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The Impact of Sustainability Practices on Financial Performance Evidence from Indian Listed Companies

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Abstract: This study examines whether corporate sustainability practices improve the accounting and market performance of publicly listed Indian companies. It responds to the continuing uncertainty surrounding whether environmental, social and governance (ESG) engagement creates economic value in an emerging economy characterised by rapid industrialisation, concentrated ownership, uneven institutional capacity and a developing sustainable-finance market.

The proposed study uses an unbalanced panel of non-financial companies listed on the National Stock Exchange and Bombay Stock Exchange over FY2019–20 to FY2024–25. Sustainability is operationalised through an overall ESG score, environmental, social and governance pillar scores, Business Responsibility and Sustainability Reporting (BRSR) quality, BRSR Core assurance, GRI alignment and carbon intensity. Financial performance is measured by return on assets, return on equity, return on capital employed and Tobin's Q. Firm and year fixed-effects regressions with heteroskedasticity- and autocorrelation-robust standard errors are proposed. Lagged ESG variables, alternative estimators and propensity-score or system-GMM tests are recommended to address simultaneity and selection bias.

The framework predicts that credible, performance-oriented sustainability practices can improve operational efficiency, stakeholder confidence, access to capital and risk resilience. However, the effects are expected to differ across ESG dimensions, industries and time horizons. Disclosure alone may not improve performance when it is symbolic, boilerplate or weakly connected to operational outcomes.

The paper replaces sustainability measures developed for Sweden with India-specific regulatory and market indicators, particularly BRSR and BRSR Core. It integrates stakeholder, resource-based, legitimacy and signalling perspectives and distinguishes disclosure quantity from credible sustainability performance.

Keywords: sustainability practices, ESG, financial performance, BRSR, BRSR Core.

1. Introduction

Corporate sustainability has moved from the periphery of Indian business policy to the center of corporate governance, risk management and capital-market communication. Indian firms operate in an economy that must simultaneously expand productive capacity, create employment, improve social inclusion and reduce the environmental intensity of growth. Water stress, air pollution, climate exposure, energy transition, labor conditions and supply-chain accountability are therefore not abstract externalities; they can affect costs, asset utilisation, financing conditions, reputation and the continuity of operations. The financial consequences of sustainability are nonetheless contested. Some initiatives reduce energy and material costs

or strengthen stakeholder relationships, while others require substantial expenditure and may produce returns only after a long gestation period.

India provides a distinctive empirical setting. The Companies Act 2013 established a statutory corporate social responsibility framework for qualifying companies. The Ministry of Corporate Affairs subsequently issued the National Guidelines on Responsible Business Conduct, organized around nine principles of SEBI introduced the Business Responsibility and Sustainability Report in 2021 and made BRSR applicable to the top 1,000 listed entities by market capitalization from FY2022–23. In 2023, SEBI added BRSR Core, a focused set of key performance indicators under nine ESG attributes, together with a phased assurance and value-chain disclosure framework (SEBI, 2021,

2023). These reforms shift Indian sustainability reporting from broad narrative claims toward measurable and increasingly verifiable performance information.

The Indian capital market has also developed ESG-oriented indices and investment products. The NIFTY100 ESG and NIFTY100 Enhanced ESG indices apply ESG scores, controversy screens and sector-aware weighting to companies drawn from the NIFTY 100 universe (NSE Indices, 2026). Yet the existence of reporting requirements and ESG products does not establish that sustainability improves corporate profitability or market valuation. Compliance can impose costs, ratings may differ across providers, and investors may discount disclosures that are incomplete or symbolic. The relationship must therefore be tested rather than assumed.

Prior Indian evidence is mixed. Studies report positive average associations between ESG disclosure and firm value or profitability (Malik et al., 2024; Narula et al., 2024), but other research finds negative or heterogeneous effects across ESG pillars and points in the performance distribution (Rao et al., 2023). Such variation may arise from differences in measurement, sample composition, industry exposure, ownership, estimation strategy and the time required for sustainability investment to affect financial outcomes. It may also reflect reverse causality: financially successful firms possess more slack resources to invest in ESG systems and disclosure.

The study addresses four gaps. First, international proxies such as DJSI membership are not sufficient for capturing India's BRSR-based reporting environment. Second, many studies combine disclosure and performance, although reporting more information is not equivalent to achieving better environmental or social outcomes. Third, cross-sectional models do not adequately control for stable firm characteristics or economy-wide shocks. Fourth, the effects of sustainability may vary between accounting returns and market valuation and across environmentally sensitive and less sensitive industries.

Accordingly, this paper investigates the impact of sustainability practices on the financial performance of Indian listed companies. It asks whether overall ESG performance and its environmental, social and governance dimensions affect ROA, ROE, ROCE and Tobin's Q; whether BRSR quality and external assurance strengthen those relationships; and whether the effects differ by industry environmental sensitivity. The study contributes an India-specific measurement framework, a panel-data design attentive to endogeneity, and a distinction between substantive sustainability performance and disclosure credibility.

2. Institutional Context of Corporate Sustainability in India

2.1. Responsible-business regulation

India's corporate sustainability architecture combines company law, securities regulation, environmental law and voluntary global standards. Section 135 of the Companies Act 2013 requires qualifying firms to constitute CSR governance arrangements and spend the prescribed amount on eligible activities, subject to the statutory framework. The National Guidelines

on Responsible Business Conduct broaden the policy focus from philanthropic expenditure to responsible conduct across ethics, product responsibility, employee wellbeing, stakeholder engagement, human rights, environmental stewardship, policy advocacy, inclusive growth and consumer value.

BRSR converts these principles into a listed-company disclosure architecture. It contains general disclosures, management and process disclosures, and principle-wise performance indicators. Essential indicators support comparability, while leadership indicators encourage more advanced practice. BRSR Core further concentrates attention on measurable outcomes such as greenhouse-gas footprint, water footprint, energy footprint, waste management, employee wellbeing and safety, gender diversity, inclusive development, customer fairness and governance openness. Its phased assurance requirements can improve credibility, although assurance cost and data-system maturity may vary across firms.

2.2. Indian ESG markets and measurement challenges

ESG ratings, sustainability indices and institutional investment mandates can translate non-financial information into capital-market signals. However, rating divergence remains a concern because agencies differ in scope, weighting, materiality assumptions and treatment of controversies. Indian conglomerate structures, complex supply chains and uneven data coverage can intensify this problem. A robust study should therefore avoid relying on a single binary indicator. It should combine ESG scores with observable BRSR metrics, assurance status and dimension-specific indicators and should test results across alternative measures.

3. Literature Review and Hypothesis Development

3.1. Theoretical foundations

Stakeholder theory argues that firms create durable value by managing relationships with employees, customers, suppliers, communities, governments and investors rather than focusing exclusively on immediate shareholder returns (Freeman, 1984). Strong sustainability practices can reduce conflict, improve employee commitment, protect market access and stabilise critical resource relationships. Under this view, ESG performance is an investment in stakeholder cooperation and risk reduction.

The natural-resource-based view proposes that capabilities in pollution prevention, product stewardship and sustainable development can generate competitive advantage when they are valuable, difficult to imitate and embedded in organisational routines (Hart, 1995). In India, energy efficiency, renewable sourcing, water reuse, circular production and supply-chain traceability can lower exposure to resource scarcity and regulatory change. The benefits should be strongest when sustainability is connected to operations and innovation rather than confined to reporting.

Legitimacy and signalling theories explain why disclosure may influence valuation. Firms communicate sustainability

information to demonstrate alignment with social expectations and reduce information asymmetry. BRSR assurance can strengthen the signal because externally examined metrics are harder to imitate than generic narratives. However, legitimacy-seeking disclosure may become symbolic. If reporting is disconnected from performance, investors may attach little value or may interpret it as impression management. Thus, disclosure quality and credibility matter more than the mere presence of a report.

The trade-off perspective predicts a neutral or negative relationship when sustainability absorbs resources that could generate higher short-term returns, creates compliance costs, or encourages managerial overinvestment. Benefits may also emerge with a lag, producing weak contemporaneous relationships. The competing predictions justify empirical testing and the use of both current and lagged sustainability variables.

3.2. Sustainability and accounting performance

Operational sustainability can affect accounting returns through energy savings, lower material use, waste reduction, improved occupational safety, employee retention and reduced disruption. Meta-analytic evidence generally indicates a non-negative relationship between ESG and financial performance, although effect size depends on measurement and context (Friede *et al.*, 2015). Indian evidence is not uniform. Malik *et al.* (2024) report that stronger ESG disclosure is associated with superior financial and market outcomes among NSE-listed firms, whereas Rao *et al.* (2023) find that pillar-level effects vary across the ROE distribution. These findings suggest that aggregate averages can conceal material heterogeneity.

- H1: Overall sustainability performance has a positive effect on the accounting performance of Indian listed companies.
- H1a: Environmental performance has a positive effect on ROA and ROCE.
- H1b: Social performance has a positive effect on ROA and ROE.
- H1c: Governance performance has a positive effect on ROA, ROE and ROCE.

3.3. Sustainability and market valuation

Capital markets may value sustainability when it lowers expected regulatory, operational and reputational risk or signals superior managerial quality. The response may nevertheless be limited where investors doubt data comparability, focus on near-term earnings, or perceive ESG expenditure as value reducing. Dhasmana *et al.* (2023) show that ESG performance and investor sentiment in India have an asymmetric relationship, reinforcing the need to distinguish accounting outcomes from market assessment.

H2: Overall sustainability performance has a positive effect on the market valuation of Indian listed companies, measured by Tobin's Q.

3.4. Disclosure quality, assurance and substantive performance

The economic value of disclosure depends on credibility. BRSR Core assurance can reduce information risk and increase confidence in reported KPIs. Conversely, extensive but unverified disclosure may not alter performance or valuation. The study therefore treats BRSR quality and assurance as separate from underlying ESG performance.

H3: BRSR disclosure quality has a positive effect on corporate financial performance.

H4: External assurance of BRSR Core strengthens the positive relationship between sustainability performance and financial performance.

3.5. Industry environmental sensitivity

The financial materiality of sustainability differs by sector. Metals, mining, cement, chemicals, power, oil and gas, automobiles and other resource-intensive industries face greater environmental exposure than many service industries. Sustainability may generate larger risk-reduction benefits in such sectors but can also require higher capital expenditure. Industry context should therefore be modelled rather than treated as noise.

H5: Industry environmental sensitivity moderates the relationship between sustainability performance and financial performance.

4. Materials and Methods

4.1. Research design and sample

The study should employ a longitudinal explanatory design using firm-year observations for non-financial companies listed on the NSE and BSE from FY2019–20 to FY2024–25. This window captures the transition from Business Responsibility Reporting to mandatory BRSR and the initial BRSR Core phase. Banks, insurers and other financial firms should be excluded because their balance-sheet structures, leverage and regulatory capital make conventional ROA, ROCE and Tobin's Q less comparable with non-financial firms. The initial universe may comprise the top 1,000 listed entities subject to BRSR requirements. Firms should be retained when the required financial and sustainability data are available for at least three consecutive years. The final sample size must be reported after documenting exclusions for missing reports, unavailable ESG scores, non-comparable financial statements, delisting or extreme data deficiencies. No sample number should be inserted until this screening has been completed.

4.2. Data sources

BRSR and annual reports can be downloaded from company and stock-exchange filing portals. ESG and pillar scores may be obtained from a consistent commercial provider such as Refinitiv, Bloomberg, CRISIL or NSE Sustainability Ratings, subject to access. Financial variables can be collected from CMIE ProwessIQ, Capitaline, Bloomberg, Refinitiv or audited annual reports.

Market capitalisation and year-end prices should come from NSE/BSE records or a consistent financial database. Industry classification must remain stable across the panel.

4.3. Variable measurement

Table 1: Variable measurement

Variable	Operational definition	Role
ROA	Profit after tax / average total assets	Dependent
ROE	Profit after tax / average shareholders' equity	Dependent
ROCE	EBIT / average capital employed	Dependent
Tobin's Q	(Market value of equity + book value of debt) / book value of assets	Dependent
ESG	Overall ESG performance score, rescaled 0–100	Independent
ENV, SOC, GOV	Environmental, social and governance pillar scores	Independent
BRSRQ	Content-analysis score based on applicable BRSR essential and leadership indicators	Independent
ASSURE	1 where BRSR Core metrics are externally assured; 0 otherwise	Moderator
CARBINT	Scope 1 and 2 tCO ₂ e / revenue	Alternative sustainability measure
SIZE	Natural logarithm of total assets	Control
LEV	Total debt / total assets	Control
GROWTH	Annual percentage change in sales	Control
AGE	Natural logarithm of years since incorporation	Control
CAPINT	Net property, plant and equipment / total assets	Control

All continuous variables should be winsorised at the first and ninety-ninth percentiles, or another pre-specified threshold, to reduce the influence of extreme observations. Ratios with economically implausible denominators should be investigated rather than automatically retained. Sustainability scores from different providers must not be pooled without normalisation and comparability testing.

4.4. BRSR disclosure-quality index

A transparent BRSR quality index should be constructed from applicable items. Each essential indicator may receive 1 when quantitatively and completely disclosed and 0 otherwise; leadership indicators may be scored separately to prevent voluntary disclosure from mechanically favouring particular industries. Partial disclosure can receive 0.5 only when explicit coding rules are established before data collection. The firm score should equal points obtained divided by applicable points, multiplied by 100. Two coders should independently assess a subsample, and intercoder agreement should be reported using Cohen's kappa or Krippendorff's alpha.

4.5. Econometric specification

The baseline model is:

$$FP_{it} = \alpha + \beta_1 ESG_{i,t-1} + \gamma Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where FP represents ROA, ROE, ROCE, or Tobin's Q; μ_i captures time-invariant firm effects; and λ_t captures common year shocks. Lagging ESG reduces, but does not eliminate, simultaneity. Separate models replace overall ESG with ENV, SOC, and GOV.

Disclosure and assurance are tested as:

$$FP_{it} = \alpha + \beta_1 ESG_{i,t-1} + \beta_2 BRSRQ_{it} + \beta_3 ASSURE_{it} + \beta_4 (ESG_{i,t-1} \times ASSURE_{it}) + \gamma Controls_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

Hausman tests can inform the fixed- versus random-effects

choice, but theoretical concern about unobserved firm characteristics favours fixed effects. Standard errors should be clustered at the firm level. Cross-sectional dependence, heteroskedasticity, serial correlation, multicollinearity and influential observations should be assessed. Driscoll–Kraay errors may be used where cross-sectional dependence is material.

4.6. Endogeneity and robustness

The ESG–performance relationship is vulnerable to reverse causality, omitted variables and non-random adoption. Robustness analysis should include lagged ESG scores, alternative performance measures, alternative sustainability proxies, industry-by-year fixed effects and exclusion of crisis-period observations. Dynamic system GMM may be applied where the time and cross-sectional dimensions are suitable, using carefully limited instruments and reporting AR(1), AR(2) and Hansen tests. Propensity-score matching or entropy balancing may compare assured and non-assured firms with similar observable characteristics. Results should be described as associations unless the identification strategy supports a causal interpretation.

5. Data Analysis and Results

Research-integrity note – All numerical values in this section are simulated solely to demonstrate a rigorous analysis and publication-ready reporting format. They are not observations from NSE/BSE companies and must be replaced by results obtained from the final Indian dataset before submission, presentation or publication. The values have been designed to be internally coherent across descriptive, diagnostic and regression tables; they should not be cited as empirical evidence.

5.1. Sample profile and data preparation

The unbalanced panel contains 1,128 firm-year observations representing 214 non-financial listed companies over FY2019–20 to FY2024–25. Firms were assumed to contribute at least three consecutive annual observations. The largest representation was assigned to industrial manufacturing (22.0%),

consumer goods (17.8%), information technology and communication services (14.5%), healthcare and pharmaceuticals (11.7%), energy and utilities (10.3%), materials and mining (9.8%), automobiles (7.5%) and other non-financial services (6.4%). Environmentally sensitive industries—energy, utilities, materials, mining, chemicals, cement and automobiles—accounted for 35.6% of observations.

Table 2: sample profile and data preparation

Sample-selection stage	Firms	Firm-year observations
Initial BRSR/ESG-eligible non-financial universe	286	1,716
Less: inadequate ESG/BRSR data	−38	−228
Less: fewer than three consecutive observations	−19	−96
Less: missing financial or market variables	−11	−228
Less: merger/delisting/non-comparable statements	−4	−36
Final panel	214	1,128

Table 3: Descriptive statistics

Variable	N	Mean	SD	Median	Min.	Max.
ROA (%)	1,128	6.84	5.91	6.35	−9.72	24.88
ROE (%)	1,128	13.72	11.46	12.41	−21.35	47.62
ROCE (%)	1,128	11.96	8.74	10.83	−12.10	38.47
Tobin's Q	1,128	1.84	1.13	1.51	0.42	6.37
ESG score	1,128	58.63	14.27	59.80	21.40	89.70
Environmental score	1,128	55.42	17.68	56.10	12.30	92.40
Social score	1,128	60.17	15.06	61.20	18.60	91.80
Governance score	1,128	62.31	12.84	63.00	25.50	90.60
BRSR quality	1,128	67.48	16.35	69.20	24.10	95.30
Assurance dummy	1,128	0.27	0.44	0.00	0.00	1.00
Carbon intensity	1,046	0.186	0.294	0.074	0.003	1.742
Firm size (ln assets)	1,128	10.42	1.57	10.31	7.12	14.38
Leverage	1,128	0.34	0.19	0.32	0.02	0.79
Sales growth	1,128	0.112	0.184	0.094	−0.318	0.693

Continuous variables were assumed to be winsorised at the first and ninety-ninth percentiles. Missing values were not mean-imputed because such imputation artificially reduces dispersion and can bias standard errors. Where a firm lacked an observation for a particular year, the panel remained unbalanced. ESG scores were lagged by one year in the baseline models to establish temporal ordering. ROA, ROE and ROCE are expressed in percentage points; ESG and BRSR quality scores range from 0 to 100; Tobin's Q is a ratio.

The average ESG score of 58.63 suggests moderate rather than advanced sustainability performance. Governance records the highest pillar mean (62.31), followed by social (60.17) and environmental performance (55.42). This ordering is plausible in a transition setting where listed companies may establish policies and governance structures before achieving resource- and emissions-intensive operational improvements. BRSR assurance is present in 27% of firm-year observations, consistent with a phased assurance environment. The standard deviations indicate sufficient between-firm and within-period variation for panel estimation.

Financial performance is heterogeneous. Mean ROA is 6.84%, whereas mean ROE is 13.72%, reflecting the influence of leverage. Tobin's Q exceeds one on average, suggesting that market value is above the recorded asset base for the typical

observation. Negative minima for accounting returns capture loss-making firm-years, but winsorisation limits their influence. Carbon intensity is positively skewed; its median is substantially below its mean, supporting the use of a natural-log transformation in robustness tests.

5.2. Correlation and multicollinearity analysis

ESG is positively correlated with all four performance measures, with coefficients ranging from 0.224 to 0.286. These bivariate relationships are consistent with the proposed hypotheses but cannot establish an independent or causal effect because they do not control for firm characteristics or time shocks. The correlation between ESG and BRSR quality is 0.643, indicating that stronger performers tend to disclose more comprehensively, while remaining below conventional thresholds associated with severe multicollinearity.

Variance-inflation factors were assumed to range from 1.18 to 2.94 in the aggregate ESG model. In the pillar model, the maximum VIF is 4.37 for the environmental score because ESG dimensions share common organisational systems. Both values are below the conservative threshold of 5.0. Tolerance values remain above 0.20. Accordingly, multicollinearity is not consid-

ered sufficient to destabilise the estimates, although aggregate ESG and its three pillars should not be entered in the same equation.

5.3. Panel-data diagnostics and model selection

Table 4: Correlation and multicollinearity analysis

Variable	ROA	ROE	ROCE	Tobin Q	ESG	BRSRQ	SIZE	LEV
ROA	1.000							
ROE	0.681	1.000						
ROCE	0.742	0.704	1.000					
Tobin Q	0.352	0.291	0.318	1.000				
ESG	0.286	0.224	0.263	0.238	1.000			
BRSRQ	0.221	0.179	0.202	0.215	0.643	1.000		
SIZE	0.147	0.096	0.156	-0.082	0.418	0.392	1.000	
LEV	-0.243	0.104	-0.198	-0.117	-0.062	-0.028	0.174	1.000

Table 5: Panel-data diagnostics and model selection

Diagnostic	Statistic	p value	Inference
Breusch-Pagan LM: pooled OLS vs random effects	$\chi^2 = 416.28$	< .001	Panel effects present
F test: pooled OLS vs firm fixed effects	F = 7.96	< .001	Firm effects jointly significant
Hausman: fixed vs random effects	$\chi^2 = 31.74$	.002	Fixed effects preferred
Modified Wald heteroskedasticity test	$\chi^2 = 9, 184.51$	< .001	Groupwise heteroskedasticity
Wooldridge serial-correlation test	F = 26.83	< .001	First-order serial correlation
Pesaran CD test	CD = 4.91	< .001	Cross-sectional dependence

Table 6: Baseline effect of aggregate ESG performance

Predictor	ROA β (SE)	ROE β (SE)	ROCE β (SE)	Tobin's Q β (SE)
ESG score $t - 1$	0.031*** (0.009)	0.052** (0.021)	0.044*** (0.013)	0.0062*** (0.0018)
BRSR quality	0.014* (0.008)	0.021 (0.018)	0.019* (0.011)	0.0031** (0.0014)
Firm size	0.482** (0.213)	0.731 (0.512)	0.694** (0.302)	-0.081* (0.046)
Leverage	-3.116*** (0.842)	4.382** (1.916)	-2.864** (1.209)	-0.392*** (0.118)
Sales growth	2.047*** (0.601)	3.816*** (1.351)	2.693*** (0.847)	0.214** (0.089)
Capital intensity	0.728 (0.592)	1.106 (1.273)	1.517* (0.814)	-0.146* (0.082)
Firm age	0.194 (0.271)	0.318 (0.648)	0.402 (0.381)	-0.037 (0.053)
Observations	1,128	1,128	1,128	1,128
Within R ²	0.274	0.213	0.251	0.196

Notes: Simulated estimates. Firm and year fixed effects included. Driscoll-Kraay standard errors in parentheses.

* $p < .10$; ** $p < .05$; *** $p < .01$.

The LM and firm-effects tests reject pooled OLS. The Hausman result rejects the null that random-effects estimates are consistent, supporting the use of firm fixed effects. Heteroskedasticity, serial correlation and cross-sectional dependence are also detected. The main specifications therefore include firm and year fixed effects and use Driscoll-Kraay standard errors. Firm-clustered standard errors are reported as a robustness alternative. Industry fixed effects are absorbed by firm fixed effects because industry membership is largely time invariant.

5.4. Baseline effect of aggregate ESG performance

Lagged ESG performance is positive and statistically significant in all four models. A one-point increase in ESG is associated with increases of 0.031 percentage points in ROA, 0.052 percentage points in ROE, 0.044 percentage points in ROCE and 0.0062 units in Tobin's Q, other factors held constant. A ten-point ESG improvement therefore corresponds to approximately 0.31 per-

centage points higher ROA, 0.52 percentage points higher ROE, 0.44 percentage points higher ROCE and 0.062 higher Tobin's Q. Relative to mean performance, these represent economically meaningful but not implausibly large changes.

BRSR quality is significant for ROA, ROCE and Tobin's Q but not ROE. This pattern suggests that disclosure quality may provide incremental information and process discipline while its relationship with shareholder returns is obscured by capital structure. Leverage reduces ROA, ROCE and market valuation but is positively associated with ROE because debt magnifies returns on the equity base. Sales growth is consistently positive. The within R² values show that the models explain between 19.6% and 27.4% of within-firm variation after fixed effects.

5.5. Disaggregated environmental, social and governance effects

Environmental performance has its strongest accounting association with ROCE, consistent with resource efficiency and productive-capital utilisation. Its relationship with ROE is pos-

itive but nonsignificant, indicating that environmental investment may not immediately translate into equity returns after financing effects. Social performance significantly predicts ROE and weakly predicts ROA, but its ROCE and Tobin's Q coefficients are not significant. Governance is the most consistent pillar, positively affecting every outcome. The governance result supports the view that oversight, ethical controls, transparency and risk management help firms convert ESG initiatives into financial value.

The pillar estimates also demonstrate why an aggregate

ESG score should not be interpreted as evidence that every component has an identical financial effect. H1a receives support for ROA and ROCE but not ROE; H1b receives support for ROA and ROE but not ROCE; and H1c is supported across the three accounting measures.

5.6. Moderating role of BRSR Core assurance

Table 7: Disaggregated environmental, social and governance effects

ESG pillar	ROA β (SE)	ROE β (SE)	ROCE β (SE)	Tobin's Q β (SE)
Environmental t-1	0.019** (0.008)	0.018 (0.017)	0.028*** (0.010)	0.0030** (0.0014)
Social t-1	0.012* (0.007)	0.031** (0.015)	0.014 (0.009)	0.0018 (0.0012)
Governance t-1	0.024*** (0.009)	0.047** (0.020)	0.026** (0.012)	0.0037** (0.0016)
Controls	Yes	Yes	Yes	Yes
Firm/year fixed effects	Yes	Yes	Yes	Yes
Observations	1,128	1,128	1,128	1,128
Within R ²	0.289	0.226	0.269	0.207

Notes: Simulated estimates. Driscoll–Kraay standard errors in parentheses. * $p < .10$; ** $p < .05$; *** $p < .01$.

Table 8: Moderating role of BRSR Core assurance

Predictor	ROA β (SE)	ROCE β (SE)	Tobin's Q β (SE)
ESG score t-1	0.025*** (0.009)	0.036*** (0.013)	0.0048*** (0.0017)
Assurance	0.286* (0.167)	0.394* (0.226)	0.041 (0.032)
ESG $\times$ Assurance	0.017** (0.008)	0.023** (0.011)	0.0036** (0.0016)
Controls and fixed effects	Yes	Yes	Yes
Observations	1,128	1,128	1,128
Within R ²	0.283	0.261	0.203

The ESG-by-assurance interaction is positive and significant. For observations without assurance, a ten-point ESG improvement is associated with a 0.25 percentage-point increase in ROA. For assured observations, the corresponding marginal effect is 0.42 percentage points: $10 \times (0.025 + 0.017)$. The ROCE effect similarly increases from 0.36 to 0.59 percentage points, while the Tobin's Q effect rises from 0.048 to 0.084. The results support H4 and are consistent with signalling theory: external assurance strengthens the credibility and financial relevance of sustainability information.

Because assurance adoption is not random, the interaction must be interpreted cautiously. Larger and better-performing firms may be more able to purchase assurance and build mature ESG data systems. The robustness section therefore uses entropy balancing and a lagged-assurance specification.

5.7. Moderating role of environmental industry sensitivity

Table 9: Moderating role of environmental industry sensitivity

Predictor	ROA β (SE)	ROCE β (SE)	Tobin's Q β (SE)
ESG score t - 1	0.024** (0.010)	0.033** (0.014)	0.0051*** (0.0018)
ESG $\times$ sensitive industry	0.021** (0.009)	0.031*** (0.012)	0.0012 (0.0015)
Controls and fixed effects	Yes	Yes	Yes
Observations	1,128	1,128	1,128
Within R ²	0.281	0.266	0.197

The interaction between ESG and environmentally sensitive industry status is positive for ROA and ROCE. A ten-point ESG improvement is associated with 0.24 percentage points higher ROA in less sensitive industries and 0.45 percentage points in sensitive industries. For ROCE, the corresponding effects are 0.33 and 0.64 percentage points. The market-valuation

interaction is not significant, implying that investors do not attach a reliably different valuation premium across the two industry groups once firm and year effects are controlled. H5 is therefore supported for accounting performance but not for Tobin's Q.

5.8. Endogeneity and robustness analysis

Table 10: Endogeneity and robustness analysis

Robustness specification	ESG→ROA	ESG→ROCE	ESG→Tobin's Q	Conclusion
Firm-clustered SE	0.031***	0.044***	0.0062***	Inference unchanged
Two-year lagged ESG	0.024**	0.035**	0.0047**	Smaller but persistent
System GMM	0.028**	0.039***	0.0054**	Positive after dynamics
Entropy-balanced assurance sample	0.030***	0.041***	0.0059***	Selection adjustment stable
Alternative ESG provider score	0.026**	0.038***	0.0051**	Measurement robust
Carbon intensity alternative	-0.412**	-0.587***	-0.061**	Lower intensity predicts performance
Excluding FY2020–21	0.029***	0.041***	0.0058***	Not crisis-driven

Notes: Simulated coefficients; significance symbols follow the preceding tables. System-GMM diagnostics were assumed to be acceptable: AR(1) $p < .001$, AR(2) $p = .284$ and Hansen $p = .317$, with 38 instruments for 214 firms. These values indicate expected first-order correlation but no evidence of second-order residual correlation, while the Hansen test does not reject instrument validity. The instrument count remains well below the number of firms.

The positive ESG coefficients persist across alternative standard errors, longer lags, dynamic estimation, balancing and

alternative score measurement. The two-year-lag estimates are smaller, which is consistent with partial attenuation rather than disappearance. Carbon intensity is negatively associated with performance, offering construct validity: firms producing more emissions per unit of revenue record weaker outcomes. Removing the pandemic-affected FY2020–21 observations does not materially change the findings.

5.9. Hypothesis decisions

Table 11: Hypothesis decisions

Hypothesis	Decision	Basis
H1: Overall ESG → accounting performance	Supported	Positive ESG coefficients for ROA, ROE and ROCE
H1a: Environmental performance	Partially supported	Significant for ROA and ROCE; not ROE
H1b: Social performance	Partially supported	Significant for ROA and ROE; not ROCE
H1c: Governance performance	Supported	Significant for ROA, ROE and ROCE
H2: Overall ESG → Tobin's Q	Supported	Positive and significant coefficient
H3: BRSR quality → financial performance	Partially supported	ROA, ROCE and Tobin's Q significant; ROE not significant
H4: Assurance moderation	Supported	Positive ESG × assurance interaction
H5: Industry sensitivity moderation	Partially supported	ROA and ROCE significant; Tobin's Q not significant

Taken together, the simulated results portray a positive but differentiated sustainability–performance relationship. Governance is the most consistently value-relevant pillar; environmental performance is especially important for capital efficiency; social performance is more closely associated with equity returns; and credible assurance strengthens the ESG effect. These patterns are more informative than a single claim that sustainability universally improves profit.

6. Discussion

If overall ESG performance is positively associated with accounting returns, the result would support stakeholder and resource-based arguments that sustainability improves efficiency, resilience and stakeholder cooperation. A stronger effect for environmental performance in resource-intensive

sectors would suggest that energy, emissions, water and waste practices are financially material. A positive governance effect would indicate that board oversight, ethical systems and transparency help convert sustainability commitments into economic outcomes.

If disclosure quality affects Tobin's Q more strongly than ROA or ROCE, the likely mechanism is information and reputation rather than immediate operating efficiency. An assurance interaction would strengthen the signalling interpretation by showing that markets or operating stakeholders reward credible information. Conversely, a weak association between BRSR quantity and performance would indicate that compliance-oriented disclosure is insufficient without substantive improvement.

Negative or heterogeneous effects would also be theoretically meaningful. Indian firms may incur substantial transition costs for cleaner technology, safety systems, supply-chain

monitoring and data assurance. Benefits can arise only after implementation capability matures. Firms at different profitability levels may also experience different returns to ESG investment, as indicated by quantile-based Indian evidence. The discussion should therefore avoid the simplistic claim that every sustainability activity automatically raises profit.

7. Implications

7.1. Managerial implications

Boards should integrate financially material ESG issues into capital budgeting, enterprise risk management and operating performance rather than treating BRSR as an annual reporting exercise. Environmental initiatives should be assessed through energy, water, waste, emissions, downtime and lifecycle-cost metrics. Social programmes should be connected to safety, retention, skills, supplier continuity and customer trust. Assurance readiness should begin with strong internal data ownership, consistent boundaries and audit trails.

7.2. Investor implications

Investors should distinguish ESG disclosure volume from verified outcomes and examine pillar-level materiality. Comparable BRSR Core data can support engagement and risk assessment, but scores should be interpreted with knowledge of provider methodology and sector exposure. Accounting and market measures should be evaluated together because sustainability may improve resilience before it becomes visible in annual profitability.

7.3. Policy implications

SEBI and other institutions should continue improving comparability, digital tagging, sector guidance and assurance quality while monitoring the compliance burden. Consistent definitions and accessible historical data would enable stronger research and reduce rating divergence. Capacity support may be necessary for value-chain partners and smaller companies that face data and assurance constraints.

8. Conclusion

The financial consequences of corporate sustainability in India cannot be inferred directly from developed-market evidence. India's BRSR regime, mandatory CSR framework, ownership patterns, industrial structure and rapidly evolving ESG market create distinct incentives and constraints. This paper develops an India-specific model that links overall ESG performance, pillar scores, BRSR quality and assurance to accounting returns and market valuation.

The proposed panel design improves on cross-sectional comparisons by controlling for stable firm characteristics and common time shocks and by incorporating lagged variables and endogeneity checks. It also separates substantive performance from disclosure credibility. The framework is suitable for empirical implementation once company-level Indian data

have been compiled. Until then, no numerical findings should be claimed. A transparent, well-identified analysis can provide useful evidence to managers, investors and regulators regarding when sustainability functions as a cost, a risk-management mechanism or a source of competitive value.

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