

Green Energy Stocks versus Green Mutual Funds: Investor Risk Perceptions, Sustainability Preferences and Growth Expectations

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ABSTRACT

Purpose. This study compares investor perceptions of green energy stocks and green mutual funds, focusing on perceived risk, sustainability contribution, long-term growth potential and awareness of investment-specific risks.

Design/methodology/approach. The study adopts a comparative quantitative design and uses primary survey data from 102 valid respondents with exposure to green investment products. Frequency analysis, percentage analysis, cross-tabulation and Pearson's chi-square tests are used to examine associations between investment preference and selected investor perceptions.

Findings. The results indicate statistically significant associations between investment preference and perceived risk ($\chi^2 = 28.772$, $p = .004$), investment-management preferences related to sustainability participation ($\chi^2 = 47.495$, $p < .001$), and perceived long-term growth potential ($\chi^2 = 102.184$, $p < .001$). No statistically significant association is found between awareness of specific risk factors and investment preference ($\chi^2 = 66.882$, $p = .112$). However, the chi-square tables contain substantial expected-frequency violations, so the strength of these relationships should be interpreted cautiously.

Originality/value. The study provides an investor-level comparison of green energy stocks and green mutual funds in the Indian context. It highlights that investor choice is associated more strongly with overall perceptions of risk, growth and management than with awareness of individual risk factors.

Keywords: green finance; green energy stocks; green mutual funds; sustainable investment; ESG; investor preferences; risk perception; India

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1. Introduction

The transition towards a low-carbon economy has increased the relevance of sustainable finance and created new investment opportunities for individuals and institutions. Green energy stocks provide direct equity exposure to companies involved in renewable-energy and clean-technology activities, whereas green mutual funds provide pooled and diversified exposure to firms selected according to environmental, social and governance considerations [1–4].

The two instruments differ in their risk-return characteristics and in the degree of diversification available to investors. Direct investment in individual renewable-energy companies can provide greater exposure to firm-specific growth opportunities but can also increase concentration and sector-specific risk. Mutual funds can reduce firm-specific exposure through diversification and professional management, although fund investors remain exposed to market, sector and fund-management risks [3,5].

Investor choice is therefore unlikely to depend on financial return alone. Perceptions of risk, environmental contribution, expected long-term growth, management expertise and transparency may shape sustainable-investment decisions. Understanding these perceptions is important for financial advisers, fund managers and policymakers seeking to expand responsible investment.

This study examines these issues by comparing investor perceptions of green energy stocks and green mutual funds and testing whether selected perceptions are statistically associated with investment preference.

2. Statement of the Problem

The growth of sustainable investing has created a choice problem for investors deciding between direct green-energy equities and diversified green mutual funds. Investors must balance risk, expected return, diversification, professional management and perceived environmental contribution. The decision may be particularly difficult for less experienced investors because green investment products can involve sector concentration, technological uncertainty and evolving regulatory conditions.

The study therefore investigates whether investor preferences are associated with perceived risk, sustainability-related views, long-term growth expectations and awareness of specific risk factors.

3. Objectives of the Study

1. To evaluate investors' perceptions of the risk levels of green energy stocks compared with green mutual funds.
2. To assess investor perceptions regarding the contribution of green energy stocks and green mutual funds to environmental sustainability.
3. To analyse investor perceptions of the long-term growth prospects of green energy stocks and green mutual funds.
4. To investigate investor awareness of specific risks associated with green energy stocks and green mutual funds, including concentration risk, limited professional management and sector volatility.

4. Hypotheses

H1: There is a significant association between investors' perception of risk and their investment preference between green energy stocks and green mutual funds.

H2: There is a significant association between sustainability-related perceptions and investors' investment preference between green energy stocks and green mutual funds.

H3: There is a significant association between perceived long-term growth potential and investors' investment preference between green energy stocks and green mutual funds.

H4: There is a significant association between awareness of specific investment risks and investors' investment preference between green energy stocks and green mutual funds.

For statistical testing, the corresponding null hypotheses state that no significant association exists. This wording corrects the logical inconsistency in the original manuscript, where hypotheses labelled H01–H04 were written as significant relationships.

5. Review of Literature

Green investment performance. The literature reviewed in the source manuscript indicates that green-energy securities can experience strong growth during periods of renewable-energy expansion but may also exhibit higher volatility. Comparative studies of green funds suggest that diversification can reduce firm-specific risk and that green funds may demonstrate resilience during periods of market stress [1,3,5].

Indian green investment market. The source literature identifies policy support, renewable-energy investment, ESG integration and institutional participation as important influences on the growth of green financial products in India [2,4].

Risk-return characteristics. Research cited in the source manuscript indicates that green funds can produce competitive risk-adjusted returns, while direct green-energy stocks may provide greater upside but expose investors to higher company and sector concentration [1,3,6].

Investor preferences. Behavioural and ethical considerations may influence sustainable-investment decisions in addition to financial performance. Investors may value environmental impact, professional management, diversification and perceived long-term growth when selecting green financial products [7,8].

Research gap. Existing research has extensively examined the performance of green securities, but investor-level comparisons of green energy stocks and green mutual funds remain context dependent. This study contributes evidence from Indian investors by examining the relationship between product preference and selected perceptions.

6. Research Methodology

6.1 Research Design

The study adopts a comparative quantitative research design. The source manuscript describes both secondary market-oriented analysis and primary investor research. Because the reported statistical tests use questionnaire variables and a valid sample of 102 respondents, the present empirical analysis is treated as a primary-data investor-perception study.

6.2 Data Collection and Sample

Primary data were collected using a structured questionnaire from investors with exposure to green finance. The source manuscript reports purposive sampling and a valid sample of 102 respondents. The sample includes individual investors and other respondents with relevant exposure to green energy stocks or green mutual funds.

6.3 Variables

The principal variables are investment preference, perceived risk, sustainability-related perceptions, perceived long-term growth potential and awareness of specific risks. The categorical response structures are analysed through cross-tabulation and chi-square tests.

6.4 Tools of Analysis

Frequency and percentage analysis are used to summarise responses. Cross-tabulation is used to compare investment preference across perception categories. Pearson's chi-square test of independence is used to test whether the categorical variables are statistically associated.

7. Results and Analysis

7.1 Risk Perception and Investment Preference

Statistic	Value
Pearson Chi-square	28.772
Df	12
p-value	0.004
Likelihood Ratio	30.093
Valid cases	102

The Pearson chi-square result is statistically significant at the 5% level ($\chi^2 = 28.772$, $df = 12$, $p = .004$). This indicates an association between perceived risk and investment preference in the sample. The cross-tabulation suggests that investors' risk perceptions differ across preference categories.

However, 16 cells (76.2%) have expected counts below 5, with a minimum expected count of .09. This is a substantial violation of the usual chi-square assumptions. Therefore, the result should be treated as indicative rather than definitive. A category-collapsing strategy or an exact/Monte Carlo procedure should be considered before final journal submission.

7.2 Sustainability/Management Preference and Investment Choice

Statistic	Value
Pearson Chi-square	47.495
Df	18
p-value	<0.001
Likelihood Ratio	30.884
Valid cases	102

The Pearson chi-square test indicates a statistically significant association ($\chi^2 = 47.495$, $df = 18$, $p < .001$). The descriptive pattern suggests that respondents who place greater value on professional management show stronger preference for mutual funds, while respondents preferring greater individual decision control show relatively stronger preference for direct stocks.

The original manuscript describes this test as measuring the impact of green investments on environmental sustainability. However, the displayed variable q3mgmt relates to management-

decision preference rather than a direct measure of environmental impact. Therefore, the revised paper interprets this result as an association between management preference and investment choice, not as evidence that one product has a greater environmental impact.

7.3 Long-Term Growth Potential and Investment Preference

Statistic	Value
Pearson Chi-square	102.184
df	36
p-value	<0.001
Likelihood Ratio	49.015
Valid cases	102

The Pearson chi-square statistic is statistically significant ($\chi^2 = 102.184$, $df = 36$, $p < .001$), indicating an association between perceived growth potential and investment preference. The descriptive cross-tabulation suggests that respondents who perceive individual green-energy stocks as having stronger growth potential tend to favour stocks, while respondents who perceive green mutual funds as more attractive or prefer similar potential across the two products show different preference patterns.

The result must again be interpreted cautiously because 44 cells (89.8%) have expected counts below 5. The minimum expected count is .01, indicating severe sparsity. The chi-square significance may therefore be unstable and should be verified after collapsing sparse categories or using an exact alternative.

7.4 Awareness of Specific Risk Factors and Investment Preference

Statistic	Value
Pearson Chi-square	66.882
Df	54
p-value	0.112
Likelihood Ratio	48.994
Valid cases	102

The Pearson chi-square result is not statistically significant at the 5% level ($\chi^2 = 66.882$, $df = 54$, $p = .112$). Therefore, the study does not find sufficient evidence of an association between awareness of specific risk factors and investment preference.

The non-significant result should not be interpreted as evidence that investors are unaware of risk. Rather, the measured categories of risk awareness do not statistically distinguish the investment-preference groups in this sample.

The chi-square assumption is also substantially violated: 63 cells (90.0%) have expected counts below 5. Accordingly, the non-significant finding should be treated cautiously and ideally re-tested using a more appropriate method for sparse categorical data.

8. Hypothesis Testing

Hypothesis	χ^2	p-value	Decision at 5%
H1: Risk perception is associated with investment preference	28.772	0.004	Supported; interpret cautiously
H2: Management/sustainability-related perception is associated with investment preference	47.495	<0.001	Supported; construct interpretation required
H3: Growth perception is associated with investment preference	102.184	<0.001	Supported; interpret cautiously
H4: Risk-factor awareness is associated with investment preference	66.882	0.112	Not supported

The results support H1, H2 and H3 at the conventional 5% significance level based on the reported Pearson chi-square tests, while H4 is not supported. Nevertheless, all four tests have substantial expected-frequency problems. The final manuscript should therefore report assumption checks and, where appropriate, a robust alternative analysis.

9. Discussion

The findings suggest that investors' overall perceptions of risk and growth are more closely related to product preference than their awareness of individual risk factors. This is consistent with the broader sustainable-finance literature, where product choice can reflect a combination of expected financial performance, diversification, professional management and sustainability considerations [1–6].

The significant relationship between risk perception and investment preference is particularly relevant because direct green-energy stocks expose investors to company-specific and sector-

specific volatility, whereas mutual funds can distribute exposure across holdings. The observed relationship therefore appears economically plausible, although the present cross-sectional analysis cannot establish causality.

The significant growth-perception result indicates that expected future expansion is an important dimension of green-investment choice. Investors who perceive individual renewable-energy companies as having greater upside may prefer direct stocks, while investors prioritising diversification may favour mutual funds.

The non-significant risk-awareness result is also informative. Awareness of specific risks does not necessarily translate into a different product choice. Investors may recognise concentration or sector risks but still select stocks because of expected growth, or select funds because of diversification and professional management.

10. Practical Implications

10.1 Investor Education

Investor education should distinguish clearly between product-level risk and investor-level risk. Educational material should explain concentration risk, sector volatility, diversification, fund-management risk and the difference between expected growth and realised performance.

10.2 Financial Advisers

Advisers should assess an investor's risk tolerance, investment horizon, diversification needs and sustainability preferences before recommending direct green-energy stocks or green mutual funds. Recommendations should not rely solely on the perceived environmental label of a product.

10.3 Fund Managers

Green mutual-fund managers should improve communication regarding portfolio composition, ESG criteria, sector concentration, risk-management practices and the role of professional management. Transparent reporting can help investors distinguish sustainability claims from measurable investment characteristics.

10.4 Policymakers and Market Institutions

Policymakers and market institutions can strengthen sustainable-investment participation through standardised disclosure, comparable ESG information and investor education. Clear definitions of green investment categories can also reduce information asymmetry.

11. Limitations

The principal limitation is the sample size of 102 valid cases and the use of purposive sampling, which limits generalisability. The study also relies on categorical self-reported perceptions rather than observed investment behaviour or verified portfolio returns.

A further methodological limitation is the high proportion of cells with expected frequencies below 5 in all four chi-square analyses. This violates a key assumption of the Pearson chi-square approximation and reduces confidence in the reported significance levels.

The source manuscript also describes a comparative five-to-ten-year secondary-data design but does not provide the underlying stock/fund performance dataset, return measures, volatility calculations or regression results. Those claims should not be presented as completed empirical analysis unless the underlying data and outputs are added.

12. Future Research

Future research should use larger probability-based samples and combine investor-survey data with actual investment holdings or transaction records. Multinomial logistic regression could model investment preference while controlling for age, income, investment experience, risk tolerance and financial literacy. Sparse categorical responses should be collapsed on theoretical grounds before inferential testing, or exact/Monte Carlo methods should be used.

A separate performance study could compare green stocks and green mutual funds using annualised return, standard deviation, Sharpe ratio, maximum drawdown, beta and downside-risk measures over a clearly defined period. This would complement the investor-perception analysis with objective financial evidence.

13. Conclusion

This study compares green energy stocks and green mutual funds from an investor-perception perspective. The evidence indicates significant associations between investment preference and perceived risk, management/sustainability-related preferences and perceived long-term growth potential. Awareness of specific risk factors is not significantly associated with investment preference in the reported sample.

The results suggest that investors may choose between direct green-energy stocks and diversified green mutual funds based less on individual risk labels and more on their overall assessment of growth, risk and management. This has implications for investor education and financial advisory practice.

At the same time, the large number of low expected cell counts across the chi-square tables requires caution. The results should therefore be regarded as exploratory until the categorical structure is improved and the analyses are re-estimated using methods appropriate for sparse data. A stronger future study combining investor perceptions with objective risk-return and sustainability measures would provide more robust evidence.

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