

Environmental, Social and Governance Performance, Asset Turnover and Firm Performance: Evidence from Indonesia

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Abstract

Purpose: This study examines whether Environmental, Social, and Governance (ESG) performance improves firm performance and investigates the mediating role of asset turnover in explaining how ESG initiatives contribute to financial outcomes among Indonesian listed firms based on stakeholder theory and the resource-based view.

Research Methodology: Using secondary panel data from 96 publicly listed firms with 674 firm-year observations during 2009–2023, this study employs two-way fixed effects regression and mediation analysis. ESG data were obtained from Refinitiv, while financial data were collected from Worldscope.

Results: The findings show that ESG performance has a positive and significant effect on future Return on Assets (ROA). The mediation analysis indicates that asset turnover acts as a key mechanism linking ESG performance to profitability by improving operational efficiency. The positive impact of ESG is more pronounced among larger firms and firms with lower leverage.

Conclusions: ESG engagement represents a value-enhancing strategy rather than a financial burden. Firms implementing stronger ESG practices can achieve better financial outcomes through improved operational efficiency and resource utilization.

Limitations: This study is limited to Indonesian publicly listed firms and primarily relies on ROA and Refinitiv ESG scores as indicators of financial performance and sustainability practices.

Contributions: This study contributes to the ESG literature by identifying asset turnover as an important operational pathway through which ESG performance enhances profitability. The findings provide empirical evidence from Indonesia and support the development of sustainable business strategies that improve competitiveness, transparency, and long-term corporate value.

Keywords: *Asset Turnover, ESG Performance, Firm Performance, Indonesia*

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1. Introduction

Sustainability issues have become a central focus of global business practices in recent years ([Global Sustainable Investment, 2022](#)). Due to increasing pressure from investors, governments, and the public, companies no longer pursue financial gains alone but also pay greater attention to their social and environmental responsibilities ([Suprpto, Agustin, & Putri, 2025](#); [Wan, Fu, & Zhong, 2023](#)). In emerging markets such as Indonesia, the implementation of ESG is encouraged by POJK No.51/POJK.03/2017, which requires sustainability reporting from publicly listed firms ([Otoritas Jasa Keuangan, 2017](#)).

Nonetheless, Environmental, Social, and Governance (ESG) disclosure is still inconsistent, and its effect on firm performance is still empirically inconclusive ([Firmansyah, Umar, & Jibril, 2023](#); [Otoritas Jasa Keuangan, 2022](#); [Suhasmoro, Novianti, Achsan, & Andati, 2026](#); [Suprpto et al., 2025](#)). Previous studies have provided mixed evidence on the relationship between ESG and financial performance. Previous studies have found a positive relationship between ESG and financial performance ([Cabaleiro-Cerviño & Mendi, 2024](#); [Shaikh, 2022](#)), while other scholars have revealed a negative relationship ([Duque-Grisales & Aguilera-Caracuel, 2021](#); [Zahid, Khan, Anwar, & Maqsood, 2022](#)). Some studies indicate that the impact of ESG may vary depending on the institutional context and quality of a country's governance ([Firmansyah et al., 2023](#); [Suhasmoro et al., 2026](#)).

This suggests that the relationship between ESG and financial performance is still contextual and requires further in-depth examination, particularly in developing countries such as Indonesia. The theoretical framework combines stakeholder theory with the Resource-Based View (RBV). Stakeholder theory suggests that firms attain lasting value by addressing the needs of all stakeholders, not just shareholders ([Freeman & McVeigh, 2001](#)). The RBV highlights that capabilities constitute intangible resources that improve competitive advantage and financial outcomes ([Barney, Wright, & Ketchen Jr, 2001](#); [Cabaleiro-Cerviño & Mendi, 2024](#)).

This study examines the effect of ESG performance on firm profitability in Indonesia, utilizing asset turnover as a mediating variable. Using a panel dataset of 96 publicly listed firms from 2009 to 2023 (674 firm-year observations) and combining Refinitiv ESG scores with Worldscope financial data, this study finds a robust positive relationship between ESG performance and future ROA. The results remain significant after controlling for firm characteristics, industry-fixed effects, and year-fixed effects. Economically, a one-standard-deviation increase in ESG performance is associated with approximately 20% standard deviation increase in future ROA. These findings suggest that ESG initiatives enhance operational efficiency and profitability rather than impose financial burdens, consistent with previous studies ([D. Wu & Zhu, 2025](#)).

Beyond the baseline relationship, the findings show significant peer influence and heterogeneous impacts. Peer-adjusted ESG metrics indicate that ESG performance is influenced by industry-specific standards and competitive pressures. Consistent with prior evidence, firms with better ESG performance relative to industry peers tend to achieve superior financial outcomes, and increased ESG involvement is positively valued by the market ([Zhiliang Wu & Chen, 2024](#)). Furthermore, the positive ESG-ROA relationship is mainly observed in large firms and firms with low leverage but is not significant for small or highly leveraged firms.

These findings suggest that organizational capability and financial flexibility are crucial for converting ESG investments into performance gains, helping to explain the mixed evidence in prior ESG-performance research ([Amendola, Bernardelli, & Giudici, 2025](#); [K.-H. Chen, Zhang, Elston, Chen, & Hsu, 2026](#); [Dinçergök & Pirgaip, 2025](#); [Pan, Qin, Li, Jing, & Zhang, 2025](#); [Zhu et al., 2025](#)). To address potential endogeneity arising from reverse causality and selection bias, this study employs two-stage least squares (2SLS), propensity score matching (PSM), and entropy balancing (EB) methods. The results remain positive and significant across all robustness tests, suggesting that the ESG performance relationship is robust to endogeneity concerns ([Tang, 2022](#); [Wan et al., 2023](#)).

This study contributes to the literature in several ways. First, we contribute to the literature by providing several mechanisms and channels that alter causality. Specifically, we examined whether the association between ESG and firm performance is explained by asset turnover. Second, it breaks down ESG into environmental, social, and governance components and includes peer and deviation influence. Third, it demonstrates the heterogeneous impact of ESG on firm characteristics, providing guidance for managers and policymakers seeking to adopt effective sustainability approaches.

The practical implications suggest that ESG engagement generates value that is integrated into firms' operational strategies. Managers should prioritize ESG initiatives that improve asset utilization, process efficiency, and governance. The financial benefits of ESG are more evident for large firms and those with low leverage ([Chen et al., 2026](#); [Dinçergök & Pirgaip, 2025](#)). From a policy perspective, consistent ESG disclosure standards are important for enhancing transparency and stakeholder confidence in emerging markets ([Hamdouni, 2025](#)). The remainder of this paper is structured as follows: Section 2 examines the literature and develops hypotheses. Section 3 outlines the data and methods used in this study. Section 4 presents the empirical findings and discussion. Section 5 concludes the paper and emphasizes the contributions and managerial implications.

2. Literature Review and Hypotheses Development

Stakeholder theory, developed by R. Freeman explains that a company holds responsibilities not only to its shareholders but also to all stakeholders, such as employees, customers, the government, society, and the environment ([Freeman & MCvea, 2001](#)). Within the framework of ESG, this theory highlights that a firm's success is evaluated not only through financial metrics but also by how well it fulfils social and environmental expectations. Adopting ESG signifies an organization's dedication to generating sustainable value for every stakeholder ([Ho, Nguyen, & Dang, 2024](#); [Shaikh, 2022](#)).

The Resource-Based View (RBV) theory, first introduced by [Wernerfelt \(1984\)](#) and later formalized by ([Barney, Wright, & Ketchen, 2001](#)), posits that a firm's competitive advantage stems from internal resources that are distinctive, hard to imitate, and offer strategic significance. ESG is considered an intangible asset that builds a favorable reputation, investor trust, and customer loyalty, leading to improved firm performance ([Cabaleiro-Cerviño & Mendi, 2024](#)).

2.1 Hypotheses Development

ESG performance is increasingly used by investors to evaluate corporate risks and opportunities ([Indriani, 2024](#)). ESG performance is viewed as having the potential to affect firm performance by enhancing operational efficiency, minimizing risks, and bolstering corporate reputation and stakeholder involvement ([Agustin, Safitri, Hesniati, & Robin, 2025](#)). One study indicates that ESG has a negative impact on ROA and profitability, although the findings lack statistical significance ([Shaikh, 2022](#)). Various studies indicate a positive relationship between ESG and firm performance, although the magnitude and direction of the effect may vary across countries, industries, and firm sizes ([Cabaleiro-Cerviño, & Mendi, 2024](#); [Firmansyah, Umar, & Jibril, 2023](#); [Ho, Nguyen, & Dang, 2024](#); [Nguyen, Hoang, & Tran, 2022](#)).

H₁: ESG Performance positively associated with firm performance

Peer ESG performance has a significant influence on corporate sustainability. Based on institutional theory and social learning models, firms frequently replicate the ESG practices of industry peers to maintain legitimacy, reduce uncertainty, and meet stakeholder expectations ([Gao, Liu, & Yang, 2025](#); [Wang, Zhang, Wu, & Sha, 2024](#)). Strong peer ESG performance creates competitive pressure and encourages firms to improve governance, transparency, and operational efficiency while benefiting from knowledge spillovers and reduced information asymmetry ([Zhao, Ngan, Jamil, Salleh, & Yusoff, 2025](#); [Wang et al., 2024](#)). Empirical studies show that firms adjust their ESG strategies in response to peer performance, leading to greater stakeholder trust, legitimacy, and improved financial outcomes ([Yang, Chen, Zhang, & Yao, 2024](#); [Zhao et al., 2025](#)). Therefore, firms in sectors with better peer ESG performance are expected to achieve better firm performance.

H₂: Peer ESG performance is positively associated with firm performance

Apart from the overall ESG score, the Environmental (E), Social (S), and Governance (G) aspects represent unique pathways through which sustainability initiatives may influence firm performance ([Itan, Sylvia, Septiany, & Chen, 2025](#); [Ma, Gao, & Xing, 2025](#)). Environmental performance indicates a firm's capacity to enhance resource efficiency and handle environmental risks, potentially lowering operating expenses and boosting profitability ([Zhu, Liu, & Zhang, 2025](#)). Social performance enhances connections with employees, customers, and communities, leading to increased productivity, improved reputation, and more stable revenue ([Bilal, Gamer, Jawadi, Alaskar, & Alzahrani, 2025](#); [Ningwati, Septiyanti, & Desriani, 2022](#)). Governance effectiveness reduces agency issues and improves transparency and managerial responsibility, which are especially vital in developing markets and positively influences firm performance ([Chen, Zhang, Elston, Chen, & Hsu, 2026](#); [Rashid, Khidmat, Hares, Muhammad, & Saleem, 2020](#)).

Previous empirical research typically indicates a positive relationship between each ESG dimension and firm performance, although the magnitude of this relationship differs between firms operating in developed and emerging economies ([Al, & Haron, 2025](#); [Banerjee, Mitra, & Aggarwal, 2025](#)). Accordingly, this study proposes the following hypothesis:

H₃: ESG pillars positively affects firm performance

Although prior studies generally find a positive relationship between ESG performance and firm performance, the mechanism underlying this relationship remains underexplored ([Handoyo, & Anas, 2024](#); [Li, Tang, & Li, 2024](#)). ESG practices can boost operational efficiency by optimizing resource utilization, minimizing waste, enhancing energy efficiency, and strengthening governance structures ([Liu, Fan, & Li, 2025](#); [Xie, Qin, & Li, 2024](#)). The enhancements enable firms to utilize their assets more effectively, resulting in higher asset turnover ([Bahadır, & Akarsu, 2024](#); [Yang et al., 2024](#)).

Asset turnover is widely used as a measure of operational efficiency, reflecting a firm's ability to use assets to generate sales ([Chandra, Wijaya, Angelia, & Hayati, 2021](#); [Zavalij, Lehenchuk, Chyzhevska, & Hrabchuk, 2025](#)). Higher asset turnover reflects better operational efficiency and more effective asset utilization, which is typically associated with stronger profitability ([Ibrahimov, Vancsura, & Parádi-Dolgos, 2025](#)). As ESG investments often involve substantial implementation costs, their financial benefits may emerge indirectly through improved operational efficiency rather than immediate profitability gains ([Li et al., 2024](#); [Wang, & Nishihara, 2025](#)). Therefore, asset turnover is expected to mediate the relationship between ESG and firm performance.

H₄: Asset turnover mediates the relationship between ESG performance and firm performance

The benefits of ESG performance may vary across firms, depending on their organizational and financial characteristics. Firm size reflects a firm's capacity to implement and benefit from ESG initiatives ([Chen et al., 2026](#)). Larger firms typically have larger financial assets, stronger governance systems, and increased public exposure, enabling them to incorporate ESG practices more effectively and transform ESG investments into competitive advantages, stakeholder trust, and operational improvements ([Al and Haron, 2025](#); [Hamdouni, 2025](#); [Istiana, & Rolanda, 2025](#); [Zhu et al., 2025](#)). In contrast, smaller firms often encounter resource constraints that limit their ability to realize the full benefits of ESG engagement ([Amendola, Bernardelli, & Giudici, 2025](#)). Empirical evidence suggests that ESG-related performance gains are stronger among larger firms because of economies of scale and greater stakeholder visibility ([Chen et al., 2026](#)).

H₅: The positive association between ESG and firm performance is primarily more pronounced in large firms

The financial structure may also influence the effectiveness of ESG initiatives. Leverage indicates a firm's dependence on debt funding, which can limit its managerial flexibility and increase its financial

risk ([Saif-Alyousfi, Alsadat, & Alalmace, 2025](#)). High-leverage firms encounter larger interest commitments and stricter financial limitations, constraining their ability to invest in ESG initiatives and postponing the achievement of their financial advantages ([Zhu et al., 2025](#)). Conversely, low-leverage firms have higher financial flexibility, allowing them to manage ESG-related expenses and convert sustainability efforts into enhanced operational efficiency and profitability ([Dinçergök & Pirgaip, 2025](#)). Prior studies have shown that leverage weakens the ESG-performance relationship, particularly in emerging markets ([Fettahoglu, Allak, & Ozcan, 2025](#); [Zhang, & Liu, 2022](#); [Zhu et al., 2025](#)).

H₆: The positive association between ESG and firm performance is primarily more pronounced in low-leverage firms

3. Methodology

This study uses a quantitative approach with secondary data collected from companies listed on the Indonesian Stock Exchange from 2009 to 2023. ESG data, comprising total ESG scores (TRESGS), environmental (ENSCORE), social (SOSCORE), and governance (CGSCORE) sub-scores, were obtained from the Refinitiv Eikon Datastream (LSEG). Financial and accounting data, including total assets, net income, total debt, and market capitalization, were obtained from Refinitiv Worldscope. The final sample consists of 674 firm-year observations from 96 firms in the manufacturing industry.

Refinitiv is used because of its broad firm coverage, transparent ESG scoring methodology, and strong cross-industry comparability ([Refinitiv, 2024](#)). Its ESG metrics are extensively used in empirical studies, improving data reliability and comparability, while merging ESG and financial databases reduces possible matching errors ([Ehlers, Elsenhuber, Jegarasasingam, & Jondeau, 2024](#)).

Panel regression utilizing two-way fixed effects (industry and year) is applied to address unobserved heterogeneity among sectors and macroeconomic changes over time. Panel data methods enable the utilization of cross-sectional and time-series variations, enhancing estimation efficiency and reducing omitted variable bias ([Arunachalam, 2023](#); [Kádárová, Lachvajderová, & Sukopová, 2023](#); [Wilms, Mäthner, Winnen, & Lanwehr, 2021](#)). The baseline regression model is presented in Formula 1:

$$ROA_{ij,t+1} = \alpha + \beta_1. ESG_{ij,t} + \beta_2. ATO_{ij,t} + \beta_3. Controls_{ij,t} + \sigma_j + \delta_t + \varepsilon_{ijt} \quad (1)$$

Where $ROA_{ij,t+1}$ represents the return on assets of firm i in industry j in year $t + 1$, reflecting the firm's efficiency in using its assets to generate profits. $ESG_{ij,t}$ denotes the total ESG scores, and $ATO_{ij,t}$ denotes asset turnover as a measure of operational efficiency.

To isolate the model from compounding factors, we include a comprehensive vector of firm-specific factors prior to the literature, denoted in the model as $Controls_{ij,t}$. Specifically, firm size is included to capture differences in the organizational scale and operational structure ([Zavalii, Zhyhlei, Ivashko, & Kornatka, 2025](#)). Tobin Q indicates market valuation and growth prospects ([Alatawi, Daud, & Johari, 2025](#)). Leverage addresses the financial risk stemming from debt ([Matsali, Skordoulis, Papagrigoriou, & Kalantonis, 2025](#)). R&D intensity serves as a proxy for innovation potential ([Saharti, 2025](#)). Industry competition reflects competitive pressure in the firm's operational context ([Baird, Nuhu, & Jiao, 2024](#)). Sales growth illustrates operational expansion and revenue trends ([Y. Liu, Zhang, Gao, & Xie, 2025](#)). The variables are listed in Table 1.

Table 1. Variable definition

Variables Name	Definition	Source
ROA	ROA is calculated by dividing the net income by the firm's total assets.	Worldscope
ESG	ESG data were obtained from the Refinitiv Datastream.	Datastream

Variables Name	Definition	Source
PeerESG	Peer ESG is calculated as the average ESG score of firms within the same industry and year, divided by the number of firms in that industry.	Datastream
ATO	ATO is calculated by dividing a firm's total sales by its total assets.	Worldscope
Firm Size (Size)	Firm size is measured using the natural logarithm of the firm's total assets (Primita & Rolanda, 2024).	Worldscope
Tobin Q	Following Maury (2006), Tobin Q is calculated as the ratio of the market value of equity plus total assets, minus the book value of equity and total debt, all divided by the firm's total assets.	Worldscope
Leverage	Leverage is calculated by dividing the total debt by the total assets.	Worldscope
RND	RND is calculated by dividing research and development expenditures by a firm's total assets.	Worldscope
Sales Growth	Sales growth is calculated as the difference between current-year sales and prior-year sales, divided by prior-year sales.	Worldscope
HHI	The HHI is calculated as the sum of the squared market shares of all firms within an industry.	Worldscope
Firm Size Group	Following Wu et al. (2025), the grouping is conducted based on the median firm size of the sample.	Worldscope
Leverage Group	Following Mahmood et al. (2019), the grouping is conducted based on the median leverage of the sample.	Worldscope

Table 1 summarizes the variables of this study. Future Return on Assets (ROA) serves as the dependent variable, ESG scores as the main independent variable, and asset turnover as the mediating variable reflecting operational efficiency. Firm size, Tobin Q, leverage, R&D intensity, industry competition, and sales growth were included as control variables. Additionally, peer ESG, firm size group, and leverage group were incorporated to facilitate robustness and heterogeneity analyses. The use of these variables allows the study to thoroughly investigate not only the direct relationship between ESG and firm performance but also the underlying mechanisms and conditional effects surrounding that relationship.

Finally, we incorporate industry fixed effects (σ_j) to absorb unobserved, time-invariant industry characteristics and year fixed effects (δt) to account for aggregate macroeconomic shocks. Finally, the standard errors (ε_{ijt}) are double-clustered at the firm and year levels to correct for potential error correlations.

4. Results and Discussions

4.1 Descriptive Statistics

Table 2 reports the descriptive statistics for all variables utilized in the analysis. The findings demonstrate significant differences in ESG performance and financial results among publicly listed firms in Indonesia, indicating the suitability of the panel data framework. The mean Return On Assets (ROA) is 0.0749, with values ranging from -0.2475 to 0.3972, indicating considerable variation in firm profitability across the sample. This suggests that Indonesian firms differ in their ability to generate profits from their assets, consistent with earlier research (Alrobai, Alrashed, & Albaz, 2025).

Table 2. Statistic descriptive

Variables	Obs	Mean	SD	Min	p1	p50	p99
ROA	695	0.0749	0.0967	-0.2475	-0.1655	0.0492	0.3972
ROE	695	0.1643	0.2783	-0.9796	-0.9796	0.1417	1.3454
TRESGS	695	47.4108	19.4641	9.79	9.79	47.48	86.97
peer_TRESGS	695	14.4739	0.0081	14.4563	14.4574	14.4738	14.49
TRESGS_dev~n	695	32.9316	19.5291	-7.4507	-5.74	33.0062	72.5126

Variables	Obs	Mean	SD	Min	p1	p50	p99
ENSCORE	695	36.9928	24.8534	0	0	32.62	89.26
SOSCORE	695	51.6444	22.388	4.44	5.72	51.63	94.45
CGSCORE	695	49.3593	22.4371	2.98	7.93	49.84	89.68
Size	695	24.5348	1.4398	19.3919	20.9888	24.4095	28.0388
tobinq	675	2.3488	3.1214	0.3446	0.6589	1.3875	16.2471
Lev	695	0.5249	0.2409	0.1235	0.1235	0.4904	0.9946
RND	695	0.001	0.0059	0	0	0	0.0419
competition	695	2.7632	2.077	1	1	1.9578	7.3487

Consistent with prior ESG literature, the mean ESG score (TRESGS) in our sample is 47.41, with a value ranging from 9.47 to 86.97. This wide range indicates substantial variation in ESG implementation among publicly listed firms in Indonesia, reflecting differences in firm characteristics, industry conditions and sustainability practices ([Aruwaji & Swanepoel, 2025](#); [Shrestha, Andrikopoulos, & Park, 2025](#); [Tripopsakul, 2025](#)). Overall, the descriptive statistics indicate sufficient variation across the variables, providing an appropriate basis for subsequent panel regression analysis.

4.2 Correlation Analysis

To examine the associations between ESG performance and firm performance, we first constructed a correlation matrix, as reported in Table 3.

Table 3. Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ROA	1							
(2) TRESGS	0.058	1						
(3) Size	-0.026	0.394***	1					
(4) tobinq	0.559***	0.011	-0.097***	1				
(5) Lev	-0.417***	0.171***	0.181***	-0.175***	1			
(6) RND	0.002	-0.025	0.004	0.105***	-0.183***	1		
(7) competition	-0.196***	0.191***	0.422***	-0.140***	0.393***	-0.105***	1	
(8) sales_growth	0.076***	-0.006	-0.130***	0.045*	0.011	0.007	-0.008	1

Table 3 presents the pairwise correlations among the dependent, independent, and control variables used in this study. ROA is positively correlated with ESG, supporting the assumption that better ESG performance is associated with higher profitability. Leverage has a negative relationship with ROA, indicating that firms with higher debt levels tend to have lower profitability. The ESG components (E, S, and G) show a moderate correlation among themselves, as anticipated, since they all play a role in determining the overall ESG score. Overall, the correlation coefficients do not indicate excessively high correlations among the independent variables, providing preliminary evidence that multicollinearity is unlikely to be a major concern.

4.3 Multicollinearity

Variance Inflation Factor (VIF) tests were conducted to evaluate multicollinearity. Table 4 reports the VIF and tolerance (1/VIF) values for all the independent variables. All VIF values are lower than the commonly recognized threshold of 10, ranging from 1.07 to 1.94, while all tolerance values are above 0.10, indicating that the independent variables show no issues with collinearity ([Zairis, Apostolopoulos, & Liargovas, 2025](#)). This suggests that the regression estimates are likely to be stable and not substantially affected by the coefficient inflation.

Table 4. Multicollinearity

Variables	VIF	1/VIF
TRESGS	1.27	0.784427
Size	1.94	0.515682
tobinq	1.2	0.835864
Lev	1.42	0.703377

Variables	VIF	1/VIF
RND	1.07	0.930238
competition	1.47	0.678705
sales_growth	1.11	0.899739

4.4 Baseline Regression Analysis

To assess the impact of ESG performance on firms' future profitability, we conducted a series of baseline regressions in which future return on assets ($ROAt+1$) was regressed against ESG performance. Table 5 presents the baseline regression results for different model specifications, including the sequential inclusion of fixed effects and firm-level control variables.

Table 5. Baseline regression

	(1)	(2)	(3)
	ROAt+1	ROAt+1	ROAt+1
TRESGS	0.000*	0.000	0.001***
	(1.825)	(1.661)	(4.462)
Size			-0.011**
			(-2.613)
tobinq			0.009
			(1.723)
Lev			-0.063*
			(-1.823)
RND			-0.582
			(-0.712)
competition			0.010
			(0.673)
sales_growth			0.000**
			(2.892)
_cons	0.056***	0.049***	0.293***
	(6.078)	(3.206)	(3.210)
Industry FE	No	Yes	Yes
Year FE	No	Yes	Yes
SE Double clustered at firm & year	No	Yes	Yes
Observations	695	695	674
Adjusted R squared	0.003	0.596	0.692

The baseline findings strongly support the claim that better ESG performance improves future operational outcomes, consistent with previous findings ([Chen & Fan, 2024](#)). In the primary specification (Model 3), which features an extensive array of firm-level controls, fixed effects for industry and year, and double-clustered standard errors at both the firm and year levels, the coefficient for ESG performance is positive and statistically significant at the 1% level. This result suggests that firms with better ESG performance eventually see increased profitability, aligning with the belief that ESG involvement enhances operational efficiency, stakeholder trust, and long-term value creation ([Bashir, Zhao, Qiu, Ahmed, & Yau, 2023](#)).

Consistent with prior studies from ([Tripopsakul, 2025](#); [Chen and Fan, 2024](#); [Zhang, & Liu, 2022](#)), the findings indicate that ESG initiatives serve as strategic investments instead of financial burdens. Firms that actively participate in sustainable environmental, social, and governance initiatives are more inclined to improve their operational efficiency ([Chen & Fan, 2024](#)). Reduce long-term risks ([Zhang](#)

& Liu, 2022). Also bolster their connections with important stakeholders. Together, these mechanisms result in enhanced financial performance in the future (Tripopsakul, 2025).

The analysis of various model specifications strengthens this understanding. In Model (1), ESG performance shows a positive, but only mildly significant, correlation with future ROA. Following the inclusion of industry and year fixed effects in Model (2), the ESG coefficient remains positive but becomes statistically insignificant. Crucially, once firm-level fundamentals are fully controlled for in Model (3), the positive and significantly high ESG coefficient reappears. Among the three models, Model (3) serves as the main specification because it includes all control variables, industry and year fixed effects, and double-clustered standard errors. This pattern suggests that ESG performance offers additional explanatory strength beyond the overarching industry trends and macroeconomic changes.

According to stakeholder theory, firms that excel in long-term investors by Hamdouni (2025), enhance customer trust by Tripopsakul (2025), and improve employee productivity by Aguilera-Caracuel, Guerrero-Villegas, Ahmadova, and Bornay-Barrachina (2026) ultimately lead to greater profitability in future periods. In addition to statistical significance, the estimated effect of ESG performance is economically relevant. This is in line with the earlier study by Zhu, Liu, and Zhang (2025), we evaluate economic importance by adjusting the regression coefficient using the standard deviation of ESG and normalizing it by the standard deviation as in Formula 2:

$$\text{Economic Significance} = \frac{\beta_{ESG} \times SD_{ESG}}{SD_{ROA}} \quad (2)$$

Using the estimates from Model (3), where $\beta_{ESG} = 0.001$, $\sigma_{ESG} = 19.4641$, and $\sigma_{ROA} = 0.0967$, the economic effect is equal to Formula 3:

$$\frac{0.001 \times 19.4641}{0.0967} = 0.2017 \quad (3)$$

This suggests that a one-standard-deviation increase in ESG performance is associated with an increase of approximately 20.17% in the future ROA standard deviation. This magnitude indicates that ESG performance is not only statistically significant but also economically meaningful in explaining future firm profits.

4.5 Robustness

Several alternative ESG measures are employed to guarantee the dependability of the baseline results. Table 6 presents the robustness test results using alternative ESG measures, including peer-adjusted ESG, the ESG deviation, the ESG combined score, the ESG dimensions, and alternative aggregate ESG metrics.

Table 6. Robustness alternative independent

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1
peer_TRESGS	-2.096***						
	(-4.476)						
TRESGS_deviation		0.001***					
		(4.476)					
esgcombinedscore			0.000**				
			(2.506)				
ENSCORE				0.000**			
				(2.371)			
SOSCORE					0.001***		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
					(4.169)		
CGSCORE						0.000**	
						(2.455)	
TRESGENERS							0.000**
							(2.684)
Size	-0.011**	-0.011**	-0.010*	-0.009*	-0.012**	-0.007	-0.009
	(-2.609)	(-2.609)	(-1.797)	(-1.785)	(-2.607)	(-1.444)	(-1.730)
tobinq	0.009	0.009	0.021***	0.009	0.009	0.009	0.009
	(1.723)	(1.723)	(6.300)	(1.647)	(1.653)	(1.634)	(1.635)
Lev	-0.063*	-0.063*	-0.062	-0.076*	-0.057	-0.074*	-0.072*
	(-1.821)	(-1.821)	(-1.586)	(-2.033)	(-1.674)	(-2.060)	(-1.955)
RND	-0.584	-0.584	-0.429	-0.847	-0.453	-0.953	-0.748
	(-0.714)	(-0.714)	(-0.497)	(-1.084)	(-0.561)	(-1.151)	(-0.970)
competition	0.010	0.010	0.022	0.008	0.009	0.008	0.011
	(0.671)	(0.671)	(1.464)	(0.563)	(0.623)	(0.548)	(0.770)
sales_growth	0.000**	0.000**	0.000*	0.000**	0.000***	0.000**	0.000**
	(2.897)	(2.897)	(1.767)	(2.892)	(3.072)	(2.623)	(2.908)
_cons	30.670***	0.306***	0.208	0.278**	0.311***	0.219**	0.249**
	(4.515)	(3.317)	(1.727)	(2.562)	(3.253)	(2.149)	(2.415)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SE Double clustered at firm & year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	674	674	580	674	674	674	674
Adjusted R Squared	0.692	0.692	0.792	0.683	0.695	0.683	0.683

Peer-adjusted ESG scores (*peer_TRESGS*) are created by calculating the average ESG performance of comparable firms within the same industry classification and year, excluding the focal firm. For each firm-year observation, *peer_TRESGS* is calculated as the total ESG score of all firms in the same industry-year minus the firm's own ESG score, divided by the number of peer firms, minus one. This method captures the dominant ESG practices within the industry while reducing mechanical correlations that may arise from including the target firm in the benchmark ([Zhao, Ngan, Jamil, Salleh, & Yusoff, 2025](#)).

Deviations from industry ESG standards (*TRESGS_deviation*) are assessed as the gap between a firm's relative ESG and its peer-adjusted ESG benchmark, indicating its comparative ESG standing in its sector. This framework adheres to the peer-based ESG benchmarking method, which is consistent with prior peer-effect ESG literature such as [Gao, Omenihu, Brahma, and Nwafor \(2025\)](#) and [Wang, Zhang, Wu, and Sha \(2024\)](#), highlighting that a firm's ESG performance and its economic impacts are influenced by both absolute ESG measures and their relative positions in comparison to industry counterparts. As reported in Table 6, the Refinitiv ESG combined score (*esgcombinedscore*), ESG Dimensions (*ENSCORE*, *SOSCORE*, *CGSCORE*), and alternative aggregate ESG metrics (*TRESGENERS*) all have positive and significant effects on ROA, confirming the robustness of the baseline findings.

The control variables retained the anticipated signs, with firm size and sales growth being negatively and positively associated with ROA, respectively, while leverage showed a negative effect. The adjusted R-squared values (0.683-0.792) demonstrate significant explanatory strength, while the standard errors are double-clustered at the firm and year levels. Overall, these tests confirm that the positive impact of ESG on firm performance is robust across various specifications.

4.6 Mediating Analysis

Having established a positive association between ESG performance and future financial performance, we propose a potential mechanism to explain how ESG engagement translates into higher profitability. Utilizing stakeholder theory and the resource-based view, this study contends that

ESG initiatives not only directly increase firm value but also enhance the internal operations of firms (Barney et al., 2001; Freeman & MCvea, 2001; Tripopsakul, 2025). Specifically, ESG adoption promotes improved governance, optimal resource use, and enhanced alignment of organizational workflows, all of which collectively boost operational efficiency (H. Liu, Fan, & Li, 2025).

Asset turnover is suggested as the mediating variable, as it directly indicates a firm's capability to utilize its assets to produce sales (Zavalii, Lehenchuk, et al., 2025). Previous research indicates that firms focused on ESG often enhance production efficiency, minimize waste, and maximize asset utilization, resulting in increased asset turnover. Consequently, increased asset turnover is regularly linked to improved profitability and greater return on assets. Crucially, ESG-related investments frequently entail significant initial expenses, indicating that their financial benefits may not materialize immediately but instead emerge indirectly through improved operational efficiency (Zhao, Ngan, Jamil, Salleh, & Yusoff, 2025). According to this reasoning, asset turnover is anticipated to act as an operational transmission channel linking ESG performance and future profitability. Table 7 presents the mediation analysis results that examine whether asset turnover is the mechanism through which ESG performance affects future firm profitability.

Table 7. Mediating asset turnover

	(1)	(2)	(3)
	ROAt+1	ATOt+1	ROAt+1
TRESGS	0.001***	0.005***	0.000
	(4.462)	(3.076)	(1.737)
asset_turnover			0.104***
			(3.144)
Size	-0.011**	-0.079***	-0.003
	(-2.613)	(-3.616)	(-0.464)
tobinq	0.009	0.013	0.008
	(1.723)	(1.043)	(1.728)
Lev	-0.063*	-0.150	-0.043
	(-1.823)	(-1.606)	(-1.295)
RND	-0.582	1.825	-0.825
	(-0.712)	(0.451)	(-1.358)
competition	0.010	0.022	0.008
	(0.673)	(0.542)	(0.595)
sales_growth	0.000**	0.001***	0.000*
	(2.892)	(3.659)	(2.055)
_cons	0.293***	2.331***	0.034
	(3.210)	(4.877)	(0.266)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
SE Double clustered at firm & year	Yes	Yes	Yes
Observations	674	674	674
Adjusted R Squared	0.692	0.908	0.730

As reported in Table 7, Model (1) shows that ESG has a positive effect on future ROA ($\beta = 0.001$, $p < 0.01$), while Model (2) indicates that ESG significantly increases asset turnover ($\beta = 0.005$, $p < 0.01$). In Model (3), asset turnover remains positive and significant ($\beta = 0.104$, $p < 0.01$), whereas the ESG coefficient is insignificant. These results suggest that the effect of ESG on future profitability is fully mediated by the asset turnover.

Consistent with prior studies ([Bahadır & Akarsu, 2024](#); [Tripopsakul, 2025](#)), the findings highlight operational efficiency as a key mechanism through which ESG creates value. Firms with stronger ESG engagement may improve asset utilization, reduce operational friction, and generate higher returns from existing resources. This mediation effect clarifies the inconsistent findings in prior ESG-firm performance studies ([\(Ziyuan Wang, Zhang, Wu, & Sha, 2024\)](#)), suggesting that ESG benefits are realized primarily through internal efficiency improvements rather than immediate profitability gains ([Bahadır & Akarsu, 2024](#)).

4.7 Heterogeneity Analysis: Big vs. Small Firms

Table 8. Big vs small firms

	Small Firm				Big Firm			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1
TRESGS	0.001				0.000**			
	(1.450)				(2.203)			
ENSCORE		0.000				0.000		
		(0.450)				(1.613)		
SOSCORE			0.001				0.000	
			(1.492)				(1.613)	
CGSCORE				0.000**				0.000
				(2.701)				(0.560)
Size	-0.018	-0.018	-0.017	-0.016	-0.001	-0.001	-0.001	0.001
	(-1.152)	(-0.993)	(-1.127)	(-1.006)	(-0.367)	(-0.201)	(-0.350)	(0.271)
tobinq	0.006	0.005	0.005	0.005	0.018***	0.019***	0.018***	0.019***
	(1.167)	(1.054)	(1.107)	(1.087)	(14.553)	(13.752)	(14.101)	(13.244)
Lev	-0.091*	-0.099*	-0.081*	-0.107**	-0.015	-0.019	-0.019	-0.018
	(-2.085)	(-2.087)	(-1.918)	(-2.331)	(-0.344)	(-0.448)	(-0.460)	(-0.409)
RND	0.160	-0.353	0.239	-0.221	3.677***	3.751***	3.796***	4.031***
	(0.215)	(-0.454)	(0.276)	(-0.293)	(6.797)	(7.172)	(7.128)	(10.676)
competition	0.050**	0.050**	0.047**	0.048**	0.022	0.021	0.023	0.022
	(2.635)	(2.938)	(2.487)	(2.505)	(1.450)	(1.381)	(1.442)	(1.442)
sales_growth	0.001**	0.001**	0.001**	0.001**	0.000***	0.000***	0.000***	0.000***
	(2.726)	(2.745)	(2.787)	(2.752)	(3.555)	(3.778)	(3.500)	(3.543)
_cons	0.392	0.423	0.381	0.385	-0.044	-0.045	-0.036	-0.083
	(1.089)	(1.005)	(1.085)	(0.980)	(-0.597)	(-0.605)	(-0.403)	(-1.062)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SE Double clustered at firm year level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	337	337	337	337	332	332	332	332
Adjusted R Squared	0.728	0.723	0.728	0.726	0.655	0.654	0.655	0.653

This subsection examines whether the ESG-performance relationships differ across firms with different organizational capacities, proxied by firm size ([Al Azizah & Haron, 2025](#); [Hamdouni, 2025](#); [Wu & Zhu, 2025](#)). Firms are categorized into big and small groups based on the sample median of total assets. Table 8 presents the regression results for the subsamples of big and small firms using the alternative ESG measures.

For small firms, the coefficient for ESG performance is positive but statistically insignificant, suggesting that ESG involvement does not lead to increased future profitability in this sector. This result indicates that smaller firms may encounter financial limitations, restricted managerial skills, or inadequate economies of scale that prevent them from turning ESG investments into real financial benefits ([Amendola et al., 2025](#)). In contrast, ESG performance shows a positive and statistically significant correlation with future ROA for large firms. This suggests that larger firms are more capable of capitalizing on the advantages of ESG initiatives.

In line with the resource-based perspective, large firms can utilize ESG more effectively as an intangible strategic resource by distributing implementation expenses across a broader asset portfolio, improving stakeholder trust, and enhancing operational efficiency ([Al Azizah & Haron, 2025](#); [D. Wu & Zhu, 2025](#)). Overall, these results are consistent with previous empirical research showing that the performance benefits of ESG are more significant in larger firms, especially in emerging market contexts ([K.-H. Chen et al., 2026](#)).

4.8 Heterogeneity Analysis: Low vs. High Leverage Firms

Following the heterogeneity based on firm size, this subsection examines whether leverage shapes the relationship between ESG performance and future financial performance. Firms with low leverage have greater financial flexibility to invest in ESG initiatives and convert them into future performance improvements ([Ding, Han, & Wang, 2024](#)). Whereas high-leverage firms may face tighter financial constraints that limit the effectiveness of their ESG investments ([Zhu et al., 2025](#)).

To test this heterogeneity, firms are divided into low- and high-leverage groups based on the sample median leverage ratios. Table 9 presents the regression results for the low- and high-leverage subsamples using the alternative ESG measures.

Table 9. High vs low leverage

	Low Leverage				High Leverage			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1
TRESGS	0.001***				0.000			
	(3.505)				(1.292)			
ENSCORE		0.000				0.000		
		(1.522)				(0.702)		
SOSCORE			0.001***				0.000	
			(3.672)				(1.364)	
CGSCORE				0.001**				-0.000
				(2.875)				(-0.053)
Size	-0.020**	-0.021**	-0.020**	-0.020*	-0.001	0.001	-0.002	0.003
	(-2.473)	(-2.243)	(-2.521)	(-2.030)	(-0.246)	(0.399)	(-0.430)	(1.033)
tobinq	0.006	0.006	0.006	0.006	0.018**	0.018**	0.017**	0.018**
	(1.447)	(1.335)	(1.371)	(1.351)	(2.891)	(2.840)	(2.854)	(2.833)
Lev	-0.171***	-0.194***	-0.158**	-0.192***	0.023	0.014	0.020	0.012
	(-3.170)	(-3.424)	(-2.825)	(-3.500)	(0.595)	(0.336)	(0.494)	(0.297)
RND	1.887	1.533	2.027	1.735	-15.490***	-14.623**	-16.722***	-15.153**
	(1.487)	(1.144)	(1.525)	(1.332)	(-3.038)	(-2.583)	(-3.510)	(-2.460)
competition	0.037*	0.038**	0.031*	0.035**	0.003	0.003	0.006	0.004
	(2.046)	(2.147)	(1.833)	(2.209)	(0.152)	(0.138)	(0.331)	(0.199)
sales_growth	0.001**	0.001**	0.001**	0.001**	0.000	0.000	0.000	0.000
	(2.695)	(2.466)	(2.641)	(2.632)	(1.591)	(1.385)	(1.419)	(1.636)
_cons	0.498**	0.539**	0.513**	0.502*	-0.014	-0.049	0.005	-0.079
	(2.390)	(2.378)	(2.570)	(2.031)	(-0.115)	(-0.407)	(0.042)	(-0.871)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SE Double clustered at firm & year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	338	338	338	338	331	331	331	331
Adjusted R Squared	0.616	0.601	0.618	0.612	0.799	0.797	0.800	0.797

Table 9 indicates that ESG performance has a positive and statistically significant impact on future ROA for firms with low leverage. This suggests that firms with lower debt loads are more likely to gain financially from ESG involvement. Having greater financial slack and less stress from creditors, these firms can allocate resources more effectively to ESG initiatives, enhance operational processes, and strengthen relationships with important stakeholders ([Dinçergök & Pirgaip, 2025](#)). In contrast, the findings for high-leverage firms show that ESG performance is statistically insignificant in explaining

future ROA. This suggests that elevated debt levels may diminish the connection between ESG and financial performance. Firms with high leverage frequently face repayment demands and increased financial risks, which may compel managers to prioritize short-term survival over long-term sustainability plans.

Overall, these findings align with those of prior studies emphasizing the moderating role of financial constraints in the ESG-performance relationship. In line with the resource-based and financial flexibility viewpoints, ESG initiatives generate greater performance advantages when firms have sufficient financial resources to back their execution (Pan et al., 2025). In emerging markets, where constraints on external financing are frequently more pronounced, the success of ESG engagement appears to be conditional on firms' leverage positions (Fettahoglu et al., 2025; Zhang and Liu, 2022; Zhu et al., 2025).

4.9 Endogeneity Testing (2SLS)

Although the baseline model controls for firm characteristics and fixed effects, endogeneity concerns may arise from reverse causality and omitted variable bias. To address these issues and strengthen the causal interpretation, we utilized a two-stage least squares (2SLS) instrumental variable method. Following prior ESG studies, we use two instruments: the firm's twice-lagged ESG score (*L2ESG*) and the peer-adjusted ESG score (*peer_TRESGS*), which is defined as the average ESG performance of other firms within the same industry-year (Tang, 2022; Wan, Fu, & Zhong, 2023). These instruments satisfy the relevance condition through their strong association with current ESG performance and are unlikely to affect firm profitability, except through the firm's ESG engagement.

The 2SLS estimation was conducted using the following model:

First stage: Formula 4

$$ESGi,t+1 = \alpha + \gamma 1 IVi,t + \gamma 2 Controlsi,t + \sigma j + \delta t + \varepsilon i,t \quad (4)$$

Second stage: Formula 5

$$ROAi,t+1 = \alpha + \beta 1 i,t+1 + \beta 2 Controlsi,t + \sigma j + \delta t + \varepsilon i,t \quad (5)$$

Where $IV_{i,t}$ denotes the twice-lagged ESG score or peer-adjusted ESG score, *Controls* denotes all the control variables, σ_j represents industry fixed effects, and δt denotes year fixed effects.

Table 10 presents the 2SLS estimation results using two instrumental variables: the twice-lagged ESG score (*L2ESG*) and the peer-adjusted ESG score (*peer_TRESGS*). The initial findings in Columns (1) and (5) indicate that both instruments demonstrate strong and statistically significant relationships with ESG performance, validating their relevance. The outcomes from the second stage in Column 2-4 and 6-8 show that the ESG variable, when instrumented, continues to be positive and statistically significant in all specifications. These results indicate that ESG performance positively influences firm profitability after addressing endogeneity. The findings remain consistent across different instruments, control sets, and fixed effects, with standard errors clustered at both the firm and year levels.

Table 10. 2SLS (Endogeneity)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$ESGi,t+1$	$ROAt+1$	$ROAt+1$	$ROAt+1$	$ESGi,t+1$	$ROAt+1$	$ROAt+1$	$ROAt+1$
L2ESG	0.535***							
	(7.807)							
TRESGS_hat		0.003***	0.002***	0.001***				
		(8.383)	(4.228)	(4.011)				

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
peer_TRESGS					-1988.515** *			
					(-32.060)			
TRESGS_hat 2						0.001***	0.001**	0.001***
						(2.965)	(2.133)	(4.467)
Size	1.857			-0.011	0.879***			-0.012**
	(1.370)			(-1.631)	(3.120)			(-2.796)
tobinq	1.101			0.017***	0.456*			0.009
	(1.602)			(5.648)	(2.065)			(1.620)
Lev	-13.600			-0.041	-1.925			-0.061*
	(-1.431)			(-1.022)	(-0.653)			(-1.766)
RND	-20.272			1.262	132.240			-0.723
	(-0.076)			(1.599)	(1.289)			(-0.877)
competition	-1.958			0.022	-0.432			0.010
	(-0.750)			(1.430)	(-0.365)			(0.703)
sales_growth	0.019			0.000*	0.001			0.000**
	(0.860)			(2.002)	(0.069)			(2.893)
_cons	-7.476	-0.064***	-0.037	0.191	28810.605** *	0.042***	0.036*	0.304***
	(-0.226)	(-3.909)	(-1.445)	(1.443)	(31.966)	(3.795)	(1.904)	(3.301)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SE Double clustered at firm & year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	437	495	487	487	607	674	674	674
Adjusted R squared	0.768	0.123	0.627	0.741	0.894	0.011	0.609	0.692

To minimize possible selection bias, we used Propensity Score Matching (PSM). Following [Li and Gan \(2026\)](#), firms are divided into -high and low-ESG groups based on the median ESG score and matched using firm characteristics, including size, Tobin Q, leverage, R&D intensity, industry competition, and sales growth. Table 11 presents the balance diagnostics before and after PSM. As shown in the table, the covariate imbalance between treated and control firms is substantially reduced after matching, indicating improved comparability between groups.

Table 11. Panel A. before and after matching

Variables	Before Matching				After Matching					
	Mean		t-test		V(t)/V(C)	Mean		t-test		V(t)/V(C)
	Treated	Control	t p>t	p>[t]		Treated	Control	t	t p>[t]	
Size	23.328	24.023		-6.37	0	2.35*	23.521	23.557	-0.52	0.606
tobinq	1.8549	2.2525		-2.89	0.004	0.50*	1.8662	1.994	-1.50	0.134
Lev	0.60551	0.49368		7.99	0.000	1.21*	0.59454	0.6249	-3.17	0.002
RND	0.00056	0.00089		-1.26	0.206	0.51*	0.00053	0.00065	-0.65	0.513
competition	2.7814	2.4092		3.02	0.003	1.51*	2.7363	2.6414	1.14	0.256
sales_growth	18.693	11.419		3.65	0.000	1.57*	17.007	12.145	4.11	0.000

Using the matched samples, we re-estimated the baseline model with several matching methods, including nearest neighbor, caliper, kernel, Epanechnikov kernel, Mahalanobis, and radius matching. Table 12 presents the regression results for these matching methods. ESG performance remains positive and statistically significant across all specifications, suggesting that the ESG-ROA relationship is unlikely to be driven by observable firm characteristics or sample selection bias.

Table 12. Propensity score matching

	Neighbor 1:1	Caliper 0.05	Kernel	Epan kernel	Mahalanobis	Radius	EB
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1	ROAt+1
TRESGS	0.001***	0.001**	0.001***	0.001***	0.000**	0.001***	0.001***

	Neighbor 1:1	Caliper 0.05	Kernel	Epan kernel	Mahalanobis	Radius	EB
	(3.367)	(2.688)	(3.201)	(3.201)	(2.325)	(3.201)	(4.713)
Size	-0.008**	-0.008***	-0.009***	-0.009***	-0.005	-0.009***	-0.012***
	(-2.259)	(-3.594)	(-3.066)	(-3.066)	(-1.548)	(-3.066)	(-4.614)
tobinq	0.020***	0.020***	0.020***	0.020***	0.022***	0.020***	0.021***
	(4.190)	(4.078)	(4.862)	(4.862)	(7.190)	(4.862)	(14.465)
Lev	-0.006	-0.006	-0.016	-0.016	-0.044	-0.016	0.025*
	(-0.177)	(-0.174)	(-0.490)	(-0.490)	(-1.313)	(-0.490)	(1.686)
RND	-0.992	-0.992*	-1.219*	-1.219*	-0.690	-1.219*	-1.198
	(-1.181)	(-1.778)	(-1.848)	(-1.848)	(-1.067)	(-1.848)	(-1.517)
competition	0.006	0.006	0.005	0.005	0.008	0.005	0.009
	(0.690)	(0.352)	(0.402)	(0.402)	(0.720)	(0.402)	(1.145)
sales_growth	0.000**	0.000**	0.000**	0.000**	0.000**	0.000**	0.000***
	(2.346)	(2.138)	(2.766)	(2.766)	(2.759)	(2.766)	(3.138)
_cons	0.172**	0.172***	0.194***	0.194***	0.113	0.194***	0.281***
	(2.093)	(3.456)	(3.750)	(3.750)	(1.715)	(3.750)	(4.642)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SE Double clustered at firm & year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	609	609	674	674	598	674	674
Adjusted R Squared	0.695	0.695	0.709	0.709	0.745	0.709	0.697

As an additional robustness test, we employ entropy balancing, which directly re-weights observations to achieve covariate balance while retaining the full sample ([Källberg, & Waernbaum, 2023](#); [Reinfeld, & Hagen, 2025](#)). Table 13 reports the covariate balance before and after the weighting. Using an entropy-balanced sample, ESG performance remains positively and significantly associated with firm profitability, further supporting the robustness of the findings.

Table 13. Appendix C. before and after weighting

	Before Weighting				After Weighting			
	Treat		Control		Treat		Control	
	mean	variance	mean	variance	mean	variance	mean	variance
Size	23.52	3.82	24.04	1.664	23.52	3.82	23.52	2.965
tobinq	1.866	4.478	2.252	8.678	1.866	4.478	1.867	2.913
Lev	0.5945	0.05657	0.4933	0.05008	0.5945	0.05657	0.5945	0.07211
RND	0.0005333	0.0000152	0.000936	0.0000352	0.0005333	0.0000152	0.000534	1.98E-05
competition	2.736	4.801	2.347	3.157	2.736	4.801	2.736	4.394
sales_growth	17.01	1033	10.75	686.4	17.01	1033	17.01	1248

5. Conclusions

5.1 Conclusion

This study shows that ESG performance significantly boosts firm performance in publicly listed Indonesian firms, mainly by increasing their operational efficiency. Using a quantitative approach with secondary data collected from companies listed on the Indonesian Stock Exchange from 2009 to 2023 and a two-way fixed effects approach, the findings reveal that an increase in ESG scores results in higher future ROA, with asset turnover as a mediating variable. Consistent with Stakeholder Theory and the Resource-Based View, the findings suggest that ESG serves as a strategic resource that strengthens stakeholder relationships and enhances operational efficiency, thereby improving firm performance. The findings remain consistent across alternative ESG measures, peer-adjusted scores, and multiple endogeneity controls, including the instrumental variables and matching techniques. Heterogeneity analysis further reveals that the effect of ESG performance is stronger for larger firms and those with lower leverage, emphasizing the importance of organizational capability and financial adaptability.

5.2 Research Limitations

While this study provides evidence that ESG performance improves firm profitability through asset turnover in Indonesia, it has several limitations. First, ESG performance was measured using Refinitiv ESG scores, which may not fully capture qualitative or firm-specific sustainability practices. Second, the analysis focuses on publicly listed firms, limiting the generalizability of the findings to private firms and other emerging markets. Third, firm performance is primarily measured using ROA, which may not fully capture the market-based or risk-related effects of ESG engagement.

5.3 Suggestions and Directions for Future Research

Future research should employ alternative ESG measures and additional firm performance indicators, including market-based and risk-related measures, to provide a broader understanding of the ESG-performance relationship. Future studies should extend the sample to other countries and periods to improve generalizability. In addition, future research could examine other mediating or moderating variables, such as innovation capability, corporate governance quality, and financial constraints, to further explain how ESG performance influences firm value.

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Author Contributions

Y conceptualized the research, designed the study, supervised the research process, and provided critical revisions of the manuscript. G conducted the formal analysis, interpreted the results, and prepared the initial manuscript draft. INA contributed to the study design, provided methodological guidance, assisted in interpreting the findings, and critically reviewed the manuscript. TC provided the data used in this study and contributed to the data validation and research support. All authors have read and approved the final manuscript, ensuring transparency and accountability throughout the study.

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