

# **ESG in Action: Measuring the Impact of Sustainable Practices on Firm Value for Indian Firms**

Alina Mohanty\*, Arun Kumar Misra, Abhijeet Chandra

Vinod Gupta School of Management, IIT Kharagpur, West Bengal - 721302, India

E-mail: alinamohanty@kgpian.iitkgp.ac.in

## **Abstract**

This study examines the impact of ESG disclosure on firm valuation for non-financial companies listed on NSE India. Using panel regression, we find that ESG factors significantly enhance valuation, particularly in extractive industries facing strict regulations. Environmental initiatives reduce penalties and improve competitiveness, while strong governance fosters transparency and investor trust. Social performance, though less pronounced, supports financial stability. The results of the quantile regression reveal a stronger ESG-valuation relationship in higher quantiles, with environmental scores more influential at lower quantiles and governance significance increasing across quantiles, while the social score remains consistent. The sectoral analysis underscores the importance of ESG disclosure for extractive firms in maximizing valuation. These findings align with stakeholder and resource-based views, suggesting that greater ESG transparency enhances stakeholder confidence and operational efficiency. The study provides insights for investors and policymakers in emerging economies, emphasizing ESG's role in sustainable business practices and long-term economic growth.

## **Keywords:**

ESG disclosure, environmental disclosure, social disclosure, governance disclosure, firm value, quantile regression

**Track:** Financial Management

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## 1. Introduction

While a constant global concern regarding the adverse impact of climate change on health, safety, and economic stability persists, the firms are often seen promoting immediate profits at the expense of long-term sustainability. A potential response to address this challenge lies within the notion of "shared value" (Kramer & Pfitzer, 2016). It proposes that firms should work towards improving both their competitive position and the well-being of the communities in which they operate. Essentially, it promotes a crossover between a company's performance and social advancement to generate higher economic value. Thus, in reaction to the economic downturn, ecological degradation, and the increasing demand from investors for non-financial information disclosure, Environmental, Social, and Governance (ESG) reporting has paved its way to join the mainstream, gaining significant attention from researchers, academicians, and policymakers. ESG disclosures provide investors with essential information for assessing investment choices, beyond conventional financial metrics. Environmental disclosures encompass reports on the efficiency of resource usage, air pollution, greenhouse gas emissions, waste management, initiatives on environmental restoration, innovations, and partnerships, all of which impact an organization's long-term sustainability and are regarded as critical performance indicators. Social disclosures focus on managing social systems, including employees' health and safety, women's empowerment, working conditions, fair competition and wages, social security, and community welfare. Additionally, corporate governance disclosures highlight the management structures, including board-level committees, shareholders' rights and responsibilities, CEO duality, women's representation on the board, executive compensation, and CSR strategies. The benefit of such non-financial disclosure by a firm serves a dual purpose: First, it provides stakeholders with insights into a company's efforts toward building a climate-positive society. It creates a positive market image among investors, suppliers, customers, and the community, thereby providing a competitive advantage over industry peers (Brammer et al., 2006; Callan & Thomas, 2009; Orlitzky et al., 2003) making it a significant strategy for enhanced value creation.

A growing number of companies throughout the world are considering ESG issues when making investment choices, as stated in the "United Nations Principles of Responsible Investment" (UNPRI, 2024). From a mere 734 in 2010 to 3,826 in March 2020, this upward trend shows no signs of dropping (Yuan et al., 2022). Similarly, Bloomberg Intelligence (2024) recently published research highlighting how ESG assets have grown due to investor dedication to responsible investing. Despite the macroeconomic concerns, these assets topped \$30 trillion in 2022 and are projected to approach \$40 trillion by 2030. Following such increasing popularity, the question of whether Socially Responsible Investments (SRI) raise investment costs or boost profitability has spurred heated disputes. Besides investors, customers are also now willing to spend more on environmentally friendly products. Hence, many companies have started to adopt ESG practices and reporting to communicate their commitment to responsible and sustainable business operations (Lee et al., 2022). Nonetheless, the relationship between ESG disclosures and financial performance remains uncertain, especially in developing nations, owing to cultural disparities, diverse social and governance frameworks, and varying institutional settings (Whelan et al., 2020; Ortas et al., 2019). Several studies have been conducted to identify the relationship between ESG score and firm valuation as well as profitability. However, the results were inconclusive. On one hand, Khan et al., (2020); Nguyen et al., (2022) and Li et al., (2018) indicated adopting sustainable practices often results in higher accounting performance and market valuation linking it to competitive advantage confirming that a high level of accountability and transparency leads to greater stakeholder trust and confidence. On the other hand, Cherkasova

et al., (2023); Conell & Damodaran (2020) confirmed that investing in ESG-related infrastructure depletes capital and acts as a competitive disadvantage, which ultimately affects firm value adversely, leading to lower expected returns for the investors.

Operating environments also have an effect on the value-enhancing effects of ESG investments; in high-risk environments, these investments may be counterproductive (Lu & Cheng, 2023). By examining a sample of companies listed on NSE India, this study seeks to address how ESG disclosures affect business value in the Indian setting. The results show a strong positive relationship between ESG activities and valuation, which is supported by stakeholder theory and the resource-based approach. Specifically, extractive firms exhibit a greater necessity for ESG disclosures than manufacturing firms in order to attain higher valuations when the operating environment is studied. The research underscores the need for investors to deepen their understanding of ESG principles, relevant reporting requirements, and their increasing importance in the current corporate setting, to devise effective investment strategies. Furthermore, it urges policymakers to implement more stringent mandates for companies to evaluate and alleviate adverse environmental and social effects, promoting responsible business conduct to align with the Triple P paradigm.

The remaining sections are distributed as: Section 2 reviews relevant literature and presents the hypothesis, Section 3 outlines the variables and methodology, Section 4 focuses on the empirical analysis of the data, and Section 5 concludes with key findings and policy implications.

## **2. Literature Review and Hypothesis Development**

### **2.1 Theoretical background**

The relationship between ESG and firm value is primarily influenced by stakeholder theory, resource-based view, agency theory, and trade-off theory. The resource-based perspective considers ESG to be a strategic investment that enables a company to attain competitive heterogeneity (Taylor & Oinas, 2006). Thus, an improvement in ESG performance might contribute to an increased valuation of the firm (Abdi et al., 2022). Moreover, numerous studies have demonstrated that a company can enhance its value by efficiently managing the interactions among its varied stakeholders (Freeman, 1984). Hence, channeling a connection between investment in ESG practices and firm valuation, the stakeholder theory emphasizes the importance of maximizing the wealth of stakeholders (Azmi et al., 2021; Minutolo et al., 2019). Conversely, the trade-off theory and the agency theory account for a negative firm value and ESG relationship. Investing in ESG initiatives like curbing carbon emissions and promoting community welfare necessitates additional allocation of funds, which increases operating costs and negatively impacts a firm's profitability, ultimately affecting its competitive stance in the market (Galant & Cadez, 2017). In a similar vein, the agency theory posits that managers tend to over-allocate resources to ESG initiatives that align with their interests (Jensen & Meckling, 1976; Barnea & Rubin, 2010), resulting in resource wastage and diminishing firm value. Many firms began publishing independent environmental reports due to the growing importance of environmental issues. Factors like firm size, profitability, capital market performance, etc. are focused more in the empirical studies (Eugénio et al., 2010). Numerous proposals are being put forth in this context to integrate ESG considerations into corporate decision-making. Companies are increasingly being encouraged to embed ESG principles into their strategic frameworks, operational models, and decision-making processes to enhance long-term value creation while addressing environmental and social challenges. The integration of reporting is a significant measure towards achieving the objective of harmonizing the value-generating activities of the corporate sector with those of the Sustainable Development Goals (SDGs).

## 2.2 ESG as a value-enhancing practice

Sustainable enterprises are increasingly viewed as key players in addressing significant ESG challenges. However, with the rise of SRI, a debate has emerged about whether ESG strategies enhance profitability or elevate costs. Assidi, (2023) noted that voluntary disclosures and robust corporate governance practices improve transparency and corporate value, while Zhou et al., (2022) found that enhanced ESG performance boosts operational efficiency and market valuation but has limited effects on profitability and growth potential. In contrast, Gull et al., (2022) highlighted the financial strain of waste management, where rising operational costs could be mitigated by ESG-driven policies and Industry 4.0 technologies, enabling businesses to decouple economic growth from resource constraints (Alkaraan et al., 2023). The outcomes are further shaped by regional dynamics; in the United States, companies with strong sustainability strategies achieve higher market valuations, reflecting a positive link between sustainability and investor confidence. Yu & Zhao (2015) emphasized that this correlation is more pronounced in regions with strong investor protection and financial transparency, enhancing the valuation premium for sustainability. Moreover, as highlighted by Ademi & Klungseth (2022), transparency in ESG performance enhances stakeholder trust and resilience, allowing organizations to effectively navigate crises and sustain competitive advantages. However, Buallay (2022), contended that there is no significant relationship between ESG performance and important financial indicators such as ROE, ROA, or Tobin's Q. Although ESG initiatives offer the potential for improved market valuation and operational efficiency, the results are found inconclusive, based on which we formed our research hypothesis as:

***H1:** ESG and its pillar scores - Environmental, Social, and Governance scores positively influence firm value.*

## 2.3 Sectoral impact of ESG practices

The energy market, shaped by geopolitical disruptions such as the SARS-CoV-2 pandemic and the Ukraine war (Brodny & Tutak, 2022) is witnessing a significant shift toward low-carbon energy sources, driving a surge in global demand for metals (Azadi et al., 2022). When financial performance is studied, sensitive industries, such as those with high environmental and social impact, appear to benefit more from the moderating effect of ESG practices. The adoption of robust ESG frameworks in these industries helps mitigate risks, enhance stakeholder trust, and improve overall financial resilience. However, challenges remain in the extractive sector, where diverse practices in accounting for exploration and evaluation costs, coupled with the lack of standardized sector-specific guidelines, hinder the comparability of financial statements (Smith & Venter, 2020). Healthcare companies in developed economies engaging in ESG initiatives report positive outcomes, whereas the same association is unfavourable in developing economies, likely due to varying stages of market maturity (Kalia & Aggarwal, 2022). Similarly, in the agriculture sector, managers are urged to focus on disclosure strategies and increase the breadth of non-financial information shared. For cost-leadership firms, social performance enhances financial performance, while environmental performance tends to have an adverse effect (Liu et al., 2022). Building on these varied insights across industries, we propose our second hypothesis as follows:

***H2:** ESG score is positively associated with the valuation of firms operating in environmentally sensitive industries.*

## 3. Data and Empirical Design

### 3.1 Model specification

Based on our hypotheses, we have formulated the following models:

$$TQ_{i,t} = \alpha_0 + \alpha_1 ESG_{i,t} + \alpha_2 ROA_{i,t} + \alpha_3 Lev_{i,t} + \alpha_4 CapEx_{i,t} + \alpha_5 Cash\_ratio_{i,t} + \alpha_6 Div\_Yield_{i,t} + \alpha_7 Firm\_size_{i,t} + \varepsilon_{i,t} \quad (1)$$

Firms operating in sectors with heightened environmental risks and significant stakeholder expectations are vulnerable to environmental challenges, making their ESG performance a critical determinant of firm value (Behl et al., 2022). To analyze the relationship between industry type, ESG scores, and firm valuation, the sample was divided into two categories: manufacturing firms, coded as '0,' and extractive firms, coded as '1,' using a dummy variable.

$$Tobin's\ Q_{i,t} = \alpha_0 + \alpha_1 Industry\ Type_{i,t} \times ESG_{i,t} + \alpha_2 ESG_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 Lev_{i,t} + \alpha_5 CapEx_{i,t} + \alpha_6 Cash\_ratio_{i,t} + \alpha_7 Div\_Yield_{i,t} + \alpha_8 Firm\_size_{i,t} + \varepsilon_{i,t} \quad (2)$$

### 3.2 Variable definition

Drawing from prior literature, we have used Tobin's Q as a proxy for measuring firm value (Aouadi & Marsat, 2018). The main focus of our study is on ESG activities, captured through the combined ESG Score and its pillar scores: Environmental Pillar Score, Social Pillar Score, and Governance Pillar Score associated with the firms in a given year. Such disclosure requirements vary with the industry segmentation and a country's developmental status. For instance, developed economies such as the USA and Europe have mandated the reporting of ESG activities since 2017, whereas fast-growing economies like India have made the mandate recently in 2019 for the top 1000 listed companies by market-cap. Above all, such information provides the investors with a transparent and more detailed overview of a firm's operation for making more informed decisions. Thus, a positive association is expected. We anticipate positive coefficients for the control variables, including profitability and ROA. Table 1 provides a detailed list of all variables utilized in the study. However, due to inconsistent findings in previous research, the expected direction of firm size remains uncertain (Damodaran, 1996; Saini et al., 2022).

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Insert Table 1 about here

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### 3.3 Data and sample

The sample comprises non-financial industry sectors, comprising companies from the extractive and manufacturing sectors, listed in NSE India. The firm-level data and ESG indicators for the analysis were sourced from the CMIE Prowess IQ and Refinitiv Eikon database. The Environmental Pillar score indicates the disclosure made by a company about its environmental actions: GHG emissions (12%), environmental innovation (11%), and resource usage (11%), being its three primary segments assessed with 68 processed data points. The social score is segregated into four categories that measure 62 processed data points on the workforce (16%), Community (8%), product responsibility (7%), and human rights (4.5%). Lastly, the governance score is also divided into three main subcategories, Management (19%), Shareholders (7%), and CSR strategies (4.5%) across 56 processed data points. The overall ESG score ranges from 0-100, where 0 represents the least amount of disclosure and 100 represents maximum disclosure on all the items of sustainability. The study focuses on the period from 2018 to 2023, reflecting the heightened engagement with and disclosure of ESG ratings during this time.

## 4. Empirical Results

### 4.1 Descriptive statistics

Table 2 provides a detailed overview of the descriptive statistics for the variables analyzed in this study. The dependent variable, Tobin's Q, has an average value of 3.591 across the sample. The ESG score, along with its three pillar scores, environmental, social, and governance, ranges from 0 to 100, highlighting considerable variability. On average, the total ESG score stands at 48.925. Among the pillars, the social dimension exhibits the highest mean score of 54.451. Control variables also display distinct characteristics, with firm size averaging 11.863. The cash ratio has a mean value of 0.025, while leverage averages 0.413. Profitability, as measured by ROA, has a mean of 8.30%, whereas the average dividend yield is 0.018, and the capital expenditure is approximately 2% of the total assets held.

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Insert Table 2 about here

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### 4.2 Regression analysis

To ensure the appropriate model specification, we estimated our models employing both Fixed Effect (FE) and Random Effect (RE) methods, with selection contingent on the assumption of uncorrelated unobserved heterogeneity. The Hausman test (p-value < 0.05) confirms the suitability of the FE model, which is subsequently employed for further analysis. Additionally, to address heteroskedasticity, Breusch-Pagan and White tests are conducted. The results indicated the presence of heteroskedasticity with a p-value below 0.05. Thus, to mitigate this issue and enhance the robustness of our estimates, we implemented robust standard errors. A significant positive impact of ESG on firm valuation, as measured by Tobin's Q, can be derived from the results reported in Table 3. The overall ESG score shows a strong positive effect, reinforcing the idea that firms prioritizing sustainability, ethical governance, and social responsibility create long-term value by fostering trust among investors, employees, and regulators. A further decomposition into pillar scores suggests that environmental performance significantly contributes to the firm value by mitigating regulatory penalties and improving the firm's market position. Similarly, strong corporate governance practices ensure transparency, improve investor confidence, and mitigate agency conflicts, consequently improving the firm valuation substantially. Along the same line, social performance, though weaker in significance, suggests that responsible labour practices and community engagement contribute to financial stability. Our findings align with (Bhaskaran et al., 2019; Chelawat & Trivedi, 2016; Petitjean, 2019) and support the stakeholder value maximization perspective, which argues that firms balancing the interests of the diverse stakeholders rather than solely focusing on shareholder returns enhance their overall market valuation. Additionally, positive effects from profitability, growth, and liquidity further strengthen this argument. Overall, the results underscore that ESG-conscious firms enjoy a valuation premium, reflecting investor confidence in sustainable and well-governed businesses.

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Insert Table 3 about here

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Further, we attempted to understand the moderating effect of the operating industry on the relationship between ESG factors and firm valuation. Table 3 (Model 2) reports the regression outcome, indicating a positive and significant interaction between industry and ESG at a 5 % level of significance, indicating a stronger influence for firms in the extractive industry compared to manufacturing firms. This aligns with stakeholder theory, which suggests that firms operating in industries with higher environmental and social risks face greater pressure from stakeholders and, therefore, benefit more from ESG adoption. Overall, the findings support our second hypothesis and suggest that ESG factors have a stronger valuation effect in industries with higher stakeholder scrutiny. This highlights the need for firms to align their ESG strategies with industry-specific stakeholder expectations to maximize value.

## 4.2 Additional analysis

To further investigate the differential impacts of ESG factors across various performance levels, we adopted quantile regression analysis. The approach allows us to address the variability in our dataset, particularly due to differences in industry classification and firm size. Unlike traditional regression techniques, quantile regression makes no assumptions about the distribution of the error term, making it robust to non-normal errors and outliers. This method also enhances internal validity by controlling for time-invariant factors and unobserved heterogeneity while mitigating potential endogeneity through fixed effects. Additionally, it accommodates heteroskedasticity, ensuring consistent and unbiased estimates across different quantiles of the dependent variable (Long et al., 2023). Consistent with the perspective of the stakeholder theory and resource-based view, the results of the quantile regression presented in Table 4 reported a robust, significant, and consistent relationship between a firm's ESG score and Tobin's Q across all the quantile distributions. A one-unit rise in ESG score resulted in a 0.011 unit increase in Tobin's Q at the 25<sup>th</sup> quantile, while for the 75<sup>th</sup> quantile, the increase was found to be 0.020 units. The findings suggest that companies engaged in sustainable practices with higher ESG scores typically demonstrate a greater firm valuation. More importantly, the impact of ESG intensifies as we ascend toward the upper quantiles. Further, with the statistical significance at a 1% level and the increasing magnitude across quantiles, the coefficient highlights the critical role of ESG in driving a higher firm valuation. In line with Rao et al., (2023) and Șerban et al., (2022), our study implies that a high ESG score ranges in benefits from improved risk management, strengthened investor relations, and competitive advantage to a reduction in reputational damages and regulatory penalties. Hence, the results underscore the strategic significance of ESG investments in augmenting business value and serving as a possible differentiator for high-performing organizations seeking to maintain or enhance their competitive advantage.

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Insert Table 4 about here

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Further, when the individual pillar scores are studied across quantiles, the results for the environmental pillar score reported in Table 5 (1) indicate a positive and statistically significant association with Tobin's Q for the 25<sup>th</sup> quantile. The coefficient rises to 0.011 as we approach the top quantile. The results substantiate (Lin et al., 2021), suggesting the growing importance of environmental measures. Considering the rising climate degradation and investor scrutiny, environmental sustainability has become a value-relevant dimension for firms to attain a higher firm valuation. In addition, the rise in the outcome for the social dimension reported in Table 5 (2) can be attributed to the crucial role of social practices in

acquiring the trust and confidence of the stakeholders, customer loyalty, and employee satisfaction, to name a few (Rao et al., 2023). Firms in the lower quantile may struggle to fully capitalize on the social benefits due to their limited financial resources, making their efforts less impactful on valuation. While the highly valued firms are expected to uphold strong social commitment, hence a rise in the impact. The governance score, on the other hand, reported a marginal increase in Tobin's Q across the quantiles. A unit increase in the governance score is associated with a statistically significant 0.003 unit increase in Tobin's Q, which further rises to 0.006 at the 75th quantile; however, the impact becomes insignificant as shown in Table 5 (3). The results suggest that stronger governance practices by a firm enhance investor confidence, improve the firm's accountability, and reduce agency costs, eventually contributing to higher operational efficiency for the lower quantile. Conversely, the insignificant impact of governance dimension for the high-value firms can be attributed to the expectations to uphold strong governance standards. These firms often face greater regulatory scrutiny, more robust internal controls, and closer monitoring by institutional investors, analysts, and management. In essence, the differential impact of governance score across the quantiles underscores the idea that good governance practices at the higher quantile, once institutionalized, allow firms to do better risk management through improved transparency, greater accountability, and effectiveness in their operation. Such firms are better positioned to adapt to regulatory changes and maintain long-term relationships with their stakeholders. In addition, such improvements will attract more investments, strengthen managerial capabilities, and facilitate an efficient allocation of capital to capitalize on growth opportunities in a highly competitive market, all of which contribute to achieving a higher firm valuation (Bhattacharjee & De, 2022; Kim & Li, 2021).

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Insert Table 5 about here

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Further, we attempted to study the influence of the operating environment in driving the valuation of a firm. We explicitly choose the manufacturing and the extractive industries due to their higher contribution to environmental degradation. The results for the regression across quantiles reported in Table 6 indicated an insignificant yet positive relationship for the industry-ESG interaction term at the lower quantile. The insignificant coefficient of 0.001 for the interaction term suggests that ESG alone may not boost valuation for extractive firms with lower Tobin's Q. Considering the resource-intensive and pollution-heavy nature of these firms, smaller firms might face higher costs in implementing ESG practices, which act as an additional financial outflow. However, the effect strengthens for the firms at higher valuation levels, with a coefficient of 0.004 for the firms in the 75th quantile, indicating the importance of ESG disclosure in the extractive industry, although the significance is weaker. Given the significant environmental and regulatory risks faced by these industries, increased transparency in ESG practices can strengthen community trust, enhance investor confidence, and provide the firm with greater reputation and operational benefits. Overall, the results align with Șerban et al., (2022) and Veeravel et al., (2024) and contribute to the notion that a higher ESG performance is a critical driver of firm value, although the magnitude is industry-dependent. Investors are also found to place a premium on firms with strong ESG practices, as such firms work on long-term sustainability and are equipped with risk management capabilities, which translates to higher valuation.

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Insert Table 6 about here

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## 5. Conclusion and Implications

India is one of the fastest-growing economies in the world despite the persistent challenges of environmental degradation and socio-economic disparities. Although several studies have extensively discussed the ESG-Firm value relationship, a conclusive result is yet to be deduced from them. Therefore, to contribute to the present literature, this study investigates the nexus between ESG and firm valuation of the non-financial firms listed on NSE India, sourced from the Refinitiv Eikon database spanning 2018 to 2023. Our analysis reveals that ESG factors significantly enhance firm valuation, particularly for the extractive industries, which are subject to heightened regulatory scrutiny. This underscores the importance of aligning ESG strategies with industry-specific expectations to maximize value. Notably, environmental performance mitigates penalties for non-compliance and bolsters market competitiveness, while robust governance practices enhance transparency and investor confidence. Although social performance shows a weaker significance, it still contributes to financial stability through responsible community engagement. These findings support the stakeholder theory, advocating for a balanced approach to cater to the diverse stakeholder interests (Du & Sun, 2023; Petitjean, 2019). A further analysis of the differential impacts of ESG across various performance quantiles revealed a positive and significant relationship between ESG and Tobin's Q. The results indicate that engaging in ESG practices leads to enhanced market performance that aligns with the stakeholder and the resource-based view perspective. The effect was observed to be more pronounced for firms in the higher quantile, highlighting the critical role of sustainability disclosure in enhancing firm valuation.

Further, when the ESG score is decomposed into its pillar scores, the environmental pillar score reported a highly significant impact for the firms at the lower and median quantile suggesting the importance of environmental reporting for the firms to attain higher valuation; While a diminishing and insignificant impact at the higher quantile suggests that the larger firms are more inclined towards environmental innovation to sustain a differential market position rather than mere compliance with environmental regulations (Long et al., 2023). Conversely, the rising impact of a high social and governance score for the firms across quantiles reflects the significance of social practices in fostering stakeholder trust and confidence and the importance of stringent governance practices in improving a firm's accountability and operational efficiency. Further, the study also investigated the influence of the operating environment, and the results substantiated (Bansal et al., 2021; Şerban et al., 2022; Yuan et al., 2022) that environmentally sensitive industries are under continuous scrutiny, hence, reporting highly on ESG issues will help strengthen community trust, alleviate regulatory penalties for non-compliance, and thereby secure long-term operational benefits.

The results of our study hold considerable importance for investors, firm management, and policymakers, offering valuable insights into the intersection of ESG practices and financial performance. First, for investors, it is crucial to carefully assess the trade-off between a company's ESG initiatives and its profitability. While sustainable practices may require significant resource allocation, they can also enhance long-term resilience, risk management, and stakeholder confidence. Investors should recognize and

support firms that consistently strive to improve their ESG performance, as such companies are more likely to demonstrate stability, lower regulatory risks, and sustained financial growth. Second, for firm management, the complexities of ESG compliance require a strategic approach to aligning business operations with sustainability objectives. Firms must proactively integrate ESG considerations into their corporate strategies to navigate market uncertainties, attract responsible investments, and foster long-term value creation. Given the evolving regulatory landscape and growing stakeholder expectations, businesses, particularly those in the manufacturing sector, are advised to embed ESG principles into their operations. Doing so enhances firm valuation and market competitiveness. Third, from a policymaker's perspective, there is a need for regulatory frameworks that encourage firms to prioritize ESG practices alongside financial performance. Since ESG adoption often entails a substantial outflow of resources, policymakers should facilitate a seamless implementation of non-financial disclosure requirements. This could be achieved through targeted incentives, subsidies, or tax benefits that offset any short-term negative impacts on profitability arising from ESG investments. By fostering an environment that supports sustainable corporate behavior, regulators can help unlock long-term economic growth while ensuring that businesses contribute meaningfully to environmental and social well-being.

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**Table 1 \***  
**Description of variables**

| <b>Variables</b> | <b>Definition</b>                                                                                                                                                      |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TQ               | Calculated as the book value of total assets minus the book value of common equity, plus the market value of common equity, divided by the book value of total assets. |
| ESG              | ESG performance indicator provided by the Refinitiv Eikon database.                                                                                                    |
| ESGE             | Environmental performance indicator provided by the Refinitiv Eikon database.                                                                                          |
| ESGS             | Social performance indicator provided by the Refinitiv Eikon database.                                                                                                 |
| ESGG             | Governance performance indicator provided by the Refinitiv Eikon database.                                                                                             |
| ROA              | Calculated as the ratio of net income to total assets.                                                                                                                 |
| Levg             | Calculated as the ratio of total debt relative to total assets                                                                                                         |
| CapEx            | Calculated as the ratio of total capital expenditure by a firm to total assets for a specific period                                                                   |
| Cash_holding     | Calculated as the ratio of total cash and cash equivalents to total assets                                                                                             |
| Div_yield        | Calculated as the annual dividend per share divided by the market price per share                                                                                      |
| Size             | Calculated as the natural logarithm of total assets                                                                                                                    |

**Note:** The table provides the description and the measurement of variables used in the study

**Table 2 \***  
**Descriptive statistics**

| <b>Variables</b> | <b>N</b> | <b>Mean</b> | <b>SD</b> | <b>Min</b> | <b>Max</b> |
|------------------|----------|-------------|-----------|------------|------------|
| TQ               | 849      | 3.591       | 2.953     | 0.802      | 11.602     |
| ESG              | 850      | 48.925      | 15.355    | 4.559      | 86.033     |
| ESGE             | 850      | 47.275      | 22.007    | 0.000      | 97.265     |
| ESGS             | 850      | 54.451      | 19.434    | 6.323      | 96.68      |
| ESGG             | 850      | 49.243      | 21.727    | 1.324      | 96.276     |
| ROA              | 850      | 0.083       | 0.060     | -0.005     | 0.218      |
| Levg             | 850      | 0.413       | 0.181     | 0.133      | 0.741      |
| CapEx            | 850      | 0.019       | 0.036     | -0.023     | 0.116      |
| Cash_ratio       | 849      | 0.025       | 0.033     | 0.001      | 0.123      |
| Div_yield        | 849      | 0.018       | 0.025     | 0.000      | 0.093      |
| Size             | 850      | 11.863      | 1.293     | 8.791      | 16.09      |

**Note:** The table provides a summary of the descriptive statistics of the variables used in the study

**Table 3 \***

**Impact of ESG and industry interaction on firm valuation**

|                | <b>(Model 1)</b>       | <b>(Model 2)</b>       |
|----------------|------------------------|------------------------|
|                | <b>TQ</b>              | <b>TQ</b>              |
| Industry * ESG |                        | 0.0215**<br>(0.0101)   |
| ESG            | 0.0111**<br>(0.0054)   | 0.0057<br>(0.0054)     |
| ROA            | 4.9891***<br>(1.7148)  | 4.7540***<br>(1.2944)  |
| Levg           | 1.7484**<br>(0.7919)   | 1.7734***<br>(0.6509)  |
| CapEx          | -0.4599<br>(1.3093)    | -0.4039<br>(1.2684)    |
| Cash           | -0.7035<br>(2.8562)    | -0.5285<br>(1.9522)    |
| Div_yield      | -0.8769***<br>(0.2618) | -0.8494***<br>(0.1987) |
| Size           | -1.3684***<br>(0.3597) | -1.3509***<br>(0.2511) |
| Constant       | 17.5184***<br>(4.1445) | 17.3192***<br>(2.9070) |
| Year FE        | Yes                    | Yes                    |
| Industry FE    | No                     | Yes                    |
| Observations   | 848                    | 848                    |
| R-squared      | 0.2117                 | 0.2176                 |

**Note:** This table reports the panel regression analysis of ESG and ESG and Industry interaction on Tobin's Q with other control variables. \*\*\*, \*\*, \* indicate  $p < 0.1$ ,  $p < 0.5$  and  $p < 0.01$ .

**Table 4 \*****Quantile regression results for ESG Score**

|                       | <b>(Q25)</b>           | <b>(Q75)</b>           |
|-----------------------|------------------------|------------------------|
|                       | <b>TQ</b>              | <b>TQ</b>              |
| ESG                   | 0.0110***<br>(0.0037)  | 0.0209***<br>(0.0060)  |
| ROA                   | 1.7078***<br>(1.7240)  | 3.5239***<br>(2.0931)  |
| Levg                  | 0.0913<br>(0.1996)     | 2.6806***<br>(0.7317)  |
| CapEx                 | 2.2292*<br>(1.3137)    | 3.4887<br>(3.2255)     |
| Cash                  | -0.4032<br>(1.8963)    | 1.6817<br>(5.2120)     |
| Div_yield             | -1.1597***<br>(0.1664) | -1.8509***<br>(0.3400) |
| Size                  | -0.2734***<br>(0.0382) | -0.6303***<br>(0.0901) |
| Constant              | 3.6202***<br>(0.4035)  | 6.5384***<br>(1.1848)  |
| Year FE               | Yes                    | Yes                    |
| Observations          | 848                    | 848                    |
| Pseudo R <sup>2</sup> | 0.1995                 | 0.3714                 |

**Note:** This table reports the analysis of ESG on Tobin's Q across the 25<sup>th</sup> and 75<sup>th</sup> quantiles with other control variables. \*\*\*, \*\*, \* indicate  $p < 0.1$ ,  $p < 0.5$  and  $p < 0.01$ .

Table 5 \*

## Quantile regression results for ESG Pillar Scores

|                       | (1)                    |                        | (2)                    |                        | (3)                    |                        |
|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|                       | (Q25)<br>TQ            | (Q75)<br>TQ            | (Q25)<br>TQ            | (Q75)<br>TQ            | (Q25)<br>TQ            | (Q75)<br>TQ            |
| ESGE                  | 0.0094***<br>(0.0023)  | 0.0117**<br>(0.0050)   |                        |                        |                        |                        |
| ESGS                  |                        |                        | 0.0089***<br>(0.0027)  | 0.0154***<br>(0.0053)  |                        |                        |
| ESGG                  |                        |                        |                        |                        | 0.0038**<br>(0.0016)   | 0.0060<br>(0.0054)     |
| ROA                   | 1.9020***<br>(1.5755)  | 3.0084***<br>(2.2829)  | 1.1391***<br>(1.5063)  | 3.1715***<br>(2.8730)  | 1.3226***<br>(1.3464)  | 3.2837***<br>(2.7575)  |
| Levg                  | 0.0117<br>(0.2158)     | 3.2000***<br>(0.5992)  | 0.0817<br>(0.2171)     | 3.0139***<br>(0.7422)  | 0.1314<br>(0.1944)     | 2.4964***<br>(0.3938)  |
| CapEx                 | 1.5091<br>(1.4861)     | 5.6695*<br>(3.1013)    | 1.6657<br>(1.0362)     | 2.6280<br>(3.5528)     | 2.3450<br>(1.5671)     | 4.0195<br>(3.5466)     |
| Cash                  | -0.7860<br>(1.6446)    | -1.8980<br>(3.2849)    | -0.1233<br>(1.5646)    | -0.4249<br>(4.3597)    | -0.3818<br>(1.1986)    | 1.8509<br>(3.8005)     |
| Div_yield             | -1.1437***<br>(0.1621) | -1.9766***<br>(0.2307) | -1.1200***<br>(0.1665) | -1.9397***<br>(0.3331) | -1.0376***<br>(0.1517) | -1.8668***<br>(0.2506) |
| Size                  | -0.2730***<br>(0.0507) | -0.6792***<br>(0.0785) | -0.2791***<br>(0.0555) | -0.6576***<br>(0.0765) | -0.2387***<br>(0.0258) | -0.5370***<br>(0.0915) |
| Constant              | 3.7917***<br>(0.6894)  | 7.4489***<br>(0.9894)  | 3.8238***<br>(0.7358)  | 6.9754***<br>(0.9364)  | 3.6472***<br>(0.3673)  | 6.1515***<br>(1.3252)  |
| Year FE               | Yes                    | Yes                    | Yes                    | Yes                    | Yes                    | Yes                    |
| Observations          | 848                    | 848                    | 848                    | 848                    | 848                    | 848                    |
| Pseudo R <sup>2</sup> | 0.2030                 | 0.3698                 | 0.2001                 | 0.3708                 | 0.1949                 | 0.3670                 |

**Note:** This table reports the analysis of environmental score, social score, and governance score on Tobin's Q across the 25<sup>th</sup> and 75<sup>th</sup> quantiles with other control variables. \*\*\*, \*\*, \* indicate p<0.1, p<0.5 and p<0.01

**Table 6 \*****Quantile regression results for the industry effect**

|                       | <b>(Q25)</b>           | <b>(Q75)</b>           |
|-----------------------|------------------------|------------------------|
|                       | <b>TQ</b>              | <b>TQ</b>              |
| Industry * ESG        | 0.0021<br>(0.0059)     | -0.0336***<br>(0.0121) |
| ESG                   | 0.0096**<br>(0.0039)   | 0.0337***<br>(0.0091)  |
| ROA                   | 13.0542***<br>(1.9773) | 36.8633***<br>(2.5945) |
| Levg                  | 0.0153<br>(0.1839)     | 2.4044***<br>(0.7799)  |
| CapEx                 | 2.1462<br>(1.3665)     | 3.9090<br>(4.0252)     |
| Cash                  | -0.3714<br>(1.5054)    | 0.6864<br>(4.6747)     |
| Div_yield             | -1.1149***<br>(0.1773) | -2.1564***<br>(0.2923) |
| Size                  | -0.2756***<br>(0.0296) | -0.5680***<br>(0.1009) |
| Constant              | 3.8225***<br>(0.5446)  | 5.3425***<br>(1.1978)  |
| Year FE               | Yes                    | Yes                    |
| Industry FE           | Yes                    | Yes                    |
| Observations          | 848                    | 848                    |
| Pseudo R <sup>2</sup> | 0.1995                 | 0.3684                 |

**Note:** This table reports the analysis of ESG and industry interaction on Tobin's Q across the 25<sup>th</sup> and the 75<sup>th</sup> quantile with other control variables. \*\*\*, \*\*, \* indicate p<0.1, p<0.5 and p<0.01.