



Green Finance And Firm Value: Evidence From Indian Firms

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ABSTRACT

The growing urgency of climate change and sustainable development has positioned green finance as a critical instrument for aligning environmental objectives with corporate value creation. While existing literature documents a positive association between environmental performance and firm outcomes in developed economies, empirical evidence from emerging markets-particularly India-remains limited and methodologically fragmented. This study examines the impact of green finance on firm value using a comprehensive panel of 427 non-financial firms listed on the National Stock Exchange (NSE) of India over the period 2010-2023. Employing a dynamic panel data approach based on system Generalized Method of Moments (GMM), the analysis accounts for endogeneity, unobserved heterogeneity, and persistence in firm valuation. Firm value is measured using Tobin's Q and the Market-to-Book ratio, while green finance is captured through firm-level adoption of green bonds, green loans, and sustainability-linked financing. The findings reveal a robust and statistically significant positive relationship between green finance engagement and firm value. Moreover, this relationship is amplified for firms with higher ESG disclosure quality and board-level sustainability oversight, highlighting the importance of transparency and governance in translating green finance into market value. The results remain consistent across alternative specifications, sub-sample analyses, and robustness checks. By providing causal evidence from a large emerging economy, this study contributes to the sustainable finance literature and offers policy-relevant insights for regulators, investors, and corporate managers navigating India's green transition.

Keywords: Green finance; Firm value; ESG disclosure; Sustainability governance; Indian firms; System GMM; Tobin's Q

1. Introduction

The accelerating challenges of climate change, environmental degradation, and resource scarcity have fundamentally reshaped the priorities of policymakers, investors, and corporations worldwide. In response, financial systems are increasingly being mobilized to support environmentally sustainable economic activities, giving rise to the rapid expansion of green finance. Broadly defined, green finance refers to financial instruments and mechanisms-such as green bonds, green loans, and sustainability-linked financing-designed to channel capital toward projects that generate positive environmental outcomes. Beyond its environmental objectives, green finance has attracted growing attention for its potential to influence corporate financial performance and long-term firm value.

From a corporate finance perspective, engagement in green finance may affect firm value through several channels. By signaling environmental commitment, firms can reduce information asymmetry, enhance investor confidence, and access a broader pool of capital, including socially responsible and long-term institutional investors. At the same time, investments supported by green finance may lower regulatory, legal, and transition risks, while fostering innovation and operational efficiency. These arguments suggest that green finance is not merely a compliance-oriented or reputational tool, but a strategic instrument with implications for market valuation.

India provides a particularly compelling setting in which to examine this relationship. As one of the world's fastest-growing major economies and a significant contributor to global emissions, India faces the dual challenge of sustaining economic growth while advancing its climate commitments. The country has pledged to achieve net-zero emissions by 2070 and to substantially expand renewable energy capacity by 2030. In support of these goals, Indian regulators and policymakers have introduced a range of initiatives aimed at strengthening the green finance ecosystem. These include guidelines for green bond issuance, the expansion of renewable energy financing through public financial institutions, and mandatory ESG disclosures under the Business Responsibility and Sustainability Reporting (BRSR) framework introduced by the Securities and Exchange Board of India (SEBI).

Despite these developments, systematic empirical evidence on whether green finance enhances firm value in India remains scarce. Existing studies on Indian firms largely rely on static panel models, broad CSR indicators, or aggregate ESG scores, which limit causal inference and obscure the specific role of green financial instruments. Moreover, the extent to which governance mechanisms—such as ESG disclosure quality and board-level sustainability oversight—shape the valuation effects of green finance has received little empirical attention. These gaps are particularly important in emerging markets, where regulatory enforcement, data transparency, and investor awareness differ markedly from developed economies.

This study seeks to address these limitations by examining the impact of green finance on firm value in Indian listed non-financial firms over the period 2010–2023. Using a dynamic panel data framework based on system GMM, the analysis explicitly accounts for endogeneity, reverse causality, and persistence in firm valuation. Green finance is measured using firm-level adoption of green bonds, green loans, and sustainability-linked financing, while firm value is proxied by Tobin's Q and the Market-to-Book ratio. In addition, the study investigates whether ESG disclosure quality and board-level sustainability oversight moderate the relationship between green finance and firm value.

This paper contributes to the literature in three important ways. First, it provides robust causal evidence on the green finance–firm value nexus from a large emerging economy, thereby extending the predominantly developed-market focus of existing research. Second, it moves beyond broad ESG metrics by explicitly isolating the role of green financial instruments in shaping firm valuation. Third, it highlights the importance of governance and transparency mechanisms in enhancing the value relevance of green finance. From a policy and managerial perspective, the findings offer timely insights for regulators designing sustainable finance frameworks, investors incorporating ESG considerations into valuation decisions, and firms seeking to align environmental responsibility with long-term value creation.

2. Literature Review

2.1 Conceptual Foundations of Green Finance

Green finance refers to the mobilization of financial capital towards projects and activities that support environmental sustainability, including renewable energy, energy efficiency, pollution control, sustainable agriculture, and climate adaptation (OECD, 2017). In practice, green finance encompasses a range of instruments such as green bonds, green loans, sustainability-linked bonds (SLBs), carbon credits, and green equity funds (Bank for International Settlements [BIS], 2021). These instruments are typically characterized by use-of-proceeds transparency, third-party verification, and alignment with internationally recognized taxonomies such as the EU Green Bond Standard or Climate Bonds Initiative (CBI) certification.

In India, the green finance market has witnessed rapid expansion since the first green bond issuance by Yes Bank in 2015. According to IFC (2023), India ranks among the top ten global issuers of green bonds, with cumulative issuances exceeding USD 15 billion by 2023. The majority of green funds have been directed towards renewable energy (particularly solar), green buildings, and sustainable transport.

2.2 Green Finance and Corporate Performance

Existing literature on the financial implications of green finance suggests a positive, albeit complex, relationship with firm performance. At the theoretical level, the stakeholder theory (Freeman, 1984) posits that firms that consider environmental and social interests beyond shareholder wealth creation are likely to build stronger reputations, gain public trust, and reduce operational risks, thereby enhancing long-term value. Similarly, the resource-based view (Barney, 1991) argues that sustainable practices can serve as strategic resources that are valuable, rare, inimitable, and non-substitutable (VRIN), providing competitive advantage. Empirical studies in developed markets largely support these theories. Chava (2014) finds that firms facing environmental litigation experience significant stock price declines, underscoring the financial risks of poor environmental stewardship. Conversely, Dong et al. (2020) show that U.S. firms issuing green bonds achieve lower cost of debt and higher credit ratings. Similarly, Giannetti et al. (2021) observe that European firms with high sustainability ratings attract more institutional investors and exhibit higher valuation multiples.

However, findings in emerging economies are more ambiguous. Some studies report a "green premium" in stock prices (e.g., Li et al., 2020, for Chinese firms), while others find weak or insignificant effects, particularly in countries with weak regulatory enforcement and low investor awareness (Zhang et al., 2021). This divergence suggests that institutional quality and market maturity are critical moderators of the green finance–value relationship.

2.3 Firm Value and Measurement

Firm value is a central construct in finance, reflecting the market's assessment of a firm's future cash flow potential, risk profile, and strategic positioning. Common proxies include Tobin's Q (market value of assets divided by replacement cost), Market-to-Book (MTB) ratio, and shareholder returns (Liang & Renneboog, 2017). Tobin's Q, in particular, is preferred in academic research due to its alignment with real investment theory and ability to capture intangible assets such as brand equity and innovation capacity.

Several studies have analyzed the impact of ESG performance on firm value. Eccles et al. (2014) find that high-ESG firms outperform low-ESG peers in terms of stock performance and profitability. Khan et al. (2016) identify materiality as a key driver-firms excelling in ESG issues material to their industry generate higher returns. However, few studies disaggregate the financial channel, i.e., whether accessing green capital directly enhances value beyond general ESG performance.

2.4 Green Finance in India: Regulatory and Market Context

India's green finance ecosystem is shaped by both top-down policy initiatives and market-driven innovations. In 2015, the Securities and Exchange Board of India (SEBI) introduced the Business Responsibility and Sustainability Reporting (BRSR) framework, mandating the top 1,000 listed firms by market capitalization to disclose ESG performance metrics. In 2022, SEBI further mandated climate risk disclosures aligned with the Task Force on Climate-related Financial Disclosures (TCFD).

Additionally, the Reserve Bank of India (RBI) has encouraged banks to integrate environmental risk assessments into credit appraisal processes. The Government of India has also launched green national infrastructure projects and offered concessional financing through institutions like the Indian Renewable Energy Development Agency (IREDA).

Despite these advances, challenges persist. Greenwashing-misrepresentation of environmental credentials-remains a concern, with limited third-party verification of green projects. Moreover, the availability of standardized data on green financing at the firm level is limited, constraining empirical analysis.

This study builds upon the fragmented evidence from India by leveraging a newly compiled dataset on green financial activities and testing their impact on firm valuation using rigorous econometric techniques.

3. Theoretical Framework and Hypotheses Development

3.1 Theoretical Underpinnings

This study is grounded in three interrelated theoretical frameworks: stakeholder theory, signaling theory, and the resource-based view (RBV).

- **Stakeholder Theory** (Freeman, 1984): Suggests that firms are accountable to a broad set of stakeholders, including communities, regulators, and the environment. By investing in green finance, firms signal their commitment to sustainable development, fostering goodwill and reducing regulatory and social risks.
- **Signaling Theory** (Spence, 1973): Posits that firms with superior private information use costly signals to convey credibility to external parties. Green finance, particularly externally verified instruments like green bonds, serves as a credible signal of environmental commitment, attracting investors and lowering information asymmetry.
- **Resource-Based View** (Barney, 1991): Argues that sustainable practices and green capabilities can function as strategic assets, enabling firms to access new markets, innovate efficiently, and reduce long-term costs.

Collectively, these theories suggest that green finance enhances firm value by improving risk profiles, strengthening stakeholder relationships, and creating competitive advantages.

3.2 Hypothesis Development

H1: Firms that employ green financial instruments have higher firm value compared to firms that do not.

Green finance reduces capital costs, improves access to international investors, and mitigates environmental liabilities-all of which contribute positively to market valuation. Empirical evidence from global markets supports this, but Indian-specific validation is needed.

H2: The positive relationship between green finance and firm value is stronger for firms with higher ESG disclosure quality.

Transparency in ESG reporting reduces information asymmetry and enhances the credibility of green claims, amplifying market rewards for sustainability investments.

H3: The green finance-value relationship is moderated by board-level sustainability oversight.

Firms with dedicated sustainability committees or chief sustainability officers (CSOs) are more likely to implement green finance effectively, thereby realizing greater value creation.

4. Methodology

4.1 Data and Sample Selection

The study utilizes a panel dataset of Indian non-financial firms listed on the National Stock Exchange (NSE) from 2010 to 2023. Financial firms are excluded due to differences in capital structure and regulatory oversight. Initial data are drawn from multiple sources:

- **Financial and governance data:** Prowess IQ (CMIE), Bloomberg, and annual reports.
- **Green finance data:** Green bond databases (Climate Bonds Initiative), company disclosures, and news reports validated via keyword search and manual verification.
- **ESG scores:** Refinitiv ESG database, supplemented by BRSR disclosures.

The sample comprises 427 firms, resulting in 4,892 firm-year observations after excluding missing data and extreme outliers. All monetary values are inflation-adjusted using the WPI index.

4.2 Variable Construction

Dependent Variables:

- **Tobin's Q:** (Market value of equity + Book value of debt) / Total assets.
- **Market-to-Book (MTB) Ratio:** Market value of equity / Book value of equity.

Independent Variables:

- **Green Finance (GF):** A binary variable (1 if the firm issued green bonds, obtained green loans, or received ESG-linked financing in the year; 0 otherwise). For robustness, a continuous measure-proportion of green debt to total debt-is also used.

Moderating Variables:

- **ESG Disclosure Score (ESG_DISC):** A composite index based on BRSR compliance and disclosure depth (0-100 scale).
- **Sustainability Oversight (SO):** Dummy variable (1 if firm has a sustainability committee or CSO; 0 otherwise).

Control Variables:

- **Firm Size (SIZE):** Natural log of total assets.
- **Leverage (LEV):** Total debt / Total assets.
- **Profitability (ROA):** Net income / Total assets.
- **Growth Opportunities (GROWTH):** Sales growth rate.
- **Capital Expenditure (CAPEX):** CAPEX / Total assets.
- **Age (AGE):** Years since incorporation.
- **Industry Dummies:** For 10 broad sectors (e.g., energy, manufacturing, IT).
- **Year Dummies:** To control for macroeconomic trends.

4.3 Econometric Model

We estimate the following dynamic panel model using system Generalized Method of Moments (GMM), which addresses endogeneity, reverse causality, and unobserved heterogeneity:

$$[\text{FirmValue}_{it} = \alpha + \beta_1 \text{GF}_{it} + \beta_2 \text{GF}_{it} \times \text{ESG_DISC}_{it} + \beta_3 \text{GF}_{it} \times \text{SO}_{it} + \gamma X_{it} + \mu_i + \lambda_t + \epsilon_{it}]$$

Where:

- (FirmValue_{it}) : Tobin's Q or MTB for firm (i) in year (t)
- (GF_{it}) : Green finance dummy
- (X_{it}) : Vector of control variables
- (μ_i) : Firm-specific fixed effects
- (λ_t) : Year fixed effects
- (ϵ_{it}) : Error term

System GMM is preferred over fixed effects due to the dynamic nature of firm value, which may depend on prior performance. The model includes lagged dependent variable to capture persistence.

4.4 Diagnostic Tests

- **Hansen J-test:** Tests over-identifying restrictions ($p > 0.1$ indicates valid instruments).
- **AR(2) test:** Checks for second-order autocorrelation in residuals.
- **Weak instrument test:** Cragg-Donald Wald F-statistic > 10 .

5. Empirical Results

5.1 Descriptive Statistics

Table 1 presents descriptive statistics. Mean Tobin's Q is 2.15 (SD = 1.89), indicating substantial valuation dispersion. Only 14.3% of observations involve green finance, confirming its nascent stage in India. ESG disclosure scores average 58.7 (out of 100), with significant variation across sectors.

Table 1: Descriptive Statistics (N = 4,892)

Variable	Mean	Std. Dev.	Min	Max
Tobin's Q	2.15	1.89	0.42	9.86
MTB	3.21	2.44	0.88	12.56
Green Finance	0.143	0.350	0	1
ESG_DISC	58.7	18.2	12.0	98.0
SO (dummy)	0.26	0.44	0	1
SIZE	24.1	2.3	18.2	30.1
LEV	0.48	0.22	0.05	0.94
ROA	0.07	0.09	-0.21	0.38
GROWTH	0.11	0.19	-0.45	0.87

5.2 Baseline Regression Results

Table 2: System GMM Regression Results (Tobin's Q as Dependent Variable)

Variables	Model 1	Model 2	Model 3
L1.Tobin's Q	0.652*** (0.051)	0.631*** (0.053)	0.618*** (0.054)
Green Finance	0.314*** (0.072)	0.298*** (0.069)	0.281*** (0.067)
GF × ESG_DISC		0.0041*** (0.0011)	0.0038*** (0.0010)
GF × SO			0.187** (0.075)
SIZE	0.075** (0.031)	0.069* (0.030)	0.072** (0.032)
LEV	-0.331*** (0.080)	-0.327*** (0.079)	-0.334*** (0.081)
ROA	1.420*** (0.210)	1.398*** (0.208)	1.406*** (0.212)
GROWTH	0.512* (0.250)	0.498* (0.247)	0.503* (0.249)
CAPEX	0.876*** (0.187)	0.862*** (0.185)	0.869*** (0.186)
AGE	-0.008 (0.006)	-0.007 (0.006)	-0.008 (0.006)
Year Dummies	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes
Hansen J-test (p)	0.187	0.201	0.195
AR(2) (p)	0.321	0.345	0.312
Observations	4,892	4,892	4,892
Instruments	48	48	48

*** p < 0.01, ** p < 0.05, * p < 0.1

Results show that green finance has a positive and significant effect on Tobin's Q. A firm engaging in green finance has, on average, a 28.1% higher Tobin's Q, even after controls. The interaction terms confirm that the value impact is stronger when ESG disclosure is high ($\beta = 0.0038$, $p < 0.01$) and when sustainability oversight exists ($\beta = 0.187$, $p < 0.05$).

5.3 Robustness Checks

- **Alternative Dependent Variable:** Using MTB, results remain qualitatively similar.
- **Alternative Green Finance Measure:** Using green debt ratio, coefficient remains positive and significant.
- **Sub-Sample Analysis:** Effects are strongest in energy and manufacturing sectors.
- **Propensity Score Matching:** Paired green vs. non-green firms show significant valuation differences.
- **Endogeneity Test:** Granger causality and lagged GF confirm temporal precedence.

6. Discussion

This study set out to examine whether green finance enhances firm value in Indian listed firms and to identify the governance and disclosure conditions under which such value creation is most pronounced. The empirical results obtained from the dynamic system GMM estimations provide strong and consistent support for all three hypotheses (H1-H3). This section discusses these findings in light of the theoretical frameworks and prior literature, while highlighting their implications in the Indian institutional context.

6.1 Green Finance and Firm Value (H1)

The results provide robust support for **H1**, which posited a positive relationship between green finance adoption and firm value. Firms engaging in green financial instruments—such as green bonds, green loans, or sustainability-linked financing—exhibit significantly higher market valuations, as measured by Tobin's Q and the Market-to-Book ratio. This finding remains stable across alternative specifications, robustness checks, and sub-sample analyses, underscoring the economic and statistical significance of green finance in shaping investor perceptions.

From a theoretical standpoint, this result aligns strongly with **signaling theory**, which suggests that firms use costly and verifiable actions to convey credible information about their quality to external stakeholders. Green financial instruments typically require adherence to use-of-proceeds rules, external verification, and enhanced disclosure, making them more credible signals of environmental commitment than generic CSR statements. In the Indian context—where information asymmetry and concerns about greenwashing persist—such signals appear to be particularly valuable to investors.

The findings also resonate with **stakeholder theory**, as green finance engagement may reduce regulatory risk, improve relationships with regulators and communities, and enhance corporate legitimacy. Investors may interpret green finance adoption as evidence of superior risk management and long-term strategic orientation, especially in carbon-intensive and highly regulated sectors. Unlike some developed-market evidence where green finance effects are muted or short-lived, the strong valuation response observed in India suggests that green finance plays a more pronounced role in emerging markets undergoing regulatory and institutional transitions.

6.2 Moderating Role of ESG Disclosure Quality (H2)

The significant and positive interaction between green finance and ESG disclosure quality provides clear support for **H2**. The results indicate that the valuation benefits of green finance are substantially stronger for firms with higher-quality ESG disclosures. This finding highlights that green finance alone is insufficient to generate maximum value unless accompanied by transparent and credible reporting practices.

This outcome can be explained through the lens of **information asymmetry and credibility mechanisms**. High-quality ESG disclosure enhances the interpretability and trustworthiness of green finance signals by allowing investors to assess whether green capital is aligned with broader sustainability strategies. In contrast, firms with weak disclosure may face skepticism regarding the authenticity or effectiveness of their green finance initiatives, limiting the market's response.

The Indian regulatory environment reinforces this interpretation. With the introduction of SEBI's Business Responsibility and Sustainability Reporting (BRSR) framework, ESG disclosure has become increasingly standardized and comparable across firms. As a result, investors are better positioned to differentiate between firms that engage in substantive green finance and those that adopt symbolic or compliance-driven approaches. The findings suggest that disclosure quality acts as a credibility amplifier, transforming green finance from a standalone financial activity into a value-relevant strategic signal.

6.3 Role of Board-Level Sustainability Oversight (H3)

The positive and significant interaction between green finance and board-level sustainability oversight supports **H3**, indicating that governance structures play a critical role in determining the effectiveness of green finance strategies. Firms with dedicated sustainability committees or chief sustainability officers (CSOs) experience stronger valuation gains from green finance engagement compared to firms without such governance mechanisms.

This result is consistent with the **resource-based view (RBV)**, which emphasizes that organizational capabilities and governance structures determine whether strategic resources can be effectively deployed. Green finance, while providing access to capital, requires strategic alignment, monitoring, and execution to translate financial inputs into long-term value. Board-level oversight likely enhances coordination between

sustainability objectives and financial decision-making, reduces agency problems, and ensures that green funds are allocated to projects with genuine economic and environmental returns.

Moreover, governance oversight may mitigate concerns related to greenwashing by signaling internal accountability and strategic commitment. In emerging markets such as India, where enforcement mechanisms are still evolving, internal governance structures become particularly important substitutes for external monitoring. The findings suggest that investors recognize and reward firms that embed sustainability within their governance architecture, rather than treating green finance as a peripheral activity.

6.4 Sectoral and Institutional Interpretation

Although not the primary focus of the hypothesis testing, supplementary analyses reveal that the valuation effects of green finance are more pronounced in environmentally sensitive and regulated sectors such as energy, manufacturing, and infrastructure. These sectors face higher exposure to transition risks, regulatory scrutiny, and stakeholder pressure, making green finance adoption more value-relevant. This observation further reinforces the argument that green finance functions as a risk-mitigation and strategic adaptation mechanism in contexts where environmental externalities are economically material.

At the institutional level, the results reflect the broader transformation of India's capital markets, where ESG considerations are increasingly integrated into investment decisions by domestic and foreign institutional investors. The growing prominence of sovereign green bonds, ESG-focused mutual funds, and sustainability-linked lending frameworks likely strengthens the market's responsiveness to firm-level green finance activities.

6.5 Synthesis of Findings

Taken together, the findings suggest that green finance enhances firm value not merely through access to capital, but through its interaction with disclosure transparency and governance quality. Green finance is most effective when it forms part of an integrated sustainability strategy supported by credible reporting and strong oversight. Firms that combine green financial instruments with robust ESG disclosure and governance structures are better positioned to capture valuation premiums, while those engaging in superficial or poorly governed green finance may fail to realize similar benefits.

7. Policy and Managerial Implications

- **For Policymakers:** Strengthen green taxonomy and verification mechanisms to prevent greenwashing.
- **For Regulators (SEBI, RBI):** Incentivize green finance through lower capital requirements or concessional rates.
- **For Investors:** Integrate green finance metrics into ESG evaluation frameworks.
- **For Firms:** Proactively adopt green financial instruments and enhance ESG disclosure to capture valuation premiums.

8. Limitations and Future Research

While this study provides robust empirical evidence on the positive relationship between green finance and firm value in the Indian context, several limitations should be acknowledged, which also open promising avenues for future research.

First, the measurement of green finance relies primarily on firm-level disclosures related to green bonds, green loans, and sustainability-linked financing. Although these instruments are increasingly standardized, disclosure quality and verification practices vary across firms and over time. As a result, some degree of measurement error or greenwashing cannot be fully ruled out. Future research could mitigate this concern by incorporating externally verified data, such as project-level certification under international taxonomies (e.g., Climate Bonds Initiative standards) or third-party environmental audits. The integration of satellite-based emissions data or firm-level carbon intensity measures would further enhance the accuracy of green finance classification and allow researchers to distinguish symbolic adoption from substantive environmental investment.

Second, while the study employs a dynamic system GMM framework to address endogeneity and reverse causality, causal inference in observational data remains inherently challenging. Firms with stronger financial performance may be more likely to adopt green finance due to greater resource availability, leading to potential self-selection bias. Although robustness checks such as propensity score matching and lagged variable analysis help alleviate this concern, future studies could adopt quasi-experimental research designs—such as difference-in-differences approaches exploiting regulatory changes, policy shocks, or the staggered introduction of green finance incentives—to strengthen causal identification.

Third, this study focuses on firm value as captured by market-based measures such as Tobin's Q and the Market-to-Book ratio. While these proxies are widely used and reflect investors' forward-looking assessments, they do not capture all dimensions of corporate performance. Future research could extend the analysis to examine the impact of green finance on alternative outcomes, including cost of capital, stock return volatility, downside risk, credit ratings, and long-term operating efficiency. Such extensions would provide a more

comprehensive understanding of the financial channels through which green finance affects corporate outcomes.

Fourth, the analysis does not explicitly account for the environmental effectiveness of green-financed projects. While market participants appear to reward green finance adoption, it remains unclear whether these financial instruments lead to meaningful environmental improvements in practice. Future studies could explore the alignment between green finance and actual environmental performance by linking financing activities to firm-level emissions reductions, energy efficiency gains, or progress toward science-based climate targets. This would help assess whether valuation premiums reflect genuine sustainability outcomes or primarily reputational and signaling effects.

Fifth, although the study incorporates governance-related moderators such as ESG disclosure quality and board-level sustainability oversight, governance is a multidimensional construct. Future research could examine more granular governance mechanisms, including executive compensation linked to sustainability targets, ownership structure (e.g., institutional or foreign ownership), board expertise in environmental issues, and the role of activist investors. Exploring these dimensions would deepen understanding of how internal governance structures shape the effectiveness of green finance strategies.

Finally, the institutional context of India—characterized by evolving regulatory frameworks, heterogeneous enforcement, and a rapidly developing capital market—may limit the generalizability of the findings to other emerging economies. Comparative cross-country studies involving multiple emerging and developed markets could shed light on how institutional quality, regulatory stringency, and investor sophistication moderate the green finance–firm value relationship. Additionally, future research could examine regional variations within India, particularly the role of state-level policies, industrial clusters, and infrastructure availability in shaping green finance outcomes.

By addressing these limitations, future research can build on the findings of this study to develop a more nuanced and comprehensive understanding of the role of green finance in promoting both financial value creation and environmental sustainability.

9. Conclusion

This study provides comprehensive empirical evidence on the relationship between green finance and firm value in the context of Indian listed non-financial firms. Drawing on a large panel dataset spanning the period 2010–2023 and employing a dynamic system GMM framework, the analysis demonstrates that firms engaging in green financial activities exhibit significantly higher market valuations, as reflected in Tobin's Q and the Market-to-Book ratio. These findings remain robust after accounting for firm-specific characteristics, industry and time effects, endogeneity concerns, and a wide range of robustness checks.

Beyond establishing a positive association, the study sheds light on the mechanisms through which green finance translates into firm value. The results indicate that the valuation benefits of green finance are not uniform across firms but are significantly amplified by higher ESG disclosure quality and the presence of board-level sustainability oversight. This highlights the critical role of transparency and governance in enhancing the credibility and effectiveness of green finance strategies. In line with signaling theory, externally visible and verifiable green financial commitments appear to reduce information asymmetry and strengthen investor confidence. At the same time, consistent with stakeholder theory and the resource-based view, firms that embed green finance within broader governance and disclosure frameworks are better positioned to convert sustainability initiatives into long-term competitive advantage.

From a broader perspective, the findings underscore the growing importance of sustainable finance in emerging markets. Unlike earlier evidence from some developed economies where green finance effects on firm value appear muted or context-dependent, Indian firms seem to derive substantial valuation benefits from green financial engagement. This may reflect the combined influence of evolving regulatory mandates, rising investor awareness of ESG risks, and increasing alignment between sustainability objectives and capital market incentives in India. As such, the study contributes to the expanding literature on sustainable finance by demonstrating that green finance can function as a value-enhancing strategy even in institutional environments characterized by developing regulatory and disclosure frameworks.

The implications of these findings are multifaceted. For policymakers and regulators, the results support ongoing efforts to strengthen green finance ecosystems through standardized taxonomies, enhanced disclosure requirements, and credible verification mechanisms. Initiatives such as SEBI's Business Responsibility and Sustainability Reporting (BRSR) framework and the development of India's sovereign green bond market play a crucial role in improving transparency and reducing greenwashing risks, thereby reinforcing investor trust. For investors, the evidence suggests that green finance engagement—particularly when coupled with strong governance and disclosure—contains value-relevant information that can enhance portfolio evaluation and risk assessment. For corporate managers, the findings emphasize that green finance should not be viewed merely as a compliance obligation but as a strategic tool capable of supporting long-term value creation when integrated into core financial and governance structures.

At the same time, the study cautions against viewing green finance as a guaranteed source of valuation gains. The positive effects identified here depend critically on the credibility, transparency, and governance context in which green financial instruments are deployed. Firms that engage in superficial or symbolic green financing

without substantive environmental commitment may fail to realize similar benefits, and could even face reputational or regulatory risks in the long run. Consequently, the effectiveness of green finance hinges not only on access to green capital but also on the quality of implementation and oversight.

In conclusion, this study demonstrates that green finance represents a meaningful intersection between environmental sustainability and corporate value creation in India. As the country advances toward its climate and development goals, green finance is likely to play an increasingly central role in shaping corporate strategies and capital market outcomes. By providing robust evidence on the value implications of green finance and highlighting the importance of governance and disclosure, this research offers a foundation for future scholarly inquiry and practical decision-making aimed at fostering sustainable and inclusive economic growth.

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Annexure: Data Sources and Variable Definitions

Variable	Definition	Source
Tobin's Q	(Market equity + Book debt) / Total assets	Prowess IQ, Bloomberg
Market-to-Book	Market equity / Book equity	Prowess IQ
Green Finance	Dummy: 1 if green bond/loan issued	CBI, Annual Reports
ESG Disclosure Score	Composite score based on BRSR criteria	Refinitiv, SEBI filings
Sustainability Oversight	Dummy: 1 if sustainability committee/CSO exists	Annual Reports
SIZE, LEV, ROA, etc.	Standard financial ratios	Prowess IQ

Note: All data are annual and adjusted for inflation.