investment as stakeholders in the ESG mechanism, and emphasizes the balance of costs in short term and financial benefits in long term. Lastly, Signalling Theory also accounts for the effect of ESG performance on market's perception and investor trust. By integrating these four theoretical frameworks, companies can build their ESG strategies to be in line with sustainability purpose and financial purpose. This is particularly important in Islamic capital markets, where ethical investment considerations meet ESG obligations to drive corporate strategy and financial viability. Comprehending these dynamics enables policy makers, investors and business managers to make decisions, that sustain economic growth but are not at the expense of long-term financial resilience.

2.5 Empirical evidence on ESG and financial performance

There was evidence that governance and social issues had positive effects on profitability and market valuation, behavioral and policy factors had mixed effects toward these outcomes while the findings for environmental factors were mixed. Strong corporate governance systems leads to financial stability by improving transparency, reducing risk of operations and thereby investors' confidence [31]. In the same view, a study by Hussaini et al. [32] also found that firms that favor social responsibility reflecting the increased customer loyalty and brand equity, which in the long run increases revenue streams. However, the economic implication of environmental sustainability was not apparent as many companies enounter challenges in turning green initiatives into immediate financial benefits [18, 19].

Literature have reflected that the COVID-19 pandemic has provided a unique opportunity to evaluate the role ESG played in financial resilience. Organisations with strong ESG commitments were more resilient and sustainable than their competitors were [14]. A study by Białkowski & Sławik [33], for instance, identified that firms with high ESG scores suffered from lower stock price volatility and had to disclose better financial performance in challenging economic environment. In contrast, a study by Demers et al. [34] found the ESG investments did not have a consistent, positive effect on a variety of industries as an exogenous economic shock more determinant in affecting firm performance. The governance structures were highlighted for management of crises due to the pandemic and the economic costs were tightened by increased operational costs for social initiatives [15].

Recent research highlights the shifting of ESG and financial performance relationships in the post-pandemic era. While the governance dimension still remains a key influencer for financial performance, social investments are holding too heavy a financial load—driven by the increasing costs of labor and operations [35]. Conversely, the environmental factors have gained prominence due to the growing attention from the investors, and regulators that are progressively responding to sustainability-oriented business models [36]. Su & Li [37] have suggested that the companies with strong environmental practices experience enhanced market valuation and investor confidence, which are more pronounced in sectors where sector-specific regulations are very tight. These findings imply that the financial salience of ESG is

evolving, which will lead businesses to develop and adjust their sustainability strategies in response to macroeconomic conditions and stakeholder pressures.

2.6 ESG in Islamic financial markets

Islamic capital markets provide a distinct perspective of ESG integration as a result of the dominical ethical investment codes operating within the industry. Shariah-compliant companies tend to being governance and social factors to the forefront; facilitated by government regulation and stakeholder demands [38]. Unlike conventional markets, social equity and ethical governance play a more crucial role in Islamic finance, which is more in line with sustainability and responsible investing ESG principles [39]. Despite that, the environment dimension is considered to be immature in Islamic finance and it is less developed compared to other dimensions in terms of the firm's emphasis on fewer governance structures, while not as focused on ethical investment guidelines [40]. This paper fills a gap in extant literature by investigating the ESG–implying financial performance relations in Islamic financial markets, and provides a novel angle on the function of sustainability in a.

3 Research design

This study employs a panel regression model with a Fixed Effects (FE) estimation to analyze the relationship between ESG performance and corporate financial outcomes, measured by ROA, ROE, and Tobin's Q. The key independent variable, ESG score from the Refinitiv database, is analyzed alongside firm-specific and macroeconomic control variables, including Firm Size, Firm Age, Leverage, HHI, Industry Munificence, Industry Dynamism, GDP Growth, and Inflation. The Fixed Effects model is chosen over the Random Effects model based on the Hausman test, which confirms that firm-specific characteristics are correlated with the independent variables. The FE model accounts for unobserved heterogeneity by controlling for time-invariant firm-specific factors, ensuring that variations in ESG-financial linkages are analyzed within firms over time rather than across different firms. This approach eliminates biases arising from firm-specific differences, providing a more accurate assessment of ESG's impact on corporate financial performance. To enhance the robustness of the estimation, the study employs robust standard errors to address potential heteroskedasticity and autocorrelation issues, ensuring statistically reliable inferences.

3.1 Population and sample

This study focuses on publicly listed firms included in the Indonesia Syariah Stock Index and the Borsa Malaysia Shariah Index, two of the largest Islamic stock markets in Southeast Asia. These indices were chosen due to their strict adherence to Shariah-compliant financial principles, which influence corporate governance, investment strategies, and sustainability practices. Unlike conventional markets, firms in these indices must operate within ethical guidelines, prohibiting interest-based transactions (riba), excessive uncertainty (gharar), and investments in non-permissible industries such as alcohol, gambling, and conventional banking. The study includes firms from various sectors, excluding those that do not meet Shariah-compliant criteria. The final sample consists of firms that have complete financial and ESG-related disclosures during the study period, ensuring a comprehensive assessment of the ESG-financial performance relationship.

3.2 Data sources, sample and period

This study utilizes data from the Refinitiv database, a widely recognized source for financial and ESG-related information, ensuring comprehensive and transparent corporate sustainability assessments. The sample comprises firms listed on the Indonesia Syariah Stock Index (ISSI) and the Borsa Malaysia Shariah Index, with complete ESG and financial data from 2010 to 2022. To maintain dataset integrity and comparability, firms with inconsistent ESG disclosures or those from non-Shariah-compliant industries (e.g., conventional banking and tobacco) are excluded. The study period is divided into pre-pandemic (2010–2019) and post-pandemic (2020–2022) phases, enabling a comparative analysis of ESG-financial linkages before and after COVID-19's economic disruptions. This long-term perspective allows for a comprehensive evaluation of ESG integration and its evolving impact on corporate resilience and financial performance over time.

3.3 Model specification

The dependent variable in this study is corporate financial performance, which is assessed using three widely recognized financial metrics. First, Return on Assets (ROA) is used to measure a firm's operational efficiency, reflecting how effectively it utilizes its assets to generate earnings performance [41, 42]. Second, Return on Equity (ROE) serves as an indicator of financial performance by evaluating a company's profitability in relation to shareholders' equity performance [43, 44]. Finally, Tobin's Q is incorporated as a measure of market valuation, calculated as follows:

$$Tobin's\ Q = \frac{Total\ Market\ Value\ of\ Equity + Total\ Book\ Value\ of\ Liabilities}{Total\ Assets}$$

Although different definitions of Tobin's Q exist, prior research suggests that these variations produce similar values, reinforcing its reliability as a market-based financial performance metric.

3.4 Independent variables: ESG scores and industry sensitivity

The study employs several independent variables, including Environmental, Social, and Governance (ESG) scores, a combined ESG score, and industry sensitivity to ESG (SIND). These variables are derived from the Thomson Reuters Eikon database, which evaluates firms based on publicly disclosed sustainability-related information. The Environmental Score assesses a company's impact on the environment, including air, land, and water resources. It reflects the effectiveness of a company's risk management practices in reducing environmental harm and leveraging sustainability opportunities to generate long-term value. Furthermore, the Social Score measures a company's ability to build trust and loyalty among employees, customers, and the broader society. It captures factors such as labor practices, workplace safety, diversity, and corporate social responsibility initiatives.

Moreover, the Governance Score evaluates corporate leadership structures and decision-making processes, ensuring that board members and executives act in the best interests of long-term shareholders. It incorporates factors such as executive compensation, shareholder rights, and transparency in corporate disclosures. Finally, the Combined ESG Score aggregates the three ESG dimensions into a single measure, providing a comprehensive assessment of a firm's overall sustainability performance.

Additionally, the study includes Sensitive Industry on ESG (SIND) as a categorical variable to capture industry-specific ESG risks. Industries such as energy, mining, and aviation tend to be more ESG-sensitive due to their environmental impact, while service-based industries face greater social and governance-related pressures.

3.5 *Control variables*

To ensure the robustness of our analysis, this study incorporates several control variables that have been widely recognized in corporate finance literature for their influence on financial performance. These include firm size [45], firm age, leverage [46], industry concentration (HHI) [38, 47], industry munificence [48], industry dynamism (H. [49]), inflation, and GDP growth. Controlling for these factors allows us to isolate the true effect of ESG performance on corporate financial outcomes, ensuring that observed relationships are not driven by firm-specific or macroeconomic influences. Firm size is a key determinant, as larger firms generally have better access to capital, economies of scale, stronger governance structures, and risk diversification, which can enhance financial performance [50, 51]. In this study, firm size is measured by the natural logarithm of total assets (LnTA), a commonly used proxy in financial research that helps normalize the distribution of firm size data and reduces the impact of extreme values. This measurement ensures comparability across firms of different scales and accounts for variations in asset structures within the sample. Similarly, firm age reflects a company's experience [52], market position, and operational efficiency, which can contribute to higher profitability [53]. However, older firms may also face challenges such as organizational rigidity and declining innovation, which could negatively affect performance.

Leverage represents a firm's capital structure and financial risk, where higher debt levels can provide tax benefits and financial leverage advantages [54] but may also increase financial distress and default risk [55]. Industry-related factors such as concentration (HHI), munificence, and dynamism influence competitive positioning—firms in highly concentrated industries may benefit from pricing power and market stability [56], while those in resource-rich industries experience

higher growth potential and profitability. Conversely, firms in highly dynamic industries may face greater uncertainty and volatility, impacting financial stability [57]. Lastly, macroeconomic conditions, including inflation and GDP growth, play a significant role in shaping corporate financial outcomes by affecting consumer demand, investment climate, and cost structures [58, 59]. By including these control variables, this study ensures a more accurate assessment of ESG's impact on financial performance while accounting for broader economic and industry-level determinants.

The relationship between ESG performance and corporate financial outcomes is estimated using the following panel regression model:

$$CFP_{it=\beta_0} + \beta_1 ESG_{it} + \beta_2 SIND_{it} + \beta_3 FirmSize_{it} + \beta_4 FirmAge_{it} + \beta_5 Leverage_{it}$$
$$+ \beta_6 HHI_{it} + \beta_7 Munificence_{it} + \beta_8 Dynamism_{it} + \beta_9 GDPGrowth_t + \beta_{10} Inflation_t + \varepsilon_{it}$$

where CFP denotes CFP proxied by ROA, ROE and Tobin's Q; ESGi,t represents the overall Environment, Social and Governance (ESG) rating from the Refinitiv database, Firm Size, Firm Age, Leverage, HHI, Munificence, Dynamism, GDP Growth and Inflation are control variables.

4 Result

4.1 Descriptive statistics and initial observations

The descriptive statistics reveal significant differences in corporate financial performance and ESG characteristics before and after the COVID-19 pandemic. Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q all declined in the post-pandemic period, suggesting that firms experienced weakened profitability and market valuation. Before the pandemic, the average ROA was 0.076, which dropped to 0.047 after the pandemic, reflecting a decline in operational efficiency. Similarly, ROE fell from 0.195 to 0.106, indicating a reduction in firms' ability to generate returns for shareholders. Tobin's Q, a key measure of market valuation, saw a dramatic drop from 33.10 to 6.26, suggesting a significant decline in investor confidence and firm valuation post-pandemic. This decline could be attributed to market uncertainty, weaker corporate earnings, and reduced economic growth. Moreover, macroeconomic indicators such as GDP growth and inflation also showed substantial shifts. GDP growth averaged 5.29% before the pandemic but fell sharply to 2.18% post-pandemic, reflecting the economic slowdown, while inflation decreased from 3.24 to 1.79%, indicating lower consumer demand and economic activity.

In terms of ESG performance, Environmental, Social, and Governance scores all improved after the pandemic, suggesting that firms placed greater emphasis on sustainability and ethical governance in response to increasing stakeholder expectations. The Environmental score increased from 31.42 to 36.07, possibly reflecting stronger commitments to green initiatives and regulatory pressures for sustainability. Similarly, the social score rose from 47.38 to 51.79, and the Governance score increased from 50.01 to 52.01, indicating a greater focus on corporate social responsibility, employee welfare, and governance transparency. However, despite these improvements, the financial benefits of ESG performance weakened, as seen in the lower ROA and ROE post-pandemic. Additionally, leverage levels remained relatively stable, while firm size decreased significantly from an average of 22.30 (pre-pandemic) to 18.03 (post-pandemic), which could indicate downsizing or restructuring due to financial pressures. Industry-level factors such as industry concentration (HHI), industry munificence, and dynamism also showed changes, with HHI decreasing from 0.188 to 0.143, implying increased market competition. The decline in munificence from 0.0132 to 0.0051 suggests that industries became less resource-abundant, potentially affecting growth opportunities. Overall, these findings suggest that while ESG engagement intensified post-pandemic, its financial impact became less pronounced, and firms struggled to recover profitability in an uncertain economic environment (Table 1).

4.2 Heteroscedasticity and multicollinearity result

According to Table 2, the Variance Inflation Factor (VIF) results reveal significant multicollinearity issues, particularly among ESG (VIF = 355.45), Social (S) (VIF = 100.85), Governance (G) (VIF = 54.87), and Firm Size (VIF = 38.7). The mean VIF of 48.42 further confirms that multicollinearity is a serious concern in the model, potentially distorting coefficient estimates and making it difficult to isolate the individual effects of ESG components on financial performance. Additionally,

Table 1 Descriptive statistics

	N	*Mean*	*Std. dev*	*Min*	*Max*
Before pandemic					
ROA	742	0.0764661	0.0848938	− 0.0763663	0.4584718
ROE	742	0.1948366	0.256123	− 0.2427994	2.343558
TobinsQ	740	33.10347	192.309	0.0194698	2532.03
E	749	31.41741	22.4214	0	85.89
S	742	47.37798	22.44716	4.55	93.15
G	742	50.01127	20.7997	9.43	90.32
ESG	742	43.99819	18.11766	7.78	84.97
SIND	749	38.95749	22.77667	0	84.97
FirmSize	742	22.30051	1.392708	19.46413	25.81021
Leverage	742	0.7304441	0.8893776	− 1.509018	6.6
FirmAge	745	44.77852	26.82862	5	154
HHI	744	0.1880149	0.1050784	0.0854124	0.6362086
Munificence	737	0.0131994	0.0151984	− 0.0205062	0.0464648
Dynamism	740	0.005887	0.0034277	0.0013403	0.0158526
Inflation	756	3.243708	1.727839	0.5833084	6.412513
GDP	745	5.291282	0.6782106	4.413187	7.424847
After Pandemic					
ROA	704	0.0474693	0.0761093	− 0.2354732	0.4983359
ROE	704	0.1064584	0.2043195	− 0.8918367	1.405004
TobinsQ	703	6.257998	47.9053	0.0115238	685.021
E	704	36.0713	23.24322	0.61	87.24
S	704	51.789	20.49376	14.29	93.31
G	704	52.01119	20.81385	12.04	92.68
ESG	704	47.62433	18.11357	15.21	87.17
SIND	709	37.02876	25.99903	0	87.17
FirmSize	703	18.0289	6.159232	3.122365	25.50575
Leverage	705	0.7084786	1.197056	0	12.59798
FirmAge	706	40.95467	21.6632	9	137
HHI	681	0.1427891	0.0676917	0.0766518	0.5284397
Munificence	718	0.0050549	0.0106269	− 0.013619	0.0398751
Dynamism	702	0.0057932	0.0030012	0.0011831	0.0154296
Inflation	718	1.788801	1.854682	− 1.138702	4.209464
GDP	718	2.183319	5.307859	− 5.456847	8.650344

if heteroskedasticity is present, it could further undermine the reliability of standard errors, leading to misleading statistical inferences (Table 3).

To correct for heteroskedasticity, this study employs robust standard errors, ensuring that standard errors remain valid even when the variance of residuals is not constant. The use of Huber-White sandwich estimators accounts for potential heteroskedasticity and serial correlation in the panel regression model, improving the robustness of statistical tests. Regarding multicollinearity, remedial measures were taken, including the use of a combined ESG score instead of separate Environmental, Social, and Governance indicators, thereby reducing redundancy while preserving explanatory power. Additionally, highly collinear variables were assessed and, where necessary, transformed or excluded to improve model stability.

By implementing robust standard error estimation and addressing multicollinearity through variable transformation and combination, the study enhances the reliability of its findings. To further validate these corrections, diagnostic test results, such as the Breusch-Pagan or White test for heteroskedasticity and correlation matrices for multicollinearity, are presented. These methodological adjustments ensure that the estimated relationships between ESG performance and corporate financial outcomes remain statistically sound and interpretable.

Table 2 Multicollinearity test

Variable	VIF	1/VIF
ESG	355.45	0.002813
S	100.85	0.009915
G	54.87	0.018227
FirmSize	38.7	0.025839
GDP	26	0.038461
ESG	20.09	0.049774
SIND	12.2	0.081999
Inflation	5.81	0.172159
HHI	4.25	0.235196
FirmAge	4.17	0.23988
Dynamism	4.02	0.248592
Munificence	1.81	0.553038
Leverage	1.27	0.787982
Mean VIF	48.42	

Table 3 Regression result

Variables	ROA	ROE	Tobin's Q	ROA	ROE	Tobin's Q
	Before pandemic			*After pandemic*		
E	0.0001	− 0.001	0.184	− 0.0012	− 0.0016	0.1904
	− 0.4882	(− 1.1073)	− 0.3288	(− 1.1713)	(− 0.5749)	− 0.352
S	0.0011**	− 0.0018	2.1075**	− 0.0045***	− 0.0049	0.4708
	− 2.5249	(− 1.1903)	− 2.1678	(− 2.9540)	(− 1.1355)	− 0.5767
G	0.0005	− 0.001	1.1455*	− 0.0016*	− 0.0012	0.6605
	− 1.5903	(− 0.9624)	− 1.7487	(− 1.6566)	(− 0.4179)	− 1.2462
ESG	− 0.0007	0.0067*	− 2.9967	0.0064*	0.0127	− 1.7073
	(− 0.6484)	− 1.7868	(− 1.2705)	− 1.916	− 1.3561	(− 0.9490)
SIND	− 0.0008	− 0.0037*	− 0.4292	0.0011	− 0.0070**	− 0.6371
	(− 1.4885)	(− 1.8122)	(− 0.3312)	− 0.9927	(− 2.2886)	(− 1.0750)
FirmSize	− 0.0420***	− 0.0273	− 7.696	0.0007	0.002	− 1.6872***
	(− 6.7343)	(− 1.2061)	(− 0.5524)	− 1.1076	− 1.0531	(− 4.7539)
Leverage	− 0.0064	0.0342**	− 5.2196	− 0.0092**	0.0542***	5.064
	(− 1.4395)	− 2.2719	(− 0.6243)	(− 2.0297)	− 3.7887	− 0.9438
FirmAge	− 0.0031***	− 0.0049	− 5.0123**	0.0059	− 0.0091	− 9.7028**
	(− 2.7581)	(− 1.2142)	(− 2.0108)	− 0.6531	(− 0.3566)	(− 2.0114)
HHI	− 0.0037	− 0.1243	− 59.8112	− 0.0314	− 0.4112	− 62.7339
	(− 0.0454)	(− 0.4249)	(− 0.3271)	(− 0.1956)	(− 0.9056)	(− 0.7451)
Munificence	0.3863***	0.6715	− 704.7604**	1.0441***	3.1748***	− 22.8662
	− 2.6542	− 1.2722	(− 2.1491)	− 3.0239	− 3.2429	(− 0.1191)
Dynamism	0.9691	2.1217	54.3232	− 0.0536	− 1.5461	− 1205.6358*
	− 1.6367	− 0.9885	− 0.0402	(− 0.0472)	(− 0.4775)	(− 1.9417)
Inflation	0.0005	0.0075	− 1.6288	− 0.003	0.0044	2.1898
	− 0.3222	− 1.3611	(− 0.4738)	(− 0.9146)	− 0.466	− 1.2107
GDP	0.0003	− 0.0044	− 1.8984	0.0005	0.0005	2.6225***
	− 0.1081	(− 0.4605)	(− 0.3206)	− 0.2964	− 0.0989	− 2.8997

4.3 Regression analysis results

The findings reveal a dynamic and evolving relationship between ESG performance and corporate financial outcomes, particularly in Shariah-compliant firms listed on the Indonesia Syariah Stock Index and the Borsa Malaysia Shariah Index. Before the pandemic, Social and Governance factors positively influenced financial performance, particularly ROA and Tobin's Q, suggesting that firms with stronger corporate governance and social responsibility initiatives were better positioned to generate profitability and attract investor confidence. However, in the post-pandemic period, the effect of Social on ROA turned negative (– 0.0045, $p < 0.01$), and the impact of Governance weakened, indicating that the financial benefits of ESG integration declined amid economic uncertainties. This shift suggests that while firms continued to prioritize ESG strategies, the market's perception of their financial value became less pronounced post-pandemic, possibly due to increased focus on financial resilience, cost management, and operational efficiency rather than long-term sustainability commitments.

One possible explanation for this shift is that during the post-pandemic recovery phase, firms faced greater financial pressures, leading to a reallocation of resources from social and governance-related investments to core business operations. The increased economic volatility and supply chain disruptions may have made firms more risk-averse, limiting their ability to leverage ESG initiatives as a strategic tool for financial growth. The findings also highlight that the Environmental score remained statistically insignificant across all financial performance measures, both before and after the pandemic. This suggests that environmental sustainability initiatives have not yet translated into tangible financial benefits for Islamic firms, possibly due to the lack of stringent environmental regulations in Islamic financial markets compared to governance and social aspects.

Moreover, macroeconomic variables played a significant role in shaping financial performance post-pandemic. Industry munificence had a strong positive effect on ROA before (0.3863, $p < 0.01$) and after (1.0441, $p < 0.01$) the pandemic, highlighting the importance of industry-level resource availability in sustaining corporate growth. Additionally, GDP growth became a key determinant of Tobin's Q in the post-pandemic period (2.6225, $p < 0.01$), reinforcing the notion that broader economic recovery efforts had a greater impact on market valuation than firm-level ESG initiatives. This finding aligns with the argument that macroeconomic stability and industry resilience were more critical drivers of firm value in the aftermath of the pandemic, as investors prioritized economic recovery indicators over sustainability metrics [60].

Overall, these results underscore the context-dependent nature of ESG and financial linkages, where economic conditions, market dynamics, and investor sentiment influence the extent to which ESG integration contributes to financial performance [61]. The declining impact of Social and Governance scores post-pandemic suggests that ESG strategies must be adaptive and aligned with financial sustainability goals to maintain their relevance in changing economic environments [62]. For corporate managers, these findings highlight the need to balance ESG investments with financial performance imperatives, ensuring that sustainability initiatives remain financially viable, particularly in periods of economic uncertainty. For investors, the results suggest that ESG scores alone may not be sufficient indicators of financial stability post-pandemic, emphasizing the importance of integrating macroeconomic and industry-level factors into investment decisions [63]. Policymakers should consider strengthening regulatory frameworks for ESG disclosures and offering incentives for environmental investments, ensuring that firms are encouraged to integrate sustainability practices that yield both long-term financial and societal benefits.

5 Findings and discussion

5.1 Key findings

The findings indicate a significant decline in corporate financial performance after the COVID-19 pandemic, as reflected in lower ROA, ROE, and Tobin's Q. The drop in ROA from 0.076 to 0.047 and ROE from 0.195 to 0.106 suggests that firms struggled with profitability and operational efficiency post-pandemic. More notably, Tobin's Q plummeted from 33.10 to 6.26, highlighting a drastic decline in market valuation and investor confidence. This could be attributed to heightened economic uncertainty, reduced corporate earnings, and shifting investment priorities during the recovery phase.

The relationship between ESG performance and financial outcomes also shifted after the pandemic. Before the pandemic, Social and Governance scores had a positive effect on ROA and Tobin's Q, suggesting that firms with

strong corporate governance and social responsibility initiatives benefited from increased financial performance. However, in the post-pandemic period, the social score had a negative impact on ROA (– 0.0045, $p < 0.01$), indicating that social expenditures may have become a financial burden rather than a driver of profitability. The impact of Governance also weakened, suggesting that while governance mechanisms were important in stable periods, they did not provide significant financial protection during economic crises. Notably, the Environmental score remained insignificant across all models, implying that environmental sustainability efforts had no immediate financial impact on firms operating in Islamic financial markets.

The overall ESG score had a weak but positive effect on ROE before the pandemic (0.0067, $p < 0.1$), but this effect diminished post-pandemic. This suggests that while ESG strategies were beneficial in stable conditions, their financial relevance became less pronounced during periods of economic uncertainty. Instead, macroeconomic variables became more significant in determining firm value post-pandemic. Industry munificence had a strong positive effect on ROA both before (0.3863, $p < 0.01$) and after (1.0441, $p < 0.01$) the pandemic, reinforcing the idea that industry-wide resource availability played a crucial role in corporate sustainability. Moreover, GDP growth, which had no significant effect before the pandemic, became a key driver of Tobin's Q post-pandemic (2.6225, $p < 0.01$). This indicates that broader economic recovery efforts had a more significant impact on market valuation than firm-level ESG initiatives in the post-pandemic period.

Firm-specific characteristics also influenced financial outcomes differently before and after the pandemic. Firm size negatively affected ROA before the pandemic (– 0.0420, $p < 0.01$), implying that larger firms faced greater profitability challenges. However, this effect disappeared after the pandemic, suggesting that larger firms may have adapted better to post-pandemic recovery efforts. Leverage had a positive impact on ROE both before (0.0342, $p < 0.05$) and after (0.0542, $p < 0.01$) the pandemic, indicating that firms relied on debt financing to maintain profitability. Meanwhile, firm age negatively affected Tobin's Q both before (– 5.0123, $p < 0.05$) and after (– 9.7028, $p < 0.05$) the pandemic, suggesting that older firms struggled with maintaining their market valuation over time, possibly due to rigid structures and lower adaptability to market changes.

Industry sensitivity to ESG risks (SIND) also played a role in shaping financial outcomes. Before the pandemic, SIND negatively affected ROE (– 0.0037, $p < 0.1$), indicating that firms in ESG-sensitive industries (such as energy and mining) faced financial pressures. This effect intensified post-pandemic, with a stronger negative impact on ROE (– 0.0070, $p < 0.05$), suggesting that firms in high-risk industries were more vulnerable to financial disruptions caused by the pandemic. This aligns with broader concerns that companies operating in sectors with higher ESG exposure may face greater regulatory scrutiny and market volatility, affecting their overall financial performance.

5.2 Theoretical implications

The findings of this study contribute to the ESG-financial performance literature by demonstrating that the impact of sustainability practices on corporate financial outcomes is dynamic and context-dependent. Before the pandemic, the positive influence of Social and Governance factors on ROA and Tobin's Q supports the Stakeholder Theory [4], which argues that firms engaging in responsible governance and social practices can enhance investor confidence and operational efficiency. However, the post-pandemic decline in the financial benefits of these factors, particularly the negative effect of Social (S) on ROA, suggests that in times of economic uncertainty [64], firms may struggle to sustain the profitability of ESG investments. This aligns with the Trade-off Theory [65], which contends that firms must carefully balance sustainability commitments with financial performance objectives, particularly when faced with resource constraints.

Furthermore, the study provides empirical support for the Resource-Based View (RBV) Theory [66], which emphasizes that firms with superior internal resources, such as strong governance frameworks and well-integrated social policies, can achieve a competitive advantage. The significant role of industry munificence in shaping financial performance suggests that firms operating in resource-abundant industries can leverage sustainability practices more effectively than those in constrained environments [48]. This finding reinforces the idea that external industry conditions moderate the impact of ESG initiatives on financial outcomes, suggesting that ESG strategies must be tailored to industry-specific factors [29]. Moreover, the shift in the post-pandemic period, where macroeconomic variables such as GDP growth and industry munificence played a more dominant role in determining firm value, aligns with Institutional Theory, which suggests that external pressures such as economic policies, regulatory frameworks, and investor expectations shape corporate strategies and financial performance.

The study also challenges the view of ESG, which assumes that all ESG components contribute positively to financial performance [37]. The insignificance of Environmental factors before and after the pandemic implies that environmental sustainability efforts may not yield immediate financial benefits in Islamic financial markets, where governance and social factors are often prioritized [67]. This finding calls for an extension of existing ESG theories to account for context-specific influences, such as Shariah compliance, industry sensitivity, and macroeconomic fluctuations. In the context of Islamic finance, where investment principles prioritize ethical governance and equitable social practices, firms may derive greater financial benefits from governance and social initiatives rather than environmental efforts, especially in regions where environmental regulations are less stringent.

Additionally, the findings highlight the importance of economic cycles in shaping ESG-financial performance relationships, which can be further explained by the Stakeholder Theory. This theory suggests that firms must continuously adapt their strategies to respond to external shocks, such as the COVID-19 pandemic. The study's results indicate that while ESG factors were financially beneficial in stable conditions, their effectiveness diminished during economic crises, reinforcing the notion that firms need to develop flexible and adaptive ESG strategies that align with shifting economic priorities. As financial markets recover, firms may need to reconfigure their ESG strategies to align with investor expectations, industry regulations, and macroeconomic conditions to sustain long-term value creation.

Overall, these findings suggest that existing ESG theories, while useful, require contextual refinement when applied to Islamic financial markets and crisis periods. This study contributes by demonstrating how Shariah principles, industry sensitivity, and macroeconomic shocks moderate the effectiveness of ESG strategies, providing a more nuanced application of Stakeholder, RBV, and Trade-Off theories in emerging markets.

5.3 Practical implications

The findings of this study underscore the dynamic nature of ESG's impact on corporate financial performance, demonstrating that its effectiveness is highly context-dependent and influenced by broader economic conditions [68]. During periods of economic stability, strong corporate governance and social responsibility initiatives contribute positively to firm performance by enhancing stakeholder trust, reducing risk, and improving investor confidence [69]. However, in times of crisis, such as the post-pandemic period, financial constraints may limit the sustainability of social investments, forcing firms to prioritize short-term financial resilience over long-term ESG commitments. The weakened governance-financial performance link post-pandemic suggests that investors shifted their focus toward financial stability and liquidity management, highlighting the need for firms to balance governance structures with financial adaptability [70]. Meanwhile, the gradual increase in the relevance of environmental factors in financial valuation suggests a growing investor awareness of climate risks and sustainability-driven financial resilience, reinforcing the importance of green finance and environmental strategies in corporate decision-making [71]. These insights highlight the necessity for adaptive ESG strategies, where firms align their sustainability commitments with changing investor expectations, industry-specific dynamics, and macroeconomic trends. Additionally, policymakers should design flexible ESG regulations that encourage sustainability without imposing excessive financial burdens, particularly during economic downturns [72]. By integrating these insights, corporate leaders, investors, and regulators can better navigate the evolving financial landscape while fostering long-term sustainable growth.

6 Conclusion, limitation and suggestion for future research

6.1 Conclusion

This study provides empirical insights into the evolving relationship between ESG performance and corporate financial outcomes in Islamic financial markets, specifically in firms listed on the Indonesia Syariah Stock Index (ISSI) and the Borsa Malaysia Shariah Index. The findings reveal that before the COVID-19 pandemic, Social and Governance factors had a positive impact on profitability (ROA) and market valuation (Tobin's Q), suggesting that firms with strong governance and social responsibility initiatives experienced financial benefits [73]. However, post-pandemic, the effect of Social on ROA turned negative, and Governance weakened, indicating that ESG investments became less effective in driving financial performance amid economic uncertainty [74]. Additionally, the Environmental factor remained insignificant throughout the study period, suggesting that environmental sustainability efforts have yet to translate into measurable financial gains in Islamic financial markets.

The study also highlights the shifting importance of macroeconomic factors in shaping firm value [75]. While ESG factors were influential in the pre-pandemic period, post-pandemic financial performance was more strongly affected by broader economic conditions, such as GDP growth and industry munificence (Cardenas et al. [76]). The increased importance of these macroeconomic indicators suggests that investors and corporate managers placed greater emphasis on economic recovery and market stability rather than ESG commitments during the post-pandemic period. Moreover, firms operating in ESG-sensitive industries (SIND) faced greater financial pressures after the pandemic, reflecting heightened regulatory scrutiny and market risks associated with sustainability [18, 19]. These findings emphasize that ESG-financial linkages are dynamic and influenced by broader economic conditions, industry characteristics, and investor sentiment.

Given these findings, this study underscores the need for firms to develop adaptive ESG strategies that align sustainability goals with financial resilience, particularly in times of economic uncertainty. Corporate managers should ensure that ESG initiatives contribute to long-term financial stability while balancing cost efficiency and market competitiveness. Investors should consider macroeconomic conditions and industry-specific risks when assessing ESG investments, as ESG scores alone may not fully capture financial risk exposure. Policymakers, in turn, should strengthen regulatory frameworks for ESG disclosure and provide targeted incentives for environmental and social sustainability efforts, ensuring that firms integrate ESG practices in ways that enhance both financial and economic resilience. As the global focus on sustainable finance continues to grow, future research should explore the long-term impact of ESG on firm performance across different economic cycles and financial markets, providing deeper insights into the sustainability-financial performance nexus.

6.2 Limitation

Despite its contributions, this study has certain limitations that must be acknowledged. The focus on Shariah-compliant firms in Indonesia and Malaysia limits the generalizability of the findings to broader financial markets, particularly those operating under different regulatory structures and corporate governance frameworks. Islamic finance imposes ethical constraints such as the prohibition of interest (riba) and speculative transactions (gharar), which may influence how ESG factors interact with financial performance. These unique characteristics distinguish Shariah-compliant firms from their conventional counterparts, potentially leading to ESG-financial linkages that are not universally applicable. Future research should conduct comparative studies between Islamic and conventional financial markets to better understand whether ethical investment principles alter the financial significance of ESG factors.

Another limitation concerns sectoral constraints, as this study only includes industries permitted under Shariah-compliant investment guidelines. Sectors such as conventional banking, alcohol, and gambling, which are excluded from Islamic indices, may exhibit different ESG-financial performance relationships due to variations in regulatory exposure, risk management strategies, and investor expectations. Consequently, the findings may not fully reflect the broader corporate landscape. Expanding future research to include a wider range of industries across different financial systems would provide a more holistic view of how ESG performance influences corporate financial outcomes. Additionally, the study's pre- and post-pandemic focus offers only a short-term perspective, limiting insights into the long-term evolution of ESG-financial linkages. A longitudinal approach would allow researchers to assess how ESG strategies continue to shape financial stability across various economic cycles and regulatory changes.

Lastly, the study measures ESG performance using Refinitiv ESG scores, which, while widely recognized, may differ from alternative ESG evaluation frameworks such as SASB, GRI, or MSCI ratings. Since different ESG rating agencies employ varying methodologies, weighting systems, and disclosure requirements, findings based on a single data provider may lack full cross-market comparability. To enhance measurement robustness, future research should consider integrating multiple ESG scoring frameworks or conducting comparative analyses across different ESG rating methodologies. This would help improve the reliability and applicability of ESG-financial performance assessments across diverse financial markets.

6.3 Suggestions for future research

Future research should broaden its scope by conducting comparative analyses between Islamic and non-Islamic financial markets to assess whether Shariah compliance and ethical constraints influence the relationship between ESG performance and financial outcomes differently. Since Islamic financial markets operate under distinct investment principles—such as the prohibition of interest (riba) and speculative activities (gharar)—it is crucial to examine how these ethical guidelines shape corporate sustainability strategies and investor behavior. A comparative approach would provide

valuable insights into whether ESG integration in Islamic markets follows a unique trajectory or aligns with global trends observed in conventional financial systems.

Additionally, future studies should explore sectoral variations in ESG's financial impact by expanding the analysis beyond industries included in Shariah-compliant indices. Investigating how ESG factors affect financial performance across different sectors, including those in conventional markets, would provide a more comprehensive understanding of sustainability-driven corporate resilience. Certain industries, such as energy, mining, and manufacturing, may experience stronger financial consequences from ESG integration due to their high environmental and social risk exposure, whereas technology and service-based industries may exhibit different ESG-financial linkages. An industry-specific approach would help identify which sectors benefit the most from ESG initiatives and under what conditions these benefits are maximized.

Moreover, longitudinal studies should be conducted to track the long-term evolution of ESG integration and its financial impact, particularly in response to global sustainability policies, evolving regulatory frameworks, and market trends. Given that ESG strategies are continuously evolving, a long-term perspective would allow researchers to assess how firms adapt to changing investor expectations, policy shifts, and economic fluctuations. Furthermore, alternative methodologies for measuring ESG performance should be explored to improve the robustness of findings and enhance cross-market comparability. Since ESG ratings and scoring mechanisms vary across different data providers, the use of multiple measurement approaches could help mitigate inconsistencies and strengthen empirical validity.

Lastly, future research should investigate the moderating effects of macroeconomic conditions and government policies on ESG-financial linkages. Factors such as GDP growth, inflation, fiscal policies, and sustainability regulations can significantly influence corporate ESG commitments and their financial implications. Understanding how these external forces shape the effectiveness of ESG initiatives in different economic environments would provide deeper insights into the role of policy interventions and economic stability in fostering corporate sustainability. By incorporating these perspectives, future research can contribute to a more holistic understanding of ESG's role in driving long-term financial resilience across diverse financial markets and economic systems.

Author contributions USA and RH conceptualized and designed the study. USA collected and analyzed the data, while USA and RH performed the statistical analysis. Both USA and RH contributed to the interpretation of results and the preparation of figures. USA wrote the main manuscript text and RH revised and proofread the text. All authors reviewed and approved the final manuscript.

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