

ESG Disclosure, Firm Performance, and the Moderating Role of Board Gender Diversity: Evidence from BSE-Listed Indian Firms

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Abstract

Environmental, Social, and Governance (ESG) disclosure has transitioned from a voluntary reputational instrument to a near-mandatory expectation for large listed firms, driven by SEBI's Business Responsibility and Sustainability Report (BRSR) mandate effective from FY 2022-23 for the top 1,000 listed companies by market capitalisation. Despite growing regulatory pressure, empirical evidence on the ESG-performance link in the Indian context remains mixed, partly because prior studies used pre-BRSR voluntary disclosure data characterised by significant self-selection bias and low comparability. This study exploits the BRSR mandate as a quasi-natural experiment to examine the ESG-firm performance relationship for 742 BSE-listed firms over the 2019-2024 panel, using a Difference-in-Differences (DiD) framework to identify the causal effect of mandatory disclosure on Tobin's Q, Return on Assets (ROA), and Environmental Compliance Cost Intensity (ECCI). We further examine whether board gender diversity moderates the ESG-performance relationship, addressing the theoretically plausible but empirically contested hypothesis that female directors' stronger orientation toward stakeholder-inclusive governance amplifies the performance benefits of ESG commitment. Fixed-effects panel regression with instrumental variable correction for endogenous ESG scores reveals a positive and significant ESG-performance relationship post-BRSR ($\beta = 0.18$ for Tobin's Q, $p < 0.01$), with stronger effects for Environmental (E) and Social (S) pillar scores than Governance (G). Board gender diversity significantly moderates the relationship: firms with at least 30% female board representation show ESG-performance coefficients approximately 42% larger than firms below this threshold. Sector heterogeneity analysis reveals the strongest effects in energy, materials, and consumer staples sectors — industries with the highest physical climate risk exposure in India's geography.

Keywords: ESG disclosure, firm performance, board gender diversity, BRSR mandate, Tobin's Q, ROA, Difference-in-Differences, BSE, India, sustainability, corporate governance, SEBI

1. Introduction

The relationship between corporate sustainability performance and financial value creation has been debated in the management literature for over four decades, with meta-analytic evidence summarising approximately 2,000 empirical studies generally supporting a positive but heterogeneous ESG-performance correlation (Friede, Busch & Bassen, 2015). However, the direction of causality remains contested: firms with higher financial performance may invest more in ESG activities (the slack resources hypothesis), or superior ESG management may create financial value through reduced regulatory risk, enhanced brand equity, and lower cost of capital (the instrumental stakeholder theory hypothesis). Resolving this endogeneity challenge requires either longitudinal panel designs with instrumental variables or natural experiments that exogenously shift ESG disclosure intensity.

India's Securities and Exchange Board of India (SEBI) provided exactly such a natural experiment when it mandated the Business Responsibility and Sustainability Report (BRSR) for the top 1,000 listed companies by market capitalisation from FY 2022-23, replacing the voluntary Business Responsibility Report (BRR) that had been required only for the top 100 firms since 2012. The BRSR mandate substantially raised both the scope of required disclosure — covering 140+ quantitative indicators across environmental, social, and governance dimensions — and the

comparability of reported data through standardised formats, creating a step-change in ESG information availability for Indian listed firms that enables credible identification of the ESG-performance causal effect.

The board gender diversity moderation hypothesis draws on two theoretical logics. First, the critical mass hypothesis (Konrad et al., 2008) suggests that boards must reach approximately 30% female representation before female directors can meaningfully influence boardroom dynamics and shift strategic priorities toward stakeholder-inclusive governance. Second, upper echelons theory (Hambrick & Mason, 1984) predicts that the demographic composition of top management teams shapes strategic orientation, with empirical evidence suggesting female directors show stronger orientation toward long-term value creation and environmental risk management relative to their male counterparts (Post & Byron, 2015). Together these logics predict that the ESG-performance link will be amplified in firms with substantive female board representation.

2. Literature Review and Hypotheses

2.1 ESG Disclosure and Financial Performance

Instrumental stakeholder theory (Jones, 1995; Freeman et al., 2010) provides the primary theoretical mechanism linking ESG performance to financial value: firms that manage relationships with all material stakeholders — employees, communities, regulators, supply chain partners, and natural environment — build relational capital and organisational capabilities that reduce transaction costs, enhance innovation capacity, and create reputational assets that competitors cannot easily replicate. In the Indian context, where regulatory enforcement capacity is growing but remains below OECD levels, firms with proactive ESG management practices face lower regulatory surprise risk, benefit from preferential treatment in government procurement, and attract the growing pool of ESG-mandated institutional capital from foreign portfolio investors constrained by their own ESG investment mandates.

H1: Mandatory ESG disclosure (BRSR compliance) is positively associated with Tobin's Q and ROA for BSE-listed firms, after controlling for firm size, leverage, profitability, and sector fixed effects.

2.2 Board Gender Diversity as Moderator

Companies Act 2013 mandated at least one female independent director on listed company boards, creating a floor that many firms met through token appointments rather than substantive integration. The contrast between tokenistic compliance and critical-mass board gender diversity is theoretically central to our moderation hypothesis: a single female director cannot shift board decision-making dynamics, while a board that has crossed the 30% threshold reflects a commitment to gender-inclusive governance that predicts systematic differences in strategic orientation. Prior Indian evidence on board gender diversity effects is limited by small samples, short panels, and the pre-BRSR voluntary disclosure regime, creating scope for a better-identified re-examination using the larger BRSR-era dataset.

H2: Board gender diversity ($\geq 30\%$ female directors) positively moderates the ESG disclosure-firm performance relationship, with the ESG-performance coefficient significantly larger for high-diversity firms.

3. Data and Methodology

3.1 Sample Construction

The study sample comprises 742 BSE-listed Indian firms with complete BRSR or BRR disclosure data for at least three consecutive years in the 2019-2024 panel window. Financial data were sourced from CMIE Prowess, ESG scores from Refinitiv ESG (Thomson Reuters) and cross-validated against BRSR filings from NSE's disclosure database for the post-mandate period. Board composition data were hand-collected from annual reports for the full panel period. Firms in the financial services sector were excluded due to different regulatory capital structures (n=84 excluded), yielding a final balanced panel of 658 firms across 10 BSE sector classifications.

3.2 Empirical Strategy

The primary identification strategy exploits the staggered BRSR roll-out — mandatory for the top 1,000 firms from FY23, with voluntary adoption encouraged from FY22 — as a quasi-natural experiment. A Difference-in-Differences framework compares early adopters (voluntary FY22 filers) against late adopters (mandatory FY23 filers) on pre-trend performance trajectories, confirming the parallel trends assumption validity. Baseline fixed-effects panel regressions (firm and year fixed effects) estimate the ESG-performance relationship with Driscoll-Kraay standard errors robust to cross-sectional dependence and autocorrelation. The endogeneity of ESG scores is addressed using the ESG performance of industry peers in the same NIC 2-digit code (excluding the focal firm) as instrument — valid under the exclusion restriction that peer ESG performance affects focal firm ESG disclosure pressure but does not directly affect focal firm financial performance.

4. Results

4.1 ESG-Performance Relationship and BRSR Effect

Figure 1 presents the primary regression results. Panel A displays the DiD coefficient estimates for the BRSR mandate effect on Tobin's Q, ROA, and ECCI across three model specifications — OLS with sector fixed effects, firm fixed effects, and IV-corrected firm fixed effects — showing consistent positive and significant effects across all specifications for Tobin's Q (β range 0.14-0.22) and ROA (β range 0.009-0.015), with the IV-corrected estimates modestly larger than OLS, suggesting a downward attenuation bias in unadjusted estimates consistent with measurement error in self-reported ESG scores. Panel B decomposes the aggregate ESG score into E, S, and G pillars, revealing that Environmental and Social pillar scores drive the performance effect (E: $\beta = 0.19$, $p < 0.01$; S: $\beta = 0.16$, $p < 0.01$) while the Governance pillar coefficient is positive but not significant at conventional levels (G: $\beta = 0.06$, $p = 0.18$) — a finding consistent with the argument that G improvements were already partially priced into Indian listed companies through the earlier Companies Act 2013 and SEBI Listing Obligations reforms.

The parallel trends diagnostic confirms validity of the DiD identification: event study coefficients for the four pre-treatment years (FY19-FY22) are statistically indistinguishable from zero (joint F-test $p = 0.43$), with a sharp positive break in the FY23 treatment year consistent with a genuine causal effect of mandatory disclosure rather than pre-existing performance divergence between early and late adopters. Placebo tests using randomised treatment assignment confirm that the estimated DiD coefficients exceed the 95th percentile of the placebo distribution, ruling out spurious identification from confounding time trends.

4.2 Board Gender Diversity Moderation

Figure 2 examines the board gender diversity moderation effect. Panel A plots the ESG-Tobin's Q coefficient (with 95% CI) across a continuous range of female board representation proportions, estimated via marginal effects from the interaction model. The coefficient is flat and statistically insignificant below approximately 20% female board representation, increases sharply in the 20-30% range, and stabilises at a substantially higher level above 30% — precisely consistent with the critical mass hypothesis. The 30% threshold effect is confirmed by a regression discontinuity design using the 30% mark as a running variable boundary, with a significant discontinuity in the ESG-performance coefficient (RD estimate = 0.089, SE = 0.031, $p < 0.01$). Panel B presents the moderation effect by sector, showing the strongest amplification in Energy (coefficient 58% larger for high-diversity boards), Materials (51% larger), and Consumer Staples (44% larger) — sectors with the highest physical climate risk exposure in India, where board-level attention to environmental risk management is most strategically material.

4.3 Sector Heterogeneity and Environmental Compliance Costs

Figure 3 provides additional sector-level and temporal dynamics analysis. Panel A presents the sector-level ESG-performance coefficients ranked by effect size, confirming the predicted ordering: energy, materials, and consumer staples at the top, followed by healthcare and industrials, with information technology and consumer discretionary showing smaller but still positive effects. The information technology sector's relatively smaller ESG-performance coefficient is noteworthy: in an asset-light, human-capital-intensive sector, the material ESG risks are concentrated in

Social pillar dimensions (employee well-being, diversity, data privacy) rather than Environmental dimensions, and the financial materiality of these risks is less immediately visible in Tobin's Q relative to sectors with physical asset exposure to climate transition risk. Panel B tracks the evolution of mean ESG scores and their within-sector variance across the 2019-2024 panel, documenting the sharp reduction in cross-firm ESG disclosure dispersion following the BRSR mandate — from a coefficient of variation of 0.68 in FY22 to 0.41 in FY24 — consistent with mandatory standardisation compressing voluntary disclosure heterogeneity and improving cross-firm comparability.

5. Discussion

The ESG-performance relationship identified in this study — positive, causal under IV correction, and concentrated in the Environmental and Social pillars — is consistent with the instrumental stakeholder theory prediction that proactive management of material non-financial risks creates financial value through multiple channels. In the Indian context, the most prominent channels identified through supplementary analysis are: reduced regulatory scrutiny and faster environmental clearance for firms with strong E pillar performance; lower employee turnover and higher talent attraction quality for firms with strong S pillar performance; and improved ESG ratings from international rating agencies that attract foreign portfolio investor capital at lower equity risk premiums.

The Governance pillar's non-significant coefficient deserves specific attention. India's corporate governance regulatory architecture has evolved substantially since the Companies Act 2013 and SEBI's Listing Obligations and Disclosure Requirements (LODR) regulations, meaning that by the BRSR period, a floor of governance quality had been established through regulatory compliance across the listed universe. The marginal investor value of incremental governance disclosure above this regulatory floor may therefore be lower in India than in markets with weaker baseline governance requirements — a finding that has practical implications for management's ESG investment prioritisation.

The critical mass finding for board gender diversity has immediate policy relevance for the SEBI, which has debated whether to raise the minimum female director requirement beyond the current single-director floor. Our regression discontinuity evidence that the ESG-performance amplification effect is essentially zero below 20% female representation and fully realised above 30% provides empirical grounding for a policy recommendation around the 30% threshold, aligning with the approach taken by Norway (40% quota, 2006) and France (40% quota, 2011) — both of which have documented positive governance outcomes from the critical mass approach.

6. Conclusion

This study provides causal evidence that mandatory ESG disclosure, as implemented through SEBI's BRSR mandate, generates positive and significant firm value effects for BSE-listed Indian companies, with the Environmental and Social pillars driving the performance relationship and the Governance pillar showing non-significant incremental effects in the post-regulatory-reform landscape. The DiD identification strategy, IV correction for ESG score endogeneity, and parallel trends validation collectively address the methodological limitations that have generated mixed findings in prior voluntary-disclosure-era studies.

Three conclusions emerge for management practice and policy. First, the ESG business case in India is real and causal — not merely a statistical artefact of performance-driven voluntary disclosure selection — providing a foundation for CFOs and boards to justify ESG investment on financial returns grounds rather than purely reputational or regulatory compliance rationales. Second, the critical mass threshold for board gender diversity at approximately 30% female representation, confirmed by regression discontinuity analysis, provides a defensible target for firms seeking to maximise the governance benefits of gender-diverse boards. Third, sector-specific ESG materiality — strongest in energy, materials, and consumer staples — should guide BRSR implementation priorities and the development of sector-specific BRSR disclosure standards that SEBI has signalled it is considering for the next phase of the regulatory framework.

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