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Are Green Firms Valued Differently? Evidence from Valuation Multiples in Indian Equity Markets

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Abstract

The study examines how "green" companies are perceived relative to traditional companies by the public equities market in India, utilizing valuation ratios as opposed to measuring returns. A total of 740 firms were examined using the Screener. in export and categorized as either Green or Conventional based on their inclusion in the NIFTY100 ESG constituent list (Green_Flag = 1 if an ESG constituent, zero otherwise). The sample consisted of 66 Green and 674 Conventional firms. Three common valuation ratios — P/E, EV/EBITDA, and P/S — were utilized to proxy for valuation and winsorized at 1% to eliminate potential outliers, allowing for the estimation of these ratios with heteroskedasticity-consistent HC3 robust standard error estimates. The separation of valuation ratios among firms in each group is somewhat limited and generally consistent with the larger body of literature, which has demonstrated that ESG-related valuations vary across markets due to different ESG classifications and are sensitive to model specifications. The Green Flag is negative and statistically significant across all three valuation ratios in the baseline sample, when controlling for firm size, profitability, and debt-servicing capacity, indicating a "green discount" within the screened universe of firms. When conducting a robustness check using 1:3 nearest neighbour matching (matching 66 Green firms to 198 Conventional firms), the relationship becomes attenuated; the coefficients continue to be negative but lose statistical significance, which suggests that part of the initial difference in valuation represents comparability and composition effects. These results contribute to the ESG valuation literature related to emerging markets by demonstrating that simply comparing valuation ratios can be misleading and that any conclusions will depend on the specific control variables and matched comparator(s) chosen, thereby having direct implications for ESG communications, valuation practices, and disclosure quality.

Keywords: *ESG; green firms; valuation multiples; P/E; EV/EBITDA; price-to-sales; India; NIFTY100 ESG; matching; HC3 robust inference; screened sample.*

1.0 Introduction

Sustainable finance has evolved from being a niche area of choice to a general frame through which investors, regulators and companies assess corporate risk and long-term value creation. A central empirical question, however, remains unanswered: Do "greener" companies trade at significantly different values than their non-green peers, and if so, does the differential represent a "valuation premium" or a "valuation discount"? Competing theoretical perspectives argue that there should be two very different answers. Stakeholder and risk management perspectives suggest that the strength of a company's ESG performance could reduce the expected volatility of future cash flows, decrease tail risk (including regulatory, litigation and reputational risk) and possibly lower the cost of capital, which would imply a valuation premium. On the other hand, transition-finance perspectives argue that new green business models will require significant investment in order to develop new technologies and products, will be dependent on the development of new policies and regulations, and will likely take many years to generate returns, which could depress multiples and create a valuation discount even when current profitability appears comparable (Pástor et al., 2021; Bolton & Kacperczyk, 2021).

Empirical research on this topic has produced mixed results that depend on (i) how "green" is defined, (ii) the specific equity market examined, and (iii) the specific model specifications used. Most meta-analytic evidence suggests a positive relationship between ESG-performance, but there is also substantial variation across contexts (Friede et al., 2015).

More recent research demonstrates that ESG ratings from various rating agencies vary substantially in terms of scope, methodology and weights, and therefore make direct comparisons of "green" vs "non-green" classifications problematic (Berg et al., 2022). The measurement problem becomes even more acute in emerging markets, such as India, where there is considerable uncertainty regarding the credibility of ESG labels, as these markets are in the process of developing their sustainability-reporting frameworks.

Given its relatively rapid development of sustainability reporting frameworks, India represents a critical context for examining the valuation implications of ESG practices. As a result of the increasing popularity of ESG investing, India has implemented several regulatory initiatives aimed at enhancing sustainability reporting and comparability. For example, India's ESG disclosure regime for listed firms has developed over time as part of the Securities Exchange Board of India's (SEBI) Business Responsibility and Sustainability Reporting (BRSR) Framework. Additionally, the regulator continues to review the requirements related to ESG disclosures as the BRSR framework is implemented.

At the same time, an increasing body of empirical research provides evidence that statistically significant relationships exist between ESG practices and firm performance in India. Some of that research suggests that these relationships may vary depending on the distribution of firm performance (quantile-based effects) and across different industries (e.g., Rao, 2023; Gartia et al., 2024).

Although a statistically significant relationship between ESG practices and firm performance implies that investors reward or penalize sustainability profiles, it does not necessarily imply that markets assign a valuation premium or discount to the same sustainability profile. Investors' beliefs regarding the persistence of ESG practices, the associated risks and the credibility of the underlying disclosures influence how they evaluate the same sustainability profile and subsequently determine whether the sustainability profile is rewarded with a premium or penalized with a discount.

In light of these gaps, the objective of the present study is to investigate whether green firms are valued differently in the Indian equity market when valuation is assessed through market multiples. Since the use of valuation multiples is a common practice among analysts and directly captures how investors perceive earnings power, cash flow generation, and revenue scalability, we deliberately focus on the valuation-multiples approach (P/E, EV/EBITDA, and P/S). Compared to return-based analyses, multiples better capture investor perceptions regarding growth, risk, and capital-allocation embedded in prices.

We operationalize "green" as the inclusion of a firm in the NIFTY100 ESG constituent list (Green_Flag=1), which is merged with a screened dataset of all listed Indian firms compiled from a screener and filtered for a minimum size and financial health.

The baseline sample comprises 740 firm observations (66 green and 674 conventional), and we apply 1% winsorization and HC3 robust inference to mitigate outliers and heteroscedasticity typical of valuation ratios.

Our design allows us to make three contributions. First, we compare multiples between green and conventional firms descriptively and in terms of their distributions, demonstrating that a simple comparison of means or medians may be misleading when the dispersion is large. Second, we control for fundamental factors (firm size, profitability, and the ability to service debt) in our multivariate valuation model to distinguish the "green label" from the economic determinants of multiples.

Third, we directly address the imbalance in the baseline group of green and conventional firms through a 1:3 matched-sample robustness test, matching each green firm to three conventional

firms that are identical in terms of the most relevant valuation factors (size, return on equity, sales and interest coverage) to improve the comparability and reduce the likelihood that any observed "green effect" is merely a compositional issue.

In summary, by combining an actionable definition of a green classification, practical valuation multiples for practitioners, robust statistical methods, and matched comparators, this study addresses both academic researchers and practitioners who seek clarity regarding whether ESG-based identifiers are systematically reflected in the valuation of Indian equity companies, and under what conditions that reflection is characterized as a premium versus a discount.

2.0 Literature Review

2.1 ESG and valuation: why premiums and discounts both make sense

The impact of ESG on valuation can be understood through a lens of competition between risk/cost-of-capital factors and cash flow/transition cost factors. On the one hand, ESG has the potential to mitigate the downsides associated with regulatory penalties, litigation, reputational damage, and operational disruptions, thereby increasing the stability of expected future cash flows and reducing perceived risk, which can lead to higher valuation multiples. On the other hand, green transitions are likely to be capital-intensive, policy-dependent, have uncertain technology paths, and require extended periods of time before a full return on investment. Therefore, they could lead to a reduced willingness to pay for each unit of earnings, EBITDA, and/or sales. Asset pricing theory also provides an additional lens into this issue; if investors derive "utility" from owning "green" assets, then equilibrium expected returns will be lower for "green" firms, and this effect will likely occur in conjunction with higher prices. However, it will depend upon the regime and preferences of investors (Pástor et al., 2021).

In addition to the study of climate and carbon risk, there is also a body of research examining how investors price carbon exposure. This line of inquiry suggests that investors do place a premium on companies with high levels of carbon exposure. Therefore, climate-related risk perceptions can significantly influence asset prices and, subsequently, valuation multiples (Bolton & Kacperczyk, 2021). These findings are consistent with the notion that the size of ESG related valuation differences will depend upon the state of the world; where ESG is used to enhance perceived risk and credibility of cash flows, premiums are likely to emerge; whereas discounting is likely to occur when investors believe that the company is exposed to transition costs, uncertain policy, or that the company's ESG practices are misleading.

2.2 What the broad evidence says: positive on average, heterogeneous in detail

Generally speaking, a significant portion of the larger-scale synthesis of literature finds that, on average, ESG does not destroy value and is often correlated with improved financial performance; however, the relationship is far from homogeneous across different designs and markets. A well-known meta-analysis of over 2000 empirical studies found that a significant number of studies reported a non-negative relationship between ESG and performance, indicating that ESG can be compatible with creating value (Friede et al., 2015). However, more recent research highlights that the literature is generally very heterogeneous—this heterogeneity arises due to different characteristics of industries, regulations, investor clientele and methods of measuring ESG.

Measurement is a key component to understanding the heterogeneity in the literature. ESG ratings provided by major rating agencies often diverge to a great extent, as rating agencies use different weights and definitions for E, S, and G pillar ratings, and also measure different aspects (e.g., performance, disclosure, etc.) and/or exposures to risk. Berg et al. (2022) demonstrate that rating agency divergence is systematic and substantial and is largely due to differences in the scope of measurement, methodology and/or weighting schemes — therefore, the same firm can receive a "high ESG" rating from one provider and an "average ESG" rating from another. Therefore, for valuation studies, the estimation of ESG premiums/discounts can vary depending on the classification scheme employed. Consequently, results should be viewed as valuations of the specific ESG signal used, rather

than a universal statement regarding the company's sustainability.

2.3 Emerging markets and the India setting: disclosure evolution and credibility effects

A key point here is that there is a distinct "environment" of emerging markets, including evolving ESG disclosure regimes and assurance practices, which results in uneven investor confidence in the information environment. As such, India's sustainability reporting ecosystem has grown significantly through BRSR-linked disclosure initiatives and regulatory reviews suggest continued pursuit of "optimal regulation" designed to enhance reporting quality while avoiding unrealistic compliance obligations, particularly for smaller firms. From a valuation perspective, this distinction is significant because less comparable and assured information will likely increase information risk, which investors may interpret as a valuation discount for companies that are otherwise considered "green."

A growing body of empirical work within India has linked ESG to performance and firm value; however, these studies typically utilize accounting or Tobin's Q-style outcomes rather than practitioner multiples. In her analysis of Nifty 50 firms, Rao (2023) found that quantile effects exist regarding ESG-profitability relationships, suggesting that the impact of ESG may differ between weak and strong performers. Gartia et al. (2024) found time-varying ESG effects on financial performance for Indian manufacturing firms, further supporting the notion that ESG effects are contingent upon the context and timing of those effects. This evidence base for India provides a starting point for consideration of the question of whether the market values "green identity" in valuation multiples, net of size, profitability and solvency.

2.4 Why valuation multiples are an important (and different) lens

Valuation multiples reflect investors' expectations about future growth, risk and capital intensity, and they are widely employed by analysts and investors, thus serving as a link between academia and practice for ESG research. Importantly, multiples may respond differently to ESG than performance metrics do. For example, if ESG primarily lowers risk, then it may result in higher P/E ratios due to lower discount rates, regardless of whether earnings grow immediately; if ESG leads to increased capital expenditures, or increased policy exposure, then it may reduce EV/EBITDA, or P/S ratios, even when sales growth appears strong. Furthermore, valuation multiples are highly sensitive to outliers and, therefore, require robust data treatment (winsorization) and robust inference techniques (heteroskedasticity).

In addition, comparisons of multiples among groups may be influenced by structural differences in sectoral composition, size and profitability, making matched sample designs a valuable method for ESG valuation research: matched samples allow researchers to compare "like with like", thereby minimizing the likelihood that valuation differences arise from size or quality differences rather than a green signal. This is consistent with the broader ESG literature's emphasis that the choice of specifications, control variables, and measures determines the inferences drawn.

2.5 Positioning of the present study in the literature

Given this background, the current study contributes by analysing green versus non-green valuation using three standard valuation multiples (P/E, EV/EBITDA, and P/S) in a screened population of publicly traded Indian firms, with a clear and transparent definition of what constitutes a "green" firm based on membership in the NIFTY100 ESG.

The robust design of the current study — a 1:3 match in terms of size, profitability, solvency, and scale — directly addresses the comparability issue that commonly hinders ESG valuation inference in emerging markets.

Finally, by providing connections between findings to credibility/uncertainty channels identified in modern ESG measurement research, and to transition-risk perspectives in climate finance, the current study provides a theoretically grounded explanation of why a green premium may not occur — or why a green discount may occur — in a market environment characterized by evolving disclosure regimes.

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3.0 Research Methodology

3.1 Research design

This study adopts a quantitative, cross-sectional comparative design to test whether firms classified as "green" are valued differently from conventional firms in Indian equity markets. The empirical strategy combines (i) group-wise valuation comparison (green vs non-green) using standard market multiples and (ii) multivariate regression to isolate the incremental association of green classification with valuation after controlling for key firm fundamentals.

3.2 Data sources and sample construction

The master dataset was compiled from a Screener.in export of listed Indian companies using a financial-quality screening rule intended to ensure minimum scale and solvency. The screening criteria used to define the eligible firm universe were: Market Capitalization > 3000, Sales > 300, Return on Equity > 5 and Interest Coverage Ratio > 1.5

The above filters yield a financially viable sample suitable for valuation-multiple analysis and reduce distortions from distressed or micro-cap firms.

To classify firms into green and conventional groups, the study uses an externally defined ESG reference list, namely the NIFTY100 ESG constituent list. The ESG file serves as the benchmark for "green" identification and is treated as the classification standard for this study.

The two datasets (master Screener export and ESG list) were merged at the firm level using company-name matching. To minimize mismatches arising from naming variations (e.g., "Ltd." vs "Limited", punctuation, spacing), company names were standardized through normalization (case standardization, removal of legal suffixes, and punctuation cleaning). Where exact standardized matches were not possible, high-threshold fuzzy matching was applied to capture minor spelling differences while avoiding false positives. Firms successfully matched to the ESG list were flagged as Green_Flag = 1; all remaining firms were flagged as Green_Flag = 0. The final analysis sample comprises 740 firms, including 66 green and 674 conventional firms.

3.3 Measurement of variables

3.3.1 Dependent variables: valuation multiples

Firm valuation is proxied using three widely used market-based multiples:

- P/E (Price-to-Earnings): captures how much the market is willing to pay per unit of earnings.
- EV/EBITDA: reflects enterprise valuation relative to operating cash-flow proxy, allowing comparability across capital structures.
- P/S (Price-to-Sales): reflects market valuation relative to topline scale and is particularly useful where margins differ across firms.

These multiples are taken directly from the Screener export (as reported at the time of extraction), ensuring consistency of measurement across firms.

Table 1 Variable definitions and expected signs (Green vs non-green valuation models)

Variable	Symbol / Column	Measurement / Construction	Role in model	Expected sign (theory)	Rationale for expected sign
Green classification	**Green_Flag**	Dummy variable: **1** if firm is in NIFTY100 ESG list (green), **0** otherwise	Key explanatory variable	+/− **(ambiguous)**	Green firms may command a **premium** due to lower risk/cost of capital and investor preference; alternatively, may face a **discount** due to transition/capex uncertainty or "greenwashing" concerns.
Price-to-Earnings multiple	**P/E**	Market price relative to earnings (as	Dependent variable (Model 1)	—	Captures how much investors pay per unit of earnings; higher values imply stronger

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ES (2026) 22, 4(S), 77-90 ISSN:1505-4683

		reported in Screener export)			market expectations and/or lower perceived risk.
EV/EBITDA multiple	**EV/EBITDA**	Enterprise value relative to EBITDA (as reported in Screener export)	Dependent variable (Model 2)	—	Captures operating valuation adjusted for capital structure; higher values imply stronger growth expectations and/or lower perceived business risk.
Price-to-Sales multiple	**P/S**	Market value relative to sales (as reported in Screener export)	Dependent variable (Model 3)	—	Useful when margins differ across firms; higher values reflect stronger growth expectations and/or pricing power.
Firm size	**ln(Market Cap)**	Natural log of Market Capitalization	Control variable	+ (often)	Larger firms typically have greater analyst coverage, liquidity, stability, and lower perceived risk, often supporting higher multiples; also proxies for market dominance.
Profitability	**ROE**	Return on Equity (%)	Control variable	+	Higher profitability increases expected cash flows and signals efficiency, supporting higher valuation multiples.
Debt-servicing capacity	**ICR**	Interest Coverage Ratio (EBIT/Interest or similar, per Screener)	Control variable	+	Higher coverage implies lower default/distress risk, which should increase investor willingness to pay (higher multiples).

3.3.2 Key explanatory variable: green classification

- Green_Flag: binary indicator where 1 denotes firms included in the NIFTY100 ESG list and 0 otherwise.

3.3.3 Control variables

To reduce omitted-variable bias in valuation regressions, the study controls for firm characteristics that commonly influence valuation multiples:

- Firm size: measured using Market Capitalization, transformed as ln(Market Capitalization) to reduce skewness and capture scale effects.
- Profitability: measured using Return on Equity (ROE).
- Solvency / debt servicing capacity: measured using the Interest Coverage Ratio (ICR).

3.4 Data preprocessing and treatment of outliers

Valuation multiples are typically right-skewed and can contain extreme observations. To ensure robust inference without discarding data, the study applies winsorization at the 1st and 99th percentiles for valuation and selected control variables. This preserves sample size while reducing sensitivity to outliers. All continuous variables used in models are converted to numeric formats, with invalid entries treated as missing.

3.5 Empirical strategy

3.5.1 Univariate analysis: group comparison

The first stage compares valuation multiples between green and conventional firms using:

1. Descriptive statistics (mean, median, standard deviation, interquartile range).

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https://economic-sciences.com
ES (2026) 22, 4(S), 77-90 ISSN:1505-4683

2. Welch's t-test for mean differences (robust to unequal variances and unequal sample sizes).
3. Mann–Whitney U test for distributional differences (non-parametric test robust to non-normality).

This two-pronged approach ensures conclusions do not rely solely on normality assumptions.

3.5.2 Multivariate analysis: baseline valuation model

To estimate the incremental association between green classification and valuation while controlling for fundamentals, the following baseline model is estimated separately for each multiple:

$$Multiple_i = \alpha + \beta_1 Green\_Flag_i + \beta_2 ln\,(MCap_i) + \beta_3 ROE_i + \beta_4 ICR_i + \varepsilon_i$$

where:

- $Multiple_i \in$ {P/E, EV/EBITDA, P/S},
- $Green_i$ is the green classification indicator,
- $MCap_i$, ROE_i, and ICR_i capture size, profitability, and solvency, respectively.

Because cross-sectional firm data often exhibits heteroskedasticity, coefficient significance is evaluated using heteroskedasticity-consistent robust standard errors (HC3).

3.6 Output and analysis readiness

The final merged dataset is prepared for journal-grade analysis by including:

- Green/Non-green flag (Green_Flag)
- Match diagnostics (match type and match score to document classification reliability)
- Clean numeric valuation and control variables
- Winsorized versions used for inference (documented in analysis tables)

This processing yields an analysis-ready file suitable for reporting descriptive comparisons, hypothesis testing, and regression-based inference for the research question: *Are green firms valued differently in Indian equity markets?*

3.7 Robustness: Matched-sample design (1:3) to address group imbalance and comparability

Given the pronounced group imbalance in the baseline sample (66 green vs 674 conventional firms; N = 740), the study implements a matched-sample design to enhance comparability and reduce the likelihood that observed valuation differences are driven by systematic differences in firm characteristics rather than green classification itself. Accordingly, we construct a 1:3 matched dataset in which each green firm is paired with three observationally similar conventional firms.

Matching is performed using nearest-neighbour matching without replacement on key firm fundamentals that directly influence valuation multiples: ln(Market Capitalization) (size), ROE (profitability), Interest Coverage Ratio (solvency/debt-servicing capacity), and ln(Sales) (scale). These covariates are standardized prior to distance computation, and matching is executed within Industry where feasible to minimize sectoral valuation distortions; when an industry-specific pool is insufficient for a given green firm, the matching algorithm draws from the remaining conventional pool to complete the 1:3 allocation. This produces a balanced matched sample of 264 firms (66 green; 198 conventional).

To verify the effectiveness of matching, we evaluate covariate balance using standardized mean differences (SMDs) for the matching variables before and after matching. The post-matching SMDs show materially improved balance relative to the full sample, indicating that the matched design reduces baseline differences in size and financial strength between green and conventional firms. The matched dataset is then used to re-estimate the univariate tests and multivariate valuation regressions as a robustness check, using the same outlier treatment (1% winsorization) and inference approach (HC3 robust standard errors) as in the baseline analysis.

4 Results and Discussion

4.1 Sample construction and variable operationalization

The empirical analysis examines whether green firms are valued differently relative to conventional firms in Indian equity markets using standard valuation multiples. The master dataset was compiled from a Screener-based filtered universe

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ES (2026) 22, 4(S), 77-90 ISSN:1505-4683

and subsequently merged with the NIFTY100 ESG list to classify firms into Green and Conventional categories. Firms that matched the ESG list were assigned Green_Flag = 1, while all remaining firms were assigned Green_Flag = 0. Company-name matching was implemented using standardized normalization and fuzzy matching to minimize classification errors arising from minor naming variations.

The final analysis sample comprises 740 firm observations, of which 66 are classified as Green and 674 as Conventional. The valuation outcomes examined are: (i) P/E (Price to Earning), (ii) EV/EBITDA, and (iii) P/S (Price to Sales). Since valuation multiples can be sensitive to extreme observations, all reported descriptive and inferential results apply 1% winsorization (top and bottom tails). For multivariate inference, heteroskedasticity-consistent HC3 robust standard errors are used.

Table 1 reports the sample split used for subsequent analysis.

Table 2 Sample split (Green vs Conventional)

Category	Count
Total firms	740
Green firms (Green_Flag=1)	66
Conventional firms (Green_Flag=0)	674

4.2 Univariate valuation differences: Descriptive evidence

Table 2 presents winsorized descriptive statistics for valuation multiples by group. At the descriptive level, Green firms exhibit slightly higher mean multiples across all three measures, though differences are modest.

- P/E: Green mean = 42.55 vs Conventional mean = 41.01; medians are 35.65 vs 34.12.
- EV/EBITDA: Green mean = 24.02 vs Conventional mean = 22.22; medians are 18.60 vs 18.93.
- P/S: Green mean = 6.29 vs Conventional mean = 5.15; medians are 4.70 vs 3.66.

This univariate pattern suggests that Green firms appear, on average, to trade at somewhat higher multiples—particularly on P/S—but such patterns require formal statistical testing and multivariate controls due to differences in size/profitability and the potential influence of outliers.

Table 3 Descriptive statistics of valuation multiples by group (winsorized 1%)

Multiple	Group	N	Mean	Median	Std	P25	P75
P/E	Green	66	42.55	35.65	25.13	23.42	62.10
P/E	Conventional	674	41.01	34.12	27.77	23.30	51.35
EV/EBITDA	Green	66	24.02	18.60	14.12	13.05	34.83
EV/EBITDA	Conventional	674	22.22	18.93	13.20	12.95	29.06
P/S	Green	66	6.29	4.70	7.32	2.85	7.88
P/S	Conventional	674	5.15	3.66	—	—	—

4.3 Statistical tests of valuation differences (mean and distributional)

To formally evaluate whether valuation multiples differ between Green and Conventional firms, we apply:

(i) Welch's t-test for differences in means (robust to unequal variances), and (ii) Mann–Whitney U test to compare distributional/rank differences (median/rank-based).

The results are summarized in Table 3. Across P/E and EV/EBITDA, differences are not statistically significant under both tests. For P/S, evidence is more suggestive: the mean difference is not significant under Welch's t-test, but the Mann–Whitney test is marginal ($p \approx 0.056$), indicating that

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ES (2026) 22, 4(S), 77-90 ISSN:1505-4683

Green firms may occupy higher ranks in the P/S distribution relative to Conventional firms.

Table 4 Difference tests (winsorized 1%)

Multiple	Mean Diff (Green−Conv)	Welch t	p-value	Mann–Whitney p-value
P/E	+1.54	0.47	0.639	0.447
EV/EBITDA	+1.80	1.00	0.322	0.426
P/S	+1.14	1.24	0.218	0.056

Interpretation: Univariate inference indicates no strong valuation premium for Green firms on P/E and EV/EBITDA in this sample, while P/S shows weak (borderline) evidence in distributional comparisons. However, univariate comparisons can be misleading if Green firms differ systematically in size or fundamentals that affect multiples.

4.4 Multivariate evidence: Do Green firms trade at a premium after controls?

To isolate the association between green classification and valuation, we estimate the following baseline model separately for each multiple:

$$Multiple_i = \alpha + \beta_1 Green\_Flag_i + \beta_2 \ln(MCap_i) + \beta_3 ROE_i + \beta_4 ICR_i + \varepsilon_i$$

where:

- $Green_i$ is Green_Flag,
- $\ln(MCap_i)$ controls for firm size,
- ROE_i captures profitability,
- ICR_i controls for debt-servicing capacity,
- and inference uses HC3 robust standard errors, with all key variables winsorized at 1%.

Table 5 Multivariate regression results (HC3 robust SE; winsorized 1%)

Dependent variable	N	Adj. R^2	Green coefficient	t-stat	p-value
P/E	740	0.040	−12.55	−2.59	0.0097
EV/EBITDA	740	0.051	−5.98	−2.37	0.0176
P/S	740	0.172	−2.61	−3.33	0.00086

Interpretation (core finding): After controlling for size, profitability, and interest coverage, the Green_Flag coefficient is negative and statistically significant across all three valuation multiples. This indicates that within the screened universe, Green firms are valued at lower multiples relative to comparable Conventional firms—suggesting a green discount rather than a green premium.

This result is economically meaningful: while raw means show Green firms slightly higher in some multiples, the controlled models imply that once fundamentals and size are held constant, Green classification is associated with lower market valuation multiples.

Economic Sciences
https://economic-sciences.com
ES (2026) 22, 4(S), 77-90 ISSN:1505-4683

4.5 Visual evidence: distributional differences in multiples

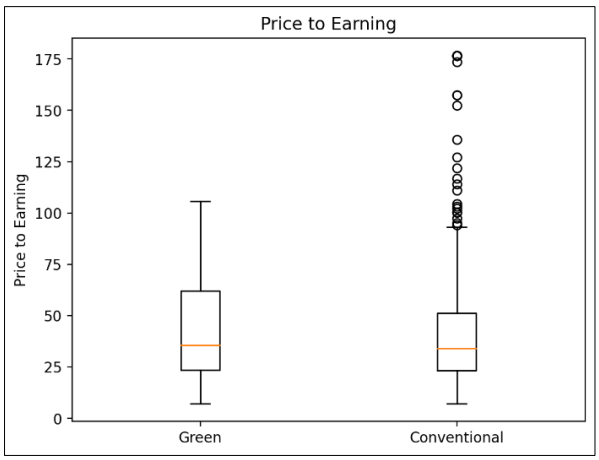

Figure 1 Boxplot of P/E by green classification (winsorized at 1%).

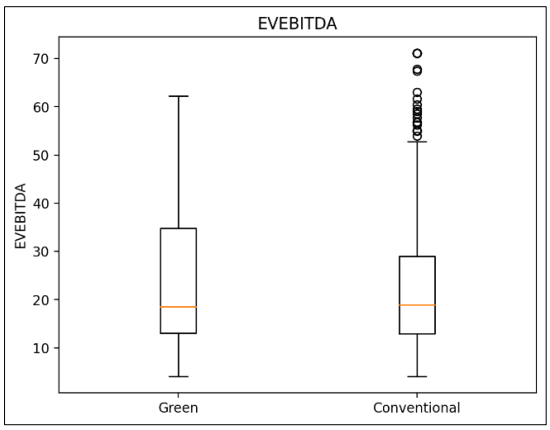

Figure 2 Boxplot of EV/EBITDA by green classification (winsorized at 1%).

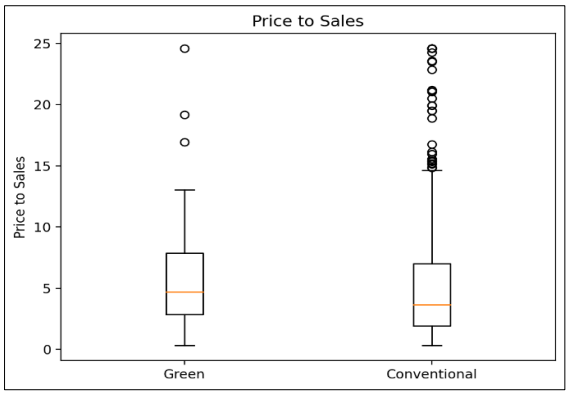

Figure 3. Boxplot of P/S by green classification (winsorized at 1%).

Figures 1–3 provide boxplots (winsorized at 1%) comparing Green and Conventional firms.

- Figure 1 (P/E): Median values are close; dispersion is high in both groups, and Green firms show somewhat wider upper tails.

Economic Sciences
https://economic-sciences.com
ES (2026) 22, 4(S), 77-90 ISSN:1505-4683

- Figure 2 (EV/EBITDA): Distributions are broadly similar; group medians are very close, consistent with weak univariate differences.
- Figure 3 (P/S): Green firms show a visibly higher distributional placement (higher median and upper quartile), consistent with the borderline Mann–Whitney result—yet the multivariate regression indicates a negative association after controls.

4.6 Discussion and implications

The findings offer a nuanced answer to the research question. Univariate comparisons provide limited evidence of valuation differences; most gaps are statistically weak. However, multivariate estimates consistently show that, conditional on firm size, profitability, and interest coverage, Green firms trade at lower valuation multiples. This pattern is consistent with a "green discount" interpretation in the screened sample.

Two interpretations are plausible in the Indian context:

1. Risk and uncertainty channel: Green firms may face higher investment needs, technology transition risk, policy dependence, or earnings volatility, leading investors to price them more conservatively even when profitability and solvency appear similar.
2. Sample selection channel: Because the master dataset is drawn from a constrained Screener universe, the distribution of sectors and business models may differ between Green and Conventional groups. This can affect multiples strongly, particularly P/S. A sector-controlled extension would sharpen causal interpretation.

4.7 Robustness results: 1:3 matched-sample valuation comparison

After restricting the analysis to the 1:3 matched dataset (N = 264; 66 green; 198 conventional). The matched design preserves the same valuation outcomes—P/E, EV/EBITDA, and P/S—and applies 1% winsorization to mitigate the influence of extreme multiples.

Across univariate comparisons in the matched sample, mean and distributional differences between green and conventional firms weaken substantially, with no statistically meaningful separation across P/E, EV/EBITDA, or P/S. This contrasts with the baseline full-sample patterns where raw differences were small but visible in certain metrics.

More importantly, the multivariate regressions estimated on the matched sample indicate that the association between green classification and valuation multiples is attenuated. While the Green_Flag coefficients remain negative (consistent in direction with baseline models), they are not statistically significant at conventional levels once firms are compared against closely similar controls:

- P/E model: Green coefficient = −6.18, $p = 0.319$
- EV/EBITDA model: Green coefficient = −3.30, $p = 0.347$
- P/S model: Green coefficient = −1.32, $p = 0.183$

These findings suggest that the baseline "green discount" observed in the full sample is, at least in part, attributable to differences in firm composition and fundamentals between green and conventional groups (e.g., size, profitability, or solvency profiles). When these characteristics are explicitly balanced through 1:3 matching, the remaining valuation difference associated with green classification becomes statistically indistinguishable from zero.

Overall, the matched-sample evidence supports a conservative interpretation of the baseline results: green status appears correlated with valuation multiples in the broader screened universe, but the strength of the relationship weakens when the analysis is restricted to financially comparable firms, implying that valuation differences may reflect firm characteristics and market composition effects rather than a standalone "green premium/discount" effect.

5.0 Conclusion (Revised with 1:3 Matched-Sample Robustness)

This study investigated whether green firms are valued differently from conventional firms in Indian equity markets using three widely applied valuation multiples—P/E, EV/EBITDA, and P/S—and a green classification benchmarked to the NIFTY100 ESG list. The baseline screened sample comprised 740 firm observations (66 green; 674 conventional).

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To address outliers and non-normality typical of valuation multiples, the analysis employed 1% winsorization and HC3 robust standard errors for inference. Recognizing the imbalance between green and conventional groups, the study additionally conducted a robustness test using a 1:3 matched-sample design, yielding a balanced comparison sample of 264 firms (66 green; 198 conventional) matched on firm fundamentals (size and financial strength variables).

Evidence summary: baseline results vs matched robustness

Overall, the findings indicate that conclusions about green valuation differences depend on **comparability between groups**.

1. Univariate comparisons show limited differences (baseline). In raw comparisons, green firms displayed marginally higher averages for valuation multiples, but statistical tests provided weak support for a generalized "green premium." P/E and EV/EBITDA differences were statistically insignificant, while P/S showed only borderline evidence under distributional testing (Mann–Whitney $p \approx 0.056$). This suggests that, at the descriptive level, valuation differences are not sufficiently strong or consistent to claim a broad premium for green classification.
2. Baseline multivariate models indicate a "green discount," but this attenuates under matching. In the full sample regression framework controlling for firm size and financial strength (ln market cap, ROE, interest coverage), the coefficient on Green_Flag was negative and statistically significant across all three multiples, indicating a green discount in the screened universe:

- **P/E:** −12.55 ($p = 0.0097$)
- **EV/EBITDA:** −5.98 ($p = 0.0176$)
- **P/S:** −2.61 ($p = 0.00086$)

However, the 1:3 matched-sample regressions (designed to compare green firms with financially similar conventional peers) produced negative coefficients that were not statistically significant:

- **P/E:** −6.18 ($p = 0.319$)
- **EV/EBITDA:** −3.30 ($p = 0.347$)
- **P/S:** −1.32 ($p = 0.183$)

This pattern implies that the baseline discount is not fully robust when the comparison is restricted to firms that are closely similar in observable fundamentals. Strategically, the combined evidence supports a conservative interpretation: valuation differences associated with green classification in the broader screened universe are partly driven by firm characteristics and sample composition, and the "green effect" becomes weaker when comparability is enforced through matching.

3. **Figures corroborate high dispersion and overlapping distributions.** The boxplots for P/E, EV/EBITDA, and P/S show substantial overlap between green and conventional firms, particularly for P/E and EV/EBITDA. This supports the inference that valuation multiples are highly dispersed and that group separation is modest—consistent with the generally weak univariate differences and the attenuation observed after matching.

Interpretation

Taken together, the baseline and matched-sample evidence suggests that Indian equity markets do not consistently award a stable valuation premium to ESG-classified firms within this screened sample. While the baseline regressions indicate a significant negative association (a green discount), the matched design indicates that this association weakens when green firms are compared against **financially comparable peers**, implying that the "discount" may reflect **composition effects** rather than a standalone green label effect.

This has an important methodological implication for ESG valuation research: **inferences about green premiums/discounts are sensitive to identification strategy**. Results drawn from large, imbalanced samples may capture differences in firm size, profitability, solvency, or sectoral mix unless explicitly controlled through matching or fixed effects. Therefore, credible interpretation requires reporting both baseline regressions and matched/controlled robustness checks.

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Managerial implications

For corporate management (CFO/CEO/Strategy)

- **Move ESG from a label to an investable cash-flow story.** The evidence does not support an automatic valuation premium for green classification. Management must demonstrate how ESG initiatives translate into **cash-flow stability, risk reduction, and durable competitive advantage**.
- **Reduce uncertainty through disclosure that investors can price.** Given that any "green effect" appears sensitive to comparability, firms should strengthen investor disclosures around: (i) project IRRs, (ii) capex timing and payback, (iii) regulatory exposure, (iv) transition execution risk, and (v) measurable operational efficiency or emission outcomes.
- **Financing strategy matters.** Since solvency controls are central to valuation inference, green firms should emphasize prudent capital structure decisions and communicate financing frameworks that reduce perceived transition risk (e.g., maturity discipline, ring-fenced project finance, transparent hedging policies).

For investor relations (IR) and ESG communication

- **Avoid positioning ESG as a guaranteed premium.** Instead, communicate ESG as a **risk-managed growth strategy** with measurable value drivers and governance safeguards.
- **Encourage peer-comparable valuation framing.** The difference between baseline and matched results highlights the need for valuation benchmarking within comparable sets; IR teams should present peer comparisons adjusted for size and financial strength to avoid misleading "premium/discount" narratives.

For portfolio managers and analysts

- **Composition-aware ESG valuation is essential.** Simple group averages can mislead; analysts should rely on models that control for size and fundamentals and validate results via matching or sector controls.
- **Potential selective opportunity, not broad re-rating.** If investors apply discounts due to uncertainty, firms with superior governance, execution credibility, and stable cash flows may be underappreciated—creating targeted opportunities rather than uniform ESG re-rating.

For policy makers and regulators

- **Standardize ESG reporting to reduce information risk.** Where valuation differences reflect uncertainty rather than fundamentals, standardized and assured ESG disclosures can reduce perceived risk and improve capital allocation efficiency.
- **Link incentives to measurable outcomes.** Policies are more effective when aligned with verifiable performance metrics rather than broad ESG labels, enabling markets to price sustainability with greater confidence.

5.1 Practical takeaway

For managers and investors, the evidence indicates that green status is not automatically rewarded with higher valuation multiples. In baseline models, green firms appear discounted, but this effect becomes weaker when comparisons are made against financially similar firms via 1:3 matching. Practically, this suggests that valuation outcomes depend less on ESG classification alone and more on whether firms can convert ESG positioning into credible, measurable, financeable performance channels—improved risk profile, stable margins, execution reliability, and growth quality.

5.2 Limitations and future scope

- Screened universe and composition effects: Since the master dataset reflects a screened firm universe, sectoral composition and firm characteristics can influence valuation comparisons. Future work should incorporate sector fixed effects or industry-stratified matching as standard robustness.
- Expanded control set: While the study controls for size, profitability, and solvency, stronger robustness would be obtained by adding controls such as leverage, growth, margins,

beta, and liquidity, subject to availability in the data export.

- Alternative ESG definitions: Extending the green classification beyond the NIFTY100 ESG list (e.g., ESG scores, emission intensity, or taxonomy-aligned revenue shares) can further validate whether valuation patterns reflect sustainability fundamentals or index membership.

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