

SUSTAINABLE EQUITY FUNDS, FACTOR-ADJUSTED RETURNS, AND DISCLOSURE REFORM IN INDIA: EVIDENCE FROM THE CARHART MODEL AND THE BRSR TRANSITION

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ABSTRACT

Sustainable investment has expanded within the Indian mutual fund industry, yet evidence on whether environmental, social, and governance-oriented funds deliver superior risk-adjusted performance remains inconclusive. This study compares 20 Indian ESG equity mutual funds with 20 traditional equity funds matched by asset management company, investment category, and approximate fund size over the 63-month period from January 2020 to March 2025. Monthly net asset value data are evaluated through conventional performance measures and the Carhart four-factor model, which controls for market, size, value, and momentum exposures. The study also examines fund behavior during the COVID-19 market decline, the subsequent recovery, and the inflation and interest-rate shock of 2022. To investigate the regulatory relevance of the Business Responsibility and Sustainability Reporting framework, pre- and post-April 2022 performance is compared through subperiod regressions, a Chow test, a BRSR dummy-variable model, and paired tests of fund-level alpha.

The reported results show that ESG funds produced slightly lower annualized raw returns than their traditional counterparts but exhibited lower volatility, lower beta, smaller maximum drawdowns, and moderately higher Sharpe, Treynor, and Sortino ratios. Neither group generated statistically significant full-period Carhart alpha, indicating that much of fund performance was explained by systematic factor exposures. ESG funds nevertheless showed significantly lower volatility during the COVID-19 decline and the 2022 inflation shock. Their reported monthly alpha shifted from -0.041% before mandatory BRSR implementation to 0.187% afterward, while traditional-fund alpha remained broadly unchanged. Exclusionary ESG strategies recorded stronger risk-adjusted outcomes than integration and positive-screening strategies. These findings suggest that the principal financial benefit of Indian ESG funds lies in downside-risk moderation rather than persistent full-cycle outperformance. The post-BRSR improvement is economically relevant but should be interpreted as an association, not definitive causal evidence, because regulatory implementation coincided with broader changes in monetary conditions, market composition, and fund maturity.

Keywords: ESG mutual funds; sustainable investment; Carhart four-factor model; BRSR; risk-adjusted return; downside risk; structural break; Indian mutual funds

1.INTRODUCTION

Environmental, social, and governance considerations have moved from a specialist ethical-investment concern to a material component of contemporary portfolio construction. Investors increasingly assess how firms manage climate exposure, labor relations, product

responsibility, board independence, business ethics, and stakeholder risk alongside conventional indicators of profitability and valuation. Nevertheless, the financial consequences of ESG investing remain contested. A large second-order review found that approximately 90% of corporate-level studies reported a non-negative relationship between ESG performance and corporate financial performance. That finding, however, should not be interpreted as proof that ESG mutual funds necessarily outperform conventional funds: firm-level associations do not automatically survive portfolio construction, management fees, trading costs, diversification constraints, or differences in factor exposure.

Fund-level evidence is considerably more cautious. Revelli and Viviani's meta-analysis of 85 studies and 190 empirical tests concluded that socially responsible investment was, on average, neither a financial strength nor a weakness relative to conventional investment. More recent meta-analytic evidence similarly indicates that risk-adjusted returns of responsible funds are generally not statistically different from conventional-fund returns across most markets. These findings support a return-neutral interpretation: sustainability constraints do not necessarily impose a systematic financial penalty, but neither do they guarantee abnormal performance.

The distinction between raw return and factor-adjusted return is particularly important. ESG portfolios often hold large, profitable, well-governed and relatively liquid companies while maintaining lower exposure to smaller firms, highly leveraged businesses, carbon-intensive sectors, and traditional value stocks. A favorable return during a particular period may therefore arise from a large-cap, quality, growth, or momentum tilt rather than superior security selection. The Carhart four-factor model extends the Fama–French market, size, and value framework by incorporating momentum. Carhart demonstrated that common factor exposures, fund expenses, and transaction costs explain much of the apparent persistence in mutual fund performance, making the model especially useful for separating manager-specific alpha from systematic investment style.

India provides a distinctive setting for such an assessment. Its ESG mutual fund segment is comparatively young, disclosure standards have evolved rapidly, and the investable universe is concentrated in large listed companies with relatively developed reporting systems. The information environment changed materially when the Securities and Exchange Board of India introduced the Business Responsibility and Sustainability Reporting framework in May 2021. BRSR became the central standardized sustainability-reporting architecture for major listed entities, replacing a more narrative reporting regime with structured environmental, social, and governance disclosures. SEBI subsequently introduced BRSR Core, including an assurance-oriented framework for selected indicators and value-chain disclosures, and issued a separate circular establishing new ESG mutual fund categories and associated disclosure requirements.

These regulatory developments potentially affect investment performance through several channels. Standardized disclosure can reduce information-processing costs, improve comparability across companies, permit fund managers to identify material ESG risks with greater precision, and make fund labels more transparent to investors. At the same time, compliance costs, uneven assurance quality, changes in investor demand, and the gradual incorporation of ESG information into market prices can complicate the relationship between reporting reform and fund returns. Indian firm-level evidence suggests that ESG scores may be associated with financial performance and share prices with a time lag rather than through an immediate valuation effect.

The present study addresses this setting by comparing ESG and traditional mutual funds over a period that includes the COVID-19 decline, a strong equity-market recovery, the inflation and interest-rate adjustment of 2022, and the initial years of mandatory BRSR reporting. Its contribution lies in integrating four questions that are often examined separately: whether ESG funds deliver better conventional risk-adjusted returns; whether apparent performance survives four-factor adjustment; whether ESG funds provide downside protection during market stress; and whether their performance changed around the BRSR transition.

The study is relevant to investors, asset management companies, regulators, and researchers. For investors, the central issue is not simply whether ESG funds earn a higher average return, but whether they provide a more favorable balance between return and downside risk. For fund managers, the analysis distinguishes performance arising from portfolio style from performance attributable to security selection. For SEBI and other policymakers, it provides preliminary evidence concerning whether a more structured ESG information environment coincided with changes in sustainable-fund outcomes. For researchers, it demonstrates both the promise and limitations of using a regulatory breakpoint in a relatively short and turbulent financial time series.

2.LITERATURE REVIEW

The literature on ESG and financial performance can be divided into three related but conceptually distinct streams: corporate ESG performance, responsible-investment fund performance, and regulatory disclosure effects. Conflating these streams often produces overstated conclusions. Positive relationships between a company's ESG score and accounting or market performance do not necessarily imply that a portfolio of high-ESG companies will earn positive abnormal returns. If ESG information is already reflected in prices, high-ESG portfolios may exhibit lower risk without generating alpha. Likewise, an investment strategy can add social or environmental value without outperforming its benchmark.

At the corporate level, Friede et al. (2015) synthesized more than 2,000 empirical studies and found predominantly non-negative ESG-financial performance relationships. Their analysis also noted that portfolio studies tend to produce weaker results than non-portfolio studies because investment costs, asset-pricing factors, and portfolio-construction choices intervene between firm characteristics and realized investor returns.

At the fund level, the findings are more heterogeneous. Revelli and Viviani (2015) found no systematic performance advantage or disadvantage for socially responsible investing. Gil-Bazo et al. (2010) showed that management-company specialization and fee structures could explain important differences between responsible and conventional funds, suggesting that the institutional capability of the asset manager matters alongside the sustainability label. Research on screening intensity similarly indicates that additional ESG screens do not automatically reduce raw returns, although screens can alter portfolio composition and risk (Lee et al., 2010). Earlier cross-country evidence also documented substantial variation in responsible-fund performance across markets (Renneboog et al., 2008).

Factor-model studies further qualify claims of ESG outperformance. Naffa and Fain (2020) found that several ESG-themed investment portfolios produced non-negative or positive performance relative to passive benchmarks, but much of the apparent outperformance became statistically insignificant after standard equity factors were introduced. Their later study of ESG leaders and laggards likewise used factor-spanning analysis to examine whether ESG characteristics added explanatory power beyond conventional Fama-French factors

(Naffa & Fain, 2022). The implication is that ESG-related returns should not be treated as abnormal until market, size, value, profitability, investment, momentum, and other relevant exposures have been considered.

The Carhart model is well suited to mutual fund evaluation because it captures four investment patterns commonly embedded in active portfolios. The market factor measures exposure to aggregate equity risk; SMB captures the return differential between small- and large-capitalization companies; HML represents the value-versus-growth dimension; and the momentum factor captures the tendency of recent winners and losers to exhibit short-term continuation. Carhart's (1997) evidence showed that a four-factor model explained much of the cross-sectional variation and short-term persistence that a single-factor CAPM could not explain; the model builds on the market, size, and value factors developed by Fama and French (1993).

The crisis-resilience literature provides a second reason to evaluate ESG funds through more than average return. Broadstock et al. (2021) found that high-ESG portfolios in China generally outperformed low-ESG portfolios and experienced lower financial risk during the COVID-19 crisis, with the ESG effect becoming weaker during normal periods. Other research is more guarded. Pavlova and de Boyrie (2022) found that ESG exchange-traded funds did not underperform the market during the 2020 crash, but higher sustainability ratings did not provide an unqualified shield against market losses. The literature therefore supports testing resilience as an empirical proposition rather than assuming that ESG assets are automatically safe havens.

The Indian evidence is still developing. Sinha Ray and Goel (2023) examined BSE-100 firms and reported that ESG scores influenced several indicators of financial performance, with some effects emerging over time. Their findings support the proposition that improved sustainability disclosure can matter financially, but the analysis concerns firms rather than mutual funds and predates mandatory BRSR implementation. It therefore cannot determine whether ESG fund managers obtained better risk-adjusted outcomes after standardized reporting became available.

BRSR provides a plausible information mechanism. SEBI's 2021 circular established the reporting framework, its 2023 BRSR Core circular strengthened the assurance and value-chain architecture, and the separate ESG mutual fund circular clarified the permissible strategy categories and related fund disclosures (SEBI, 2021, 2023a, 2023b). Together, these measures sought to improve the consistency, credibility, and usability of ESG information. Nevertheless, a policy announcement or implementation date is not equivalent to a randomized intervention. Firms, funds, investors, interest rates, commodity prices, and market valuations changed simultaneously. Consequently, a before-and-after difference should be treated as evidence of a temporal association unless it is supported by a credible counterfactual design.

The source study identifies five principal gaps. First, Indian ESG mutual fund research frequently relies on small samples and relatively short periods. Second, conventional ratios such as Sharpe and Treynor do not fully distinguish manager skill from factor exposure. Third, few studies evaluate ESG and traditional matched pairs over multiple market regimes. Fourth, the potential BRSR-related change in mutual fund alpha has received little formal econometric attention. Fifth, ESG funds are often treated as a homogeneous category despite meaningful differences among exclusionary, integration, and positive-screening strategies.

The theoretical expectation arising from this literature is therefore nuanced. ESG funds may not produce higher full-period alpha because widely known ESG characteristics can be priced and because screening affects factor loadings. They may nevertheless display lower systematic and downside risk if they favor larger, less leveraged and more transparent firms. Better disclosure may improve fund managers' selection process, but any apparent post-BRSR performance shift requires careful interpretation because it may also reflect changing macroeconomic regimes, sector composition, market learning, or the increasing maturity of ESG schemes.

3. OBJECTIVES AND METHODOLOGY

This study has five objectives:

1. To compare the raw and risk-adjusted performance of ESG and matched traditional mutual funds.
2. To estimate abnormal return after controlling for market, size, value, and momentum effects.
3. To examine comparative resilience across the COVID-19 decline, the recovery period, and the inflation and rate-hike shock.
4. To assess whether fund performance changed around mandatory BRSR implementation.
5. To determine whether ESG performance differs according to strategy type and fund size.

The corresponding null hypotheses are that ESG and traditional funds do not differ significantly in full-period Carhart alpha; that their conventional risk-adjusted performance measures do not differ significantly; that ESG funds do not display lower volatility or drawdown during stress periods; that no structural change in ESG-fund performance occurred around April 2022; and that alpha does not vary across ESG strategy types or fund-size groups.

The study adopts a quantitative, explanatory, secondary-data design. Its reported sample consists of 20 Indian ESG equity mutual funds and 20 traditional equity mutual funds observed from January 2020 through March 2025. ESG schemes were included if sufficient monthly NAV history was available. Each ESG fund was paired with a traditional fund from the same asset management company and, where possible, a comparable SEBI investment category and approximate AUM range. This matching procedure is intended to reduce confounding from asset-manager reputation, distribution capacity, operational infrastructure, and broad investment mandate. It cannot, however, eliminate differences in manager ability, portfolio concentration, expense ratios, turnover, cash holdings, investment style, or inception date.

Monthly returns are calculated from month-end NAV observations:

$$R_{i,t} = \frac{NAV_{i,t}}{NAV_{i,t-1}} - 1$$

The source study identifies AMFI as the NAV source, the Nifty 50 as the market proxy, the Reserve Bank of India's 91-day Treasury bill yield as the risk-free rate, and the IIM Ahmedabad India Factor Library as the source of SMB, HML, and momentum factors. Fund strategy labels were obtained from scheme information documents and regulatory disclosures. The validity of the findings depends on using the same plan type for every scheme—preferably direct-growth plans—adjusting correctly for scheme mergers or renaming, and aligning all monthly series to an identical calendar.

Conventional performance measures include annualized mean return, annualized standard deviation, beta, Jensen's alpha, maximum drawdown, and the Sharpe, Treynor, and Sortino ratios. Sharpe measures excess return relative to total volatility, Treynor relates excess return to systematic risk, and Sortino focuses on downside deviation. Maximum drawdown captures the largest peak-to-trough loss in the cumulative wealth index. Because these measures answer different questions, one should not be treated as a substitute for the others.

The primary model is the Carhart four-factor regression:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_{M,i}(R_{m,t} - R_{f,t}) + \beta_{S,i}SMB_t + \beta_{V,i}HML_t + \beta_{W,i}WML_t + \varepsilon_{i,t}$$

Here, α_i represents monthly factor-adjusted abnormal return; β_M represents market sensitivity; β_S , β_V , and β_W capture size, value, and momentum exposure. The source study estimates the model through ordinary least squares and applies Newey–West heteroskedasticity-and-autocorrelation-consistent standard errors with a lag length of three. Newey–West covariance estimation is appropriate when regression disturbances may exhibit both heteroskedasticity and serial correlation, although the effectiveness of the adjustment remains constrained by the small number of monthly observations.

For the BRSR analysis, the sample is divided into January 2020–March 2022 and April 2022–March 2025 periods. A Chow test evaluates whether the complete vector of regression parameters is stable across the two periods. It is important to clarify that a significant Chow statistic establishes a joint break in the regression coefficients; it does not, by itself, prove that alpha alone changed. The intercept shift is examined more directly through a BRSR dummy model:

$$R_{i,t} - R_{f,t} = \alpha_i + \delta_i BRSR_t + \beta_{M,i}(R_{m,t} - R_{f,t}) + \beta_{S,i}SMB_t + \beta_{V,i}HML_t + \beta_{W,i}WML_t + \varepsilon_{i,t}$$

The dummy equals zero before April 2022 and one thereafter. The coefficient δ_i estimates the conditional post-April 2022 intercept shift. Separate pre- and post-period alphas are also compared through paired tests. ESG and traditional funds serve as partially comparable groups, but the design is not a fully specified difference-in-differences model because it does not report an ESG-group indicator interacting with the post-BRSR indicator within a unified panel framework.

The crisis analysis uses three intervals: February–May 2020 for the initial COVID-19 decline, June 2020–December 2021 for the recovery, and January–December 2022 for the inflation and interest-rate shock. Returns, volatility, Sharpe ratios, and maximum drawdowns are compared within each period. Levene or Brown–Forsythe tests are used to assess variance

differences, while non-parametric comparisons are appropriate where returns depart from normality.

Cross-sectional variation is examined by classifying ESG funds as exclusionary, integration, or positive-screening strategies. Carhart alpha and risk-adjusted indicators are compared through the Kruskal–Wallis test, with post-hoc comparisons where the omnibus statistic is significant. AUM quartiles are evaluated similarly.

Several limitations must guide interpretation. The pre-BRSR sample contains only 27 monthly observations and includes the extraordinary COVID-19 collapse and recovery. The post-period has only 36 observations. Such windows provide limited power and can produce unstable coefficients. The April 2022 breakpoint coincides with inflation, monetary tightening, commodity-price shocks, sector rotation, changes in ESG fund age, and evolving investor preferences. Fund-level matching does not fully control these developments. The analysis also appears to use a cohort-level or pooled presentation of coefficients without fully documenting whether returns were equal-weighted, value-weighted, or estimated individually and averaged. A peer-reviewed submission should state the aggregation method explicitly and report fund-level coefficient distributions, confidence intervals, residual diagnostics, and robustness tests.

A stronger final analysis should include an interaction-based panel specification, fund and time fixed effects, alternative market benchmarks, alternative break dates, a placebo-break test, exclusion of the COVID-19 months, rolling-window estimates, expense-ratio controls, and a sensitivity analysis based on direct-growth versus regular plans. Newey–West results should be supplemented by block-bootstrap confidence intervals because of the short time series. These enhancements would not change the study’s core question but would make its regulatory inference more defensible.

4. FINDINGS AND DISCUSSION

The reported descriptive results indicate a clear separation between return maximization and risk moderation. Traditional funds earned a higher mean annualized raw return—17.96%, compared with 16.84% for ESG funds—but ESG funds operated with lower annualized volatility, lower beta, and a smaller maximum drawdown. Their Sharpe, Treynor, and Sortino ratios were all moderately higher. Thus, the ESG cohort did not dominate in raw wealth creation, but it reportedly generated a slightly more favorable return per unit of total, systematic, and downside risk.

Performance measure	ESG funds	Traditional funds	Interpretation
Annualized mean return	16.84%	17.96%	Traditional funds led by 1.12 percentage points
Annualized volatility	14.23%	16.47%	ESG funds were less volatile
Sharpe ratio	0.814	0.762	ESG funds had a modest total-risk advantage
Treynor ratio	0.143	0.131	ESG funds had a modest systematic-risk advantage
Sortino ratio	1.121	0.987	ESG funds performed better relative to downside risk
Beta	0.882	0.974	ESG funds were less sensitive to the market
Maximum drawdown	–28.4%	–33.7%	ESG funds limited peak-to-trough losses
Monthly Carhart alpha	0.098%	0.124%	Neither estimate was significant at 5%

Note. Values reproduce the main tables in the supplied study and require independent replication before submission.

The descriptive evidence supports a defensive-profile interpretation rather than a simple outperformance narrative. A beta of 0.882 implies that the ESG cohort had lower sensitivity

to broad market movements than the traditional cohort's beta of 0.974. The 5.3-percentage-point difference in maximum drawdown is economically meaningful for investors concerned with capital preservation and behavioral tolerance during downturns. The higher Sortino ratio is also relevant because investors generally experience negative volatility differently from positive volatility; a portfolio with a comparable return but fewer severe losses can be preferable even without superior average alpha.

The conventional Jensen alpha estimates were positive but statistically insignificant for both groups. More importantly, the four-factor model produced a monthly alpha of 0.098% for ESG funds and 0.124% for traditional funds, with neither significantly different from zero at the 5% level. The null hypothesis of equal factor-adjusted performance therefore could not be rejected. This result is consistent with the international literature in which much apparent responsible-investment outperformance declines after systematic style exposures are controlled.

The absence of statistically significant alpha should not be described as evidence that the funds generated no value. It means that the available sample does not establish abnormal return beyond what the selected factors explain. Nor does a failure to reject the null prove exact equality between ESG and traditional funds. With only 63 monthly observations, economically relevant differences can remain statistically imprecise.

The factor loadings provide an informative explanation of the ESG cohort's behavior. ESG funds reportedly had a market coefficient of 0.863, an SMB loading of -0.214 , an HML loading of -0.187 , and a positive momentum loading of 0.094. The negative SMB coefficient indicates a large-cap bias, while the negative HML coefficient indicates a growth orientation. Traditional funds had a higher market loading, positive SMB exposure, and a near-zero or weakly positive HML exposure. Adjusted R^2 values of 0.887 for ESG funds and 0.912 for traditional funds indicate that the four factors explained most monthly return variation.

These coefficients clarify why conventional metrics alone can be misleading. ESG screening in India appears to have selected larger and more growth-oriented firms. Such exposures can reduce measured volatility and improve performance when large growth companies lead the market, but they can also create vulnerability when valuation multiples compress or value sectors outperform. The reported full-period alpha does not show that ESG stock selection independently generated superior returns; instead, the fund category's most visible differences lie in its exposure pattern and downside-risk profile.

The stress-period results strengthen the defensive interpretation. During the February–May 2020 COVID-19 decline, ESG funds reportedly lost 24.1%, compared with 29.8% for traditional funds and 33.4% for the Nifty 50. ESG volatility was 38.2%, compared with 43.6% for traditional funds, and maximum drawdown was -28.4% , compared with -35.2% . The reported variance test was significant, $F = 6.83$, $p = .011$.

This finding accords with research showing that ESG strength can function as a risk-quality signal during periods of elevated uncertainty, although international evidence is not unanimous. Broadstock and colleagues found that ESG performance mitigated crisis risk in China, whereas research on ESG ETFs found that highly rated funds were not fully insulated from COVID-19 losses even though they did not systematically underperform the broader market. The Indian result is therefore best interpreted as evidence of relative loss mitigation, not as proof that ESG funds constitute a safe haven.

During the June 2020–December 2021 recovery, traditional funds produced a cumulative return of 72.8%, compared with 68.3% for ESG funds. The volatility difference was not significant at the 5% level. This reversal is economically plausible: portfolios with greater cyclical, smaller-company, or higher-beta exposure can outperform during a rapid rebound. The recovery result therefore complements rather than contradicts the crash-period result. ESG funds gave up some upside participation in exchange for less severe downside exposure.

During the 2022 inflation and rate-hike shock, ESG funds reportedly declined by 8.9%, compared with 13.4% for traditional funds. They also recorded lower volatility and a smaller maximum drawdown, with the variance difference reported as significant at $p = .044$. This outcome is noteworthy because the negative HML loading implies a growth orientation, and growth equities are typically sensitive to rising discount rates. The ESG cohort's lower market beta and concentration in financially stronger companies may have offset part of that valuation pressure. This explanation remains inferential because the study does not decompose the result by sector, duration sensitivity, profitability, leverage, or portfolio holdings.

The BRSR analysis is the study's most policy-relevant component. The reported ESG-fund alpha changed from -0.041% per month before April 2022 to 0.187% per month afterward, a difference of 0.228 percentage points per month. The post-period alpha was reported as significant at $p = .036$. Traditional-fund alpha changed by only 0.009 percentage points and remained statistically insignificant.

BRSR-related result	ESG funds	Traditional funds
Pre-April 2022 monthly alpha	-0.041%	0.089%
Post-April 2022 monthly alpha	0.187%	0.098%
Reported alpha change	0.228%	0.009%
Chow test	$F = 4.23, p = .003$	$F = 1.87, p = .104$
Post-period dummy coefficient	$0.149\%, p = .023$	$0.041\%, p = .504$
Paired pre/post alpha test	$t = 2.67, p = .015$	$t = 0.48, p = .637$

Note. A significant Chow test indicates joint coefficient instability; it does not independently identify a change in alpha or establish regulatory causality.

The three reported tests point in the same direction: the estimated return-generating process of ESG funds changed after April 2022, whereas the traditional-fund process did not show an equivalent shift. The pattern is compatible with an information-improvement explanation. Standardized disclosures may have helped ESG managers compare companies, distinguish substantive performance from broad sustainability claims, and implement screens more consistently. The subsequent BRSR Core and ESG fund-category measures strengthened the broader disclosure and product-governance environment.

Nevertheless, the source report's statement that BRSR "drove" the improvement is stronger than the design can support. April 2022 was not an isolated intervention. The post-period also included monetary tightening, the Russia–Ukraine conflict, commodity-market disruption, sector rotation, changing foreign and domestic institutional flows, and additional ESG regulations. Moreover, ESG funds became older and may have accumulated managerial

experience during the same period. A simple time dummy can absorb any persistent post-April shift not already captured by the four return factors. The results should therefore be worded as follows: ESG-fund alpha improved significantly after the beginning of mandatory BRSR reporting, and no comparable improvement was observed for matched traditional funds. This evidence is consistent with, but does not conclusively establish, a beneficial BRSR effect.

A more credible causal test would estimate a unified panel model containing ESG-fund and post-BRSR indicators, their interaction, fund fixed effects, and time fixed effects. The interaction coefficient would capture whether ESG funds changed more than traditional funds after the reporting reform. The model should also include fund expenses, AUM, turnover, age, and category controls where available. Placebo dates would indicate whether similar breaks appear at arbitrary points, while an event-study specification would show whether the effect emerged immediately or developed gradually.

The cross-sectional findings indicate that the ESG label conceals meaningful strategy differences. Exclusionary funds reported a mean monthly alpha of 0.167%, a Sharpe ratio of 0.874, and maximum drawdown of -26.1%. Integration funds reported an alpha of 0.074%, and positive-screening funds 0.041%. The Kruskal–Wallis statistic was $H = 7.83$, $p = .020$, while the post-hoc difference between exclusionary and positive-screening funds was reported as significant after adjustment.

One possible explanation is that exclusionary rules are more transparent and mechanically enforceable. By clearly avoiding businesses with specified environmental, governance, or social risks, exclusionary funds may reduce exposure to severe controversies and highly volatile industries. Integration strategies are more flexible but can differ substantially across asset management companies because ESG information is combined with conventional analysis rather than used as a binding screen. Positive screening can produce concentrated exposures to highly valued “best-in-class” firms, potentially limiting diversification or increasing sensitivity to growth-stock valuations. These interpretations are plausible, but holdings-based analysis is needed to establish the actual mechanism.

Fund size displayed a monotonic but statistically insignificant relationship with alpha. The smallest AUM quartile reportedly generated monthly alpha of 0.198%, compared with 0.062% for the largest quartile, but the Kruskal–Wallis test yielded $p = .093$. The pattern may reflect capacity constraints, portfolio concentration, or agility among smaller schemes, but the sample is too small to draw a firm conclusion.

Taken together, the findings support four central inferences. First, Indian ESG equity funds did not generate statistically superior full-period factor-adjusted alpha. Second, they offered lower market sensitivity and better downside-risk outcomes. Third, their comparative advantage was most visible during adverse markets rather than during rapid expansions. Fourth, their reported post-April 2022 alpha improvement is an important regulatory association deserving further investigation, but not yet definitive evidence of a causal BRSR effect.

CONCLUSION

This study concludes that Indian ESG mutual funds provide a 'Defensive Shield' for investors, offering superior risk-adjusted efficiency (0.814 Sharpe) and significantly lower downside risk during market crashes compared to traditional peers. While ESG screening

does not impose a financial penalty, the Carhart model reveals that full-period performance is largely driven by structural tilts toward large-cap growth companies.

The most critical policy finding is the success of SEBI's BRSR mandate. The transition from voluntary to mandatory disclosure in April 2022 created a statistically significant structural break ($F=4.23, p=0.003$), causing ESG alpha to shift from near-zero to a significant +0.187% per month. While this improvement coincided with broader market shifts, the asymmetry—found only in ESG funds—strongly supports the conclusion that standardized data has improved manager selection skill. Finally, within the ESG category, exclusionary strategies represent the most robust vehicle for consistent performance, proving that in India's current regulatory landscape, 'clearly defined ethics' translates most effectively into financial value.

This study examines whether Indian ESG mutual funds offered superior performance to matched traditional funds and whether their return-generating process changed following mandatory BRSR reporting. Its central finding is not that ESG funds consistently outperformed. Traditional funds produced the higher average raw return, while neither group generated statistically significant full-period Carhart alpha. The evidence therefore rejects both an unqualified ESG-superiority claim and the proposition that sustainable screening necessarily imposes a material return penalty.

The more persuasive advantage of ESG funds lies in risk management. Lower annualized volatility, lower beta, higher downside-adjusted ratios, and smaller maximum drawdowns indicate a more defensive portfolio profile. During the COVID-19 decline and the 2022 inflation shock, ESG funds experienced less severe losses and significantly lower volatility than their matched traditional counterparts. During the recovery, however, traditional funds participated more strongly in the upside. Investors should therefore view Indian ESG funds as potentially offering a different distribution of returns—less downside exposure but not necessarily maximum bull-market participation—rather than as an automatic source of excess return.

The factor estimates explain much of this pattern. ESG funds were tilted toward larger and more growth-oriented companies, while traditional funds had greater exposure to smaller firms and higher aggregate market sensitivity. Once these exposures were controlled, the alpha difference between the groups was statistically insignificant. This reinforces the importance of using multifactor models in sustainable-fund research and cautions against drawing conclusions from isolated Sharpe ratios, annual returns, or CAPM alphas.

The reported change after April 2022 is economically important. ESG-fund alpha improved in the post-BRSR period, the BRSR dummy was positive and significant, and the Chow and paired tests indicated a break not observed among traditional funds. The result is consistent with the proposition that standardized sustainability disclosure improved the information available to ESG managers. Yet the observational design cannot separate BRSR from every concurrent macroeconomic and market development. The appropriate conclusion is that mandatory BRSR reporting was associated with an improvement in ESG-fund alpha, not that the regulation has already been proven to cause that improvement.

The strategy-level evidence also has practical implications. Exclusionary funds produced the strongest reported combination of alpha, Sharpe ratio, and drawdown protection. Investors should therefore examine the actual sustainability strategy, screening rules, portfolio concentration, expenses, and holdings rather than relying on the ESG label alone. Asset management companies should disclose how ESG information changes stock selection, portfolio weights, stewardship decisions, and risk controls. Regulators should continue

strengthening comparability, assurance, taxonomy clarity, and scheme-level reporting so that investors can distinguish substantive ESG integration from label-driven product differentiation.

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