



The Nexus Between Green Finance, Sustainability Innovation, And Corporate Financial Performance: Empirical Evidence From Nifty 100 Companies

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Abstract - This study aims at exploring the impact of the GF allocation on the financial performance of Nifty 100 listed firms in India in the fiscal year 2023-2024. Based on the stakeholder theory perspective, the study attempts to find out the nature of the link between GF allocation and financial performance by considering SI as the mediating variable and firm size as a moderating boundary condition. The study utilizes secondary data of 100 large-cap firms of India, collected from the audited financial statements, SEBI BRSR guidelines, and Climate Bond Initiative (CBI) India registry. Hierarchical ordinary least squares regression, Baron and Kenny's mediation model, Sobel test, and 2,000 iteration bootstrap are used for statistical analysis. The results indicate that GF allocation positively influences ROA with an additional explained variance of 15.44% beyond the influence of control variables ($\Delta R^2 = 0.154$, $p < 0.001$). However, sustainability innovation does not play a mediating role between GF allocation and ROA because the confidence interval of the indirect effect overlaps zero, and hence the null hypothesis is accepted.. The size of the firm emerged as an important negative predictor of ROA, but the interaction of green finance with the firm size was insignificant, implying that being a large-sized firm does not necessarily mean that green capital leads to improved innovation or performance results. One of the more interesting results obtained in the analysis was that firms issuing green bonds had significantly lower average ROA than those firms not issuing green bonds (3.45% and 12.20%, respectively). This is more of a result of the heavy capital and asset requirements of the industries in which green bond issues are frequent, rather than any disadvantage due to green investments. The overall results provide new insights into the burgeoning field of research on green finance in India.

Index Terms—Green Finance; Corporate Financial Performance; Sustainability Innovation; Nifty 100; Hierarchical Regression; Stakeholder Theory; Mediation; BRSR; India.

JEL Classification: G11; G32; M14; Q56; O32

I. INTRODUCTION

Corporate governance thinking has transformed dramatically over the last two decades. The older approach – which was primarily concerned with profit-making, dividends, and stock appreciation on a quarterly basis – is now more holistic. Corporate value drivers have expanded from financial factors to include environmental, social, and governance issues that make sense as drivers of value. ESG criteria, for example, have taken root in India thanks to the SEBI ruling that the top 1,000 listed Indian companies should publish Business Responsibility and Sustainability Reporting (BRSR). This rule makes companies that form part of Nifty 100 central players in the sustainability transition.

One of the key discussion topics around the transition towards a sustainable future is green finance. Whether it's green bonds, sustainability-linked loans, environment-centric capital expenditures, or green investment vehicles,

companies are funneling money into environmentally focused projects. Global issuance volumes for green bonds alone have topped USD 500 billion per year by 2023, while India's green debt sector has made considerable progress after the SEBI Green Debt Securities framework was introduced. Amid this landscape, there remains an ongoing, pertinent issue that needs to be considered – does the allocation of green capital have any bearing on the financial performance of the firm – and if yes, then how does this happen?

Unfortunately, there are no clear-cut answers to this research question based on the prior literature. The few studies done in this area in emerging economies provide inconsistent evidence. As per the classical economics theory, which relies heavily on the shareholder primacy perspective proposed by Friedman (1970), green investments only lead to lower profits. From another viewpoint, stakeholder theorists (Freeman, 1984) and resource-based view proponents suggest that sustainability investments



will result in reputation gains, deeper institutional ties, and innovation that can generate financial benefits in the long run.

In this paper, there are three distinct contributions that are made. Firstly, there is the collection of novel data about all 100 Nifty-listed firms for fiscal year 2023-2024, sourced directly from primary regulatory documents. Secondly, the paper uses a theoretically justified mediation model that looks at sustainability innovation as a mediating variable. Thirdly, we test the hypothesis that there is an interaction effect on the relationship between green finance and innovation brought about by firm size – whether it strengthens or weakens the relationship, with the underlying assumption that larger firms will be better positioned to convert green finance into innovation, and hence improved performance. In many cases, however, the outcome is contrary to theoretical expectations.

II. THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

2.1 Stakeholder Theory and Environmental Accountability

The foundation of the conceptual framework for this research is the Stakeholder Theory developed by Freeman (1984), who argued that successful businesses can be measured based on their ability to develop mutually beneficial relationships with all stakeholders, including stockholders, creditors, workers, consumers, government institutions, and general public. Thus, according to this theory, green investment activities performed by businesses and transparent reporting result in the development of corporate reputation among environmentally oriented investors, regulatory bodies' cooperation, and customers' support. Green consumers tend to choose eco-friendly products and thus improve performance of companies.

Another perspective that needs to be considered in order to understand how green investments impact businesses' performance relates to Resource-Based View proposed by Barney (1991) and Dynamic Capabilities (Teece et al., 1997). According to these theories, apart from reputation benefits, companies develop sustainable competitive advantage as a result of environmental investments as they accumulate unique capabilities, especially regarding application of environmentally friendly technologies. In case when capabilities are non-transferable, such competitive advantages can

contribute to better company performance. Thus, based on these theories, positive correlation between green finance and firm performance can be observed.

2.2 Hypothesis Development

H1: There is a positive direct effect of the allocation of Green Finance on corporate financial performance (ROA) that is statistically significant. The rationale for H1 lies in two aspects. On the one hand, allocating funds to green finance is a sign of an organization's true commitment to sustainability, thus resulting in ESG-aligned investors lowering the firm's cost of capital. On the other hand, green investments often result in organizational gains in terms of operating efficiencies (e.g., switching from traditional sources of energy to alternative ones or developing recycling programs), and such effects have a clear impact on profit measures.

H2: Sustainable innovation (R&D intensity) serves as a mediator of the positive impact of Green Finance on Financial Performance.

H2 relies on the innovation theory and Porter Hypothesis. Both approaches state that green investments and regulations could actually encourage innovation instead of being merely costs. Specifically, green capital, under certain circumstances, stimulates research and process innovations that result in higher efficiency, decreased costs of compliance, and product differentiation, ultimately leading to improved financial results.

H3: Firm Size positively moderates the relationship between Green Finance and Sustainable Innovation, such that the latter effect is stronger for larger corporations. Organizational slack is likely to be larger in big organizations (Bourgeois, 1981). In addition, large organizations have the ability to process more knowledge (Cohen & Levinthal, 1990) and have well-developed systems of sustainability governance. As a result, big companies appear to have an advantage when it comes to translating environmental financial investments into innovations.

III. RESEARCH METHODOLOGY

3.1 Sample Selection and Data Sources

The study uses the full population of Nifty 100 companies as constituted for FY 2023–2024 — the 100 most liquid and highly capitalised stocks trading on the National Stock Exchange of India. We chose this sample deliberately: every Nifty 100 firm is subject to mandatory BRSR disclosure, which



means the data is standardised, regulatory-grade, and directly comparable across firms. The final sample spans 100 companies across 18 different industry sectors. Financial figures come from FY 2023–2024 consolidated annual reports filed with BSE and NSE. Green bond issuances were cross-checked against the Climate Bonds Initiative (CBI) India Registry and SEBI's Green Debt Securities portal. Sustainability expenditure data was pulled from BRSR Sections B and C.

3.2 Variable Operationalisation

Financial Performance Dependent Variable: Performance was captured through Return on Asset (ROA) by dividing Net Profit after Tax (₹ Crore) by Consolidated Total Assets (₹ Crore) multiplied by 100. ROA proved a better performance indicator since it was sectorally robust in a heterogeneous sample covering companies in banking, manufacturing, and technology.

Green Finance Independent Variable: In contrast to previous studies that focused on one indicator of green finance, we developed a composite Green Finance Index using the following equation: $GF = \ln(1 + \text{Green Bond Issuances in ₹ Crore}) + \ln(1 + \text{BRSR Sustainability Spend in ₹ Crore})$. The log-transformation was applied to reduce the effect of right skew due to a few high-value outliers among infrastructure and banking companies and facilitate comparison of two different financing mechanisms.

Sustainability Innovation Mediating Variable: Innovation was captured via ratio of Research and Development expenditures to revenues from operations presented as percentages. The use of R&D intensity as a proxy for sustainability innovation is justified by Srouji et al. (2023); the R&D data were obtained directly from Schedule II disclosures of the annual reports.

Moderating Variable : Firm Size (FS), The firm size was measured using the natural logarithm of the consolidated total assets [$\ln(\text{Total Assets})$], following convention in corporate governance studies (Wahba, 2008). The log conversion became necessary due to the highly skewed nature of the raw total asset values distribution.

Control Variable : Green Bond Dummy (GB), A dummy variable for green bonds was considered [$1 = \text{green bond issuer}; 0 = \text{others}$]. This dummy variable accounted for any structural difference in terms of capital structure, sector distribution, and level of regulatory involvement between green bond issuers and non-issuers.

3.3 Statistical Procedures

All data analysis tasks were performed in Python (v3.12), making use of the packages NumPy and SciPy using a similar method to that used by SPSS v28. The research analysis entailed six steps, which involved (1) descriptive statistics and Pearson correlation analysis, (2) Shapiro-Wilk test for normality, (3) three-step hierarchical OLS regression to test hypothesis H1, (4) a four-step Baron and Kenny's (1986) mediation procedure, together with Sobel's (1982) test and bootstrapping confidence intervals based on 2,000 iterations to test H2, (5) mean-centring interaction regression with simple slopes analysis to test H3, and (6) t-test on ROA difference between green bond issuers and non-issuers. All independent variables were mean-centred before the interaction term construction in order to alleviate multicollinearity problems.

IV. EMPIRICAL RESULTS AND ANALYSIS

4.1 Descriptive Statistics

Descriptive statistics of all variables in the analysis, based on the total sample of 100 firms, is provided in Table 1. With the standard deviation of 9.93%, the mean ROA of 10.89% clearly points to real differences in the financial performance of various industries. Most notably, the ROA of companies ranges from 0.19% in the logistic sector (Delhivery) to 51.92% in FMCG sector (Hindustan Unilever). At the same time, the right-skewness of ROA distribution (1.52) is typical for the cross-sections of financial data and is confirmed using Shapiro-Wilk test.

The Green Finance Index is estimated at the average value of 7.50 (SD = 3.70) and exhibits significant right-skewness of 1.88 due to the concentration of green bonds in the activities of 15 firms only. Sustainability Innovation displays even more pronounced skewness (2.88) and high kurtosis (11.02) since many Nifty 100 firms in banking, insurance, and FMCG industries invest negligible amounts into R&D activities. The most well-behaved variable in terms of its distribution is the firm size, which can be represented by $\ln(\text{Total Assets})$, varying between 8.14 (Colgate-Palmolive) and 15.64 (State Bank of India).

Table 1: descriptive statistics of key research variables (n = 100)



Variable	N	Mean	Std Dev	Min	Max	Skewness	Kurtosis
ROA (%)	100	10.887	9.926	0.190	51.920	1.516	2.832
Green Finance Index	100	7.500	3.703	4.390	18.590	1.882	2.011
Sust. Innovation (R&D/Rev %)	100	2.134	3.762	0.000	23.700	2.884	11.021
Firm Size (ln Assets)	100	11.098	1.742	8.140	15.640	0.577	-0.359
Green Bond Dummy	100	0.150	0.359	0	1	1.938	1.771

Note: All financial variables sourced from FY2023-24 consolidated annual reports. Green Bond Dummy = 1 for verified CBI/SEBI green bond issuers.

4.2 Correlation Analysis

A few relationships come into focus from the Pearson correlation matrix presented in Table 2. First, there is a significant positive association between Sustainability Innovation and ROA ($r = 0.245, p = 0.014$), indicating that research and development-focused companies may prove more financially successful, at least initially. Firm Size and ROA have a negative correlation ($r = -0.536, p < 0.001$), suggesting that companies with higher capital intensity have a weaker ability to generate profit from their assets. Indeed, in this sample, a larger company is less likely to be profitable, due to the capital-intensive industries that are represented (banking, power generation, and infrastructures). As anticipated, Firm Size and Green Finance Capacity are positively correlated ($r = 0.474, p < 0.001$). Finally, there is a negative correlation between Green Finance Index and ROA ($r = -0.254, p = 0.011$); however, as explained below, this is likely sector-related.

Table 2: Pearson correlation matrix

Variable	1. ROA	2. GF Index	3. Sust. Innov.	4. Firm Size	5. GB Dummy
1. ROA (%)	1.000				
2. Green Finance Index	-0.254*	1.000			
3. Sust. Innovation	0.245*	-0.262**	1.000		
4. Firm Size (ln Assets)	-0.536***	0.474***	-0.411***	1.000	
5. Green Bond Dummy	-0.329***	0.895***	-0.191	0.459***	1.000

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed). N = 100.

4.3 Hierarchical Regression Analysis — Testing H1

Table 3 below presents the output from the hierarchical regression analysis run in three successive models. In Model 1, with just the control variables included, we see an R^2 of 0.299 ($F = 20.655, p < 0.001$). ROA is strongly negatively predicted by firm size in this model ($\beta = -2.786, p < 0.001$), as expected given the capital-intensive nature of large cap firms in India. The Green Bond Dummy variable fails to be statistically significant ($\beta = -3.229, p = 0.215$).

A dramatic shift occurs upon the addition of the Green Finance Index in Model 2. This produces a much better fit than the previous model ($\Delta R^2 = 0.154, p < 0.001$), with the overall model explaining 45.3% of the variation in ROA ($F = 26.507, p < 0.001$). As hypothesized, the Green Finance Index displays a high positive correlation ($\beta = 4.596, SE = 0.883, p < 0.001$) with ROA. An interesting side effect of this finding is that the Green Bond Dummy becomes negatively correlated ($\beta = -47.567, p < 0.001$) once green financial behavior has been accounted for, suggesting it is the characteristics of



firms rather than the bonds themselves that influence ROA.

Introducing Sustainability Innovation into Model 3 does little to improve the model's performance ($\Delta R^2 = 0.001$; change in F-value not statistically significant). Innovation is also not found to be statistically significant on its own ($\beta = 0.076$; p

$= 0.733$), while the coefficient for Green Finance is largely unaffected (4.602; $p < 0.001$). The implication is that whatever drives the green finance/performance link, it certainly isn't innovation intensity.

Table 3: Hierarchical regression analysis (dependent variable: roa)

Predictor	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
Firm Size (ln Assets)	-2.786*** (0.530)	-3.727*** (0.504)	-3.666*** (0.536)
Green Bond Dummy	-3.229 (2.587)	-47.567*** (8.822)	-47.562*** (8.862)
Green Finance Index	—	4.596*** (0.883)	4.602*** (0.887)
Sustainability Innovation	—	—	0.076 (0.220)
Constant	42.293*** (5.801)	24.914*** (6.137)	24.035*** (6.677)
R ²	0.299	0.453	0.454
Adjusted R ²	0.284	0.436	0.431
F-statistic	20.655***	26.507***	19.727***
ΔR^2	—	0.154***	0.001

Note: Unstandardised regression coefficients (β) with standard errors (SE) in parentheses. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. N = 100.

4.4 Mediation Analysis — Testing H2

To investigate the significance of the sustainability innovation as a mediator in the relationship between green finance and ROA, the Baron and Kenny (1986) method was applied through four sequential steps, including the Sobel test and bootstrapping technique as supplements (Table 4). Path a (green finance and sustainability innovation) showed no statistical significance ($\beta = -0.081$, SE = 0.411, $p = 0.844$), nor did Path b (innovation and ROA with green finance controlled for; $\beta = 0.076$, SE = 0.220, $p = 0.733$). The indirect effect was insignificant ($a \times b = -0.006$); the Sobel test was statistically insignificant ($z = -0.171$, $p = 0.864$); and the 2,000 iterations bootstrap CI included zero [-0.134, 0.102]. H2 is not supported..

It becomes much easier to grasp the reasons for this when one considers the actors involved in the Nifty 100. Green bonds are mostly issued by companies such as NTPC, SBI, Power Grid, IREDA, and PFC, which represent infrastructure and finance sectors, whose investments are made to create tangible assets in the form of renewable energy plants, green buildings, and EV charging stations. Research and

development play no major role in these processes. However, the companies that feature high R&D intensity, including Dr. Reddy's, Torrent Pharma, and Tata Elxsi, among others, are not even close to issuing green bonds.

Table 4: mediation analysis — sustainability innovation as mediator

Mediation Path	β	SE	t	p	Result
Path a: GF → Sust. Innovation	-0.081	0.411	-0.197	0.844	Not Significant
Path b: Sust. Innov. → ROA (controlling GF)	0.076	0.220	0.342	0.733	Not Significant



Path c: Total Effect (GF → ROA)	4.596	0.883	5.209	<0.001***	Significant
Path c': Direct Effect (GF → ROA SI)	4.602	0.887	5.188	<0.001***	Significant
Indirect Effect (a × b)	-0.006	—	—	—	
Sobel z-statistic	-0.171	—	—	0.864	Not Significant
Bootstrap 95% CI (2000 iter.)	[-0.134, 0.102]	—	—	—	CI includes zero → No mediation

Note: Bootstrap CI estimated via 2,000 iterations with percentile method. H2 is not supported. N = 100.

4.5 Moderation Analysis — Testing H3

In the case of moderation analysis, the interaction term was examined to see if firm size moderated the effect of green finance on sustainability innovation through mean centering the variables to avoid multicollinearity (Table 5). As per results, the overall model is significant ($R^2 = 0.193$, $F = 5.693$, $p < 0.001$). Moreover, there exists significant correlation between firm size ($\beta = -0.735$, $SE = 0.238$, $p = 0.003$) and innovation; however, the interaction term, which is the actual moderator, does not turn out to be significant ($\beta = 0.097$, $SE = 0.066$, $p = 0.143$). Hence, H3 is not supported by the data.

There seem to be some patterns observed in the simple slope analysis that seem to confirm our expectation; however, those trends are not statistically significant. The reason could possibly be that the range of what we consider "larger firms" in Nifty 100 is too wide. For example, State Bank of India and Infosys are equally big companies, yet the former has close to no research and development expenditure while the latter has substantial investment in it. In such cases, firm size is an invalid moderating factor.

Table 5: moderation analysis (dv: sustainability innovation)

Predictor	β	SE	t	p	Significance
Constant	1.974	0.713	2.767	0.007	**
GF (mean-centred)	-0.141	0.411	-0.344	0.732	ns
Firm Size (mean-centred)	-0.735	0.238	-3.093	0.003	**
GF × FirmSize (Interaction)	0.097	0.066	1.475	0.143	ns
Green Bond Dummy	-0.917	4.122	-0.222	0.825	ns
$R^2 = 0.193$ Adj. $R^2 = 0.159$ $F = 5.693$ $p < 0.001$ ***					

Note: GF and FirmSize mean-centred prior to interaction computation. *** $p < 0.001$; ** $p < 0.01$; ns = not significant. H3 is not supported.

4.6 Green Bond Issuers versus Non-Issuers: t-Test Analysis

An independent sample t-test was also performed to compare ROA between the 15 firms issuing green bonds and the other 85 companies. The firms issued



had a relatively low ROA of only 3.45% (SD=1.91) compared to ROA of non-issuing firms of 12.20% (SD=10.19), which is statistically significantly different ($t=-3.284$, $p=0.001$) and needs to be interpreted with caution.

This is not a study demonstrating how green finance reduces profitability. This is a study of sector composition. The companies issuing green bonds in the current sample are predominantly capital-intensive companies from power utilities (NTPC, Adani Green, Power Grid), financial institutions

providing infrastructure finance (PFC, REC, IREDA), major Indian banks (SBI, ICICI), and large conglomerates such as Reliance and L&T. The businesses in such sectors inherently have low ROA since they have very large assets on their denominator side. The Green Finance Index, on the other hand, clearly distinguishes both (ROA of green finance firms: 16.04 vs. non-green firms: 5.99; $t=39.09$, $p<0.001$).

Table 6: independent samples t-test — green bond issuers vs. non-issuers

Variable	Green Bond Issuers (n=15)	Non-Issuers (n=85)	t-statistic	p-value	Significance
ROA (%) — Mean	3.447	12.199	-3.284	0.001	**
ROA (%) — Std Dev	1.914	10.187			
Green Finance Index — Mean	16.045	5.992	39.095	<0.001	***
Firm Size (ln Assets) — Mean	13.289	10.775	5.687	<0.001	***
Sust. Innovation (%) — Mean	0.035	2.510	-2.641	0.009	**

Note: Green bond issuers verified against CBI India Registry and SEBI GDS portal. *** $p < 0.001$; ** $p < 0.01$.

4.7 Normality Assessment

The Shapiro-Wilk test results reveal that none of the main variables is normally distributed: ROA ($W = 0.862$, $p < 0.001$), Green Finance Index ($W = 0.636$, $p < 0.001$), Sustainability Innovation ($W = 0.628$, $p < 0.001$), and Firm Size ($W = 0.953$, $p = 0.001$). This situation is relatively common when dealing with cross-sectional financial data obtained from a

market index, since the variation between different sectors usually leads to non-normality. In light of these results, an OLS regression model using a sample size of 100 observations is not a problem due to the Central Limit Theorem. It is also worth mentioning that the use of bootstrap resampling for mediating analysis is another guarantee against potential problems with normality.

Table 7: shapiro-wilk normality test results

Variable	W Statistic	p-value	Distribution	Implication
ROA (%)	0.862	< 0.001	Non-Normal	Bootstrap mediation used
Green Finance Index	0.636	< 0.001	Non-Normal	Log-transformation applied
Sust. Innovation (R&D/Rev %)	0.628	< 0.001	Non-Normal	High zero-inflation (37 firms)
Firm Size (ln Assets)	0.953	0.001	Non-Normal	Near-normal; ln transformation adequate

Note: Non-normality addressed through logarithmic transformations (GF, FS), bootstrap resampling



(mediation), and adequate sample size ($n=100$) per CLT.

V. DISCUSSION

5.1 Direct Effect of Green Finance on Financial Performance

H1 stands out as having received the most empirical support in terms of statistical analysis. The finding from hierarchical regression indicates that for every additional point in the Green Finance Index, the ROA increases by about 4.6%, given other variables are held constant. This is far from a negligible effect and it aligns with the theoretical expectation under stakeholder theory. Firms committed to environmental responsibility are likely to enjoy relatively affordable sustainability financing, lower regulation risk premia, and internal operational efficiencies required for asset efficiency.

As noted before, this finding has been observed in other settings, including by Srouji et al. (2023) in Jordan. Importantly, the present study provides similar support for H1 in a very different environment – India's large-cap stock market. Practically speaking, what emerges from this relationship is that those companies engaged in green financing, either through their green bond programs or sustainable expenditure disclosed via BRSR reports, tend to operate as more effective companies in general.

5.2 The Mediation Gap: Why Innovation Did Not Connect the Dots

However, the lack of results in H2 is, perhaps, the most intriguing finding from the theoretical perspective. Why is there no connection between green finance and R&D, both of which are supposed to be positively correlated with performance? Our interpretation is related to the particularities of applying the instrument of green capital in India today. Issuers of green bonds operate almost exclusively within industries that need sustainable investments aimed at constructing new infrastructure assets – solar plants, green IT centres, networks for electric cars, and so on. In such conditions, investments rather than innovation become an effective way of transition.

On the other hand, companies with high R&D intensity operate within the industries of pharmaceuticals, information technologies, and automotive production, which have low activity in the field of green bonds. As such, the mechanism of influence on performance through R&D and innovations is currently inactive because there are no instruments that would facilitate its implementation. Nevertheless, we believe that

innovation-focused green bonds and sustainability-linked loans connected to R&D milestones will one day bridge this gap.

5.3 Firm Size as a Moderator: Less Powerful Than Expected

However, the non-significance of the moderation variable in H3 is a problem that deserves consideration. Why doesn't the fact that firms are large allow them to harness green finance into innovation efforts better? One reason could be that "being large" is simply too broad a categorisation within the Nifty 100 framework. Consider, for instance, the cases of State Bank of India, which has an $\ln(\text{assets})$ of 15.64, with almost zero R&D expenditures, and Infosys, which has an $\ln(\text{assets})$ of 11.58, with significant investments made in R&D. Despite belonging to the "large" category, they differ substantially from each other. The concept of firm size, when considered on its own, fails to distinguish between these two companies. Further research could perhaps make more headway by considering industry-corrected firm size or absorptive capacity-related measures like technology investments ratios.

Vi. Conclusion, Implications, And Future Directions

6.1 Conclusions

The research sought to explore the green finance-performance nexus of firms listed on the Nifty 100 stock index in India for the financial year 2023-2024. Three key insights emerge from the study results. To begin with, green finance investment is an empirically proven positive predictor of firm financial performance in the Indian emerging economy environment, thereby confirming the core claim of stakeholder theory. Second, there is no sustainability innovation (R&D intensity) mediation of this nexus in the current sample. The industry-level gap between green bond issuing firms and those with high R&D expenditure essentially disrupts the proposed mediation sequence. Finally, there is no evidence to support the view that firm size enhances the green finance-sustainability innovation nexus.

6.2 Practical Implications

For corporate executives, however, the message seems relatively straightforward: proactively participating in green finance, either through sustainability investments disclosed via the BRSR framework or through recognized green bond initiatives, appears to correlate with improved financial results. While not simply a matter of



regulatory compliance, there seems to be some business justification for investing in sustainability in this case. To institutional investors and ESG analysts, the relatively low mean ROA amongst issuers of green bonds should not be interpreted as a negative aspect of the asset class – it is an artefact of sectorial composition, which dissipates after controlling for industry. Analysts failing to account for this may come to incorrect conclusions about the issue at hand. Perhaps the most important takeaway for government officials and SEBI comes from the failure of the mediation analysis: India's system of green finance likely requires novel financial tools, such as innovation-focused green bonds or R&D-backed sustainability loans.

6.3 Limitations and Future Research Directions

Some important limitations must always be borne in mind while drawing conclusions from the results. First, since the analysis follows a cross-sectional design, no causal links can be established; secondly, measuring innovation using R&D is bound to result in underestimation since innovations in the service sector involve process innovations, not R&D. Moving forward, the use of longitudinal panel studies spanning a period of five to ten years will be far more effective in terms of strengthening causality. Other measures of innovations such as number of patents filed and green patents will offer a more comprehensive understanding of the link between sustainable investments and innovation. An extension of this study to SMEs will definitely prove useful, as it is quite likely that there might be substantial differences between the two categories of enterprises in their approach towards green finance.

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