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"Sustainable Portfolio Management and Investment Analysis: Risk and Return of High ESG-Scoring BSE Sensex Stocks".

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Abstract: *Incorporation of Environmental, Social, and Governance (ESG) considerations into investment has gained prominence, reflecting the growing acknowledgment of the importance of sustainability in financial performance. ESG considerations serve as complex indicators of business responsibility, including aspects such as environmental footprint, social engagement, and governance. The research study explores connection between ESG capability and Investment returns performance by creating two-asset portfolios of firms with outstanding ESG ratings on the BSE Sensex. Five companies across different sectors—Marico Ltd, HDFC Bank, Bharti Airtel, Tata Consumer Products Ltd, and EID Parry—were selected based on ESG Risk AI 360° ratings. The study approximates average returns, standard deviations, correlations, portfolio weights, and portfolio risks for ten unique pairings. Findings suggest that the Marico–EID Parry portfolio offers the lowest risk (8.74%) and high return (20.42%), which is the best bet among risk-averse investors. Conversely, the Tata Consumer–EID Parry pair offers the highest return (42.04%) albeit at the cost of greater risk (42.35%). Visualization of findings through risk-return plots and heat maps emphasizes the role of correlation and industry diversification in the performance of the portfolio. This study contributes to the nascent literature on sustainable investing by demonstrating how portfolios balanced on ESG principles can optimize risk-adjusted returns through systematic pairing and quantitative evaluation.*

Keywords: *ESG scores, portfolio analysis, BSE Sensex, risk-return trade-off, sustainable finance, correlation, portfolio optimization.*

1.Introduction:

1.1 Background of ESG Investing: Environmental, Social, and Governance (ESG) investing is increasingly becoming a core strategy in modern portfolio management. More stakeholders are including ESG indicators to determine a company's sustainability, management of its risks, and its ethical dimension (Halid et al., 2023; Gadekar et al., 2024). Quantitative and qualitative-based ESG ratings of a company's performance on these three dimensions offer important information on its long-term sustainability (Narula et al., 2023). The role of ESG in financial analysis has become more important in the aftermath of the pandemic, when investors are seeking sustainable and responsible investment (Cheng et al., 2023).

1.2 ESG and Financial Performance: Empirical Observations: A number of studies have established that there is a positive relationship between ESG performance and firm profitability.

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For example, Devi and Y (2024) and Alfarizzi et al., (2024) noted that Indian and Indonesian firms that assign high importance to ESG attributes performed better than their peers regarding risk-adjusted returns. Likewise, Sandu (2024) and Shrimal et al., (2024) established that high ESG scores exhibit an association with improved market capitalization also greater investor confidence, particularly under volatile market conditions.

1.3 Portfolio Construction with ESG: Environmental, social, and governance (ESG) considerations are progressively being incorporated into strategies for portfolio optimization, frequently alongside conventional financial indicators. Pan et al. (2025) employed Markowitz's modern portfolio theory in their analysis of MSCI-rated ESG equities and revealed enhancements in Sharpe ratios. Additional studies by Pramitasari (2024) and Kusno et al. (2024) have indicated that portfolios concentrating on ESG factors typically yield higher returns while maintaining reduced risk levels, thereby reinforcing their inclusion in conventional investment methodologies.

1.4 Consistency of ESG ratings and Market Implications: Despite increasing reliance on ESG ratings, the absence of comparability among rating agencies is a major hindrance. Alfaro and Cifuentes (2023) as well as Cesarone et al's (2024) work has observed that these differences are capable of influencing investment decisions and reducing the effectiveness of comparison. The difference in scores is of concern to institutional investors (Wei & Chengshu, 2023), especially in developing economies where ESG disclosures are not uniformly standardized.

1.5 ESG in Indian Capital Markets: India's ESG environment remains to be dynamic, with the ESG India 360□, CRISIL ESG Ratings NIFTY 100 ESG Index serving as a standard for sustainable investing. Latest research like Gadekar et al. (2024) and Chandana (2024) also indicated rising importance of ESG-concordant portfolios in the Indian context. ESG-based indices' performance, in comparison to traditional indices like BSE Sensex, has depicted more desirable risk-return profiles, further asserting their feasibility (Pradeep & Simmy, 2024).

1.6 Study Gap and Research Objective: Though evidence from around the world favors ESG integration in investment, there has not been sufficient empirical work on highly rated ESG firms listed on the Indian BSE Sensex. This research tries to fill this gap by creating best two-asset portfolios with leading performing ESG-rated stocks from various industries and examining their patterns of risk and return. Specifically, it tries to find out if highly rated ESG firms (rated by ESG India 360 tools) offer greater returns with reduced levels of risk, using parameters like average return, correlation, standard deviation, portfolio weights, and Markowitz risk-return model.

2. Review of Literature: Gadekar, Sharma, & Polat (2024) examined 49 firms listed in the S&P BSE ESG 100 index and used panel data techniques to evaluate the profitability variations in relation to ESG scores.They found the social pillar had a markedly advantageous in relation to return on assets (ROA), while governance scores negatively influenced returns, highlighting a

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nuanced linkage between ESG dimensions and financial returns.Devi & Y (2024) used a panel regression analysis on 148 listed Indian firms in the BSE500 index and discovered that there was a statistically significant negative correlation between the ESG scores and the return on assets. The authors proposed that ESG programs, though they might be costly in the short run, could lead to long-run sustainability and confidence among investors.Shrimal, Kumar, & Shukla (2024) employed OLS regression and Pearson correlation techniques to assess the influences of ESG scores on stock returns of the Nifty 50 firms. They established a negative relationship, suggesting that improvements in ESG may be meaningfully unrelated to stock price appreciation for firms in India Halid et al. (2023) carried out a literature review of ESG scores and their impact on firm performance, highlighting inconsistent results. The research established that ESG scoring can influence working outcomes, and can assist investors in assessing risk-adjusted return across industries.Pan et al. (2025) used Markowitz's portfolio theory to construct ESG-based portfolios from stocks rated by MSCI. They found that ESG integrated portfolios, especially when optimized by Sharpe ratios produce stable risk-adjusted returns and demonstrate that using ESG in investments can be meaningful in long-term strategies.Alfarizzi, Purnamasari, and Abidin (2024) used data on ESG score, valuation metric (P/E ratio), and earnings (dividends per share) for publicly listed companies to understand how ESG performance contributes to stock price behavior. The authors concluded that ESG factors, in addition to financial performance measures, has a significant impact on stock values with almost 50% of variability in stock values explained by ESG and related risk indicators. The results showed that ESG factors are helpful to stakeholders in building their investment portfolio with significance Wei and Chengshu (2023) explored how institutional investors initiated investment preferences in China. The authors found that if a company displayed strong corporate ESG performance, high institutional ownership would be driven by investors, especially among long-term, and independent investors. ESG performance was found to create an indirect effect between preferences for firm value and the importance of investor preference, thereby becoming an important variable when creating portfolio construction strategies .He et al. (2023) devised portfolios of S&P 500 stocks on the basis of ESG scores and classification of sectors. They found that although ESG-based portfolios provided some diversification benefits, they ultimately could not outperform their benchmarks in terms of returns. Sandu (2024) evaluated ESG portfolios across 23 European countries and determined that portfolios with the highest ESG scores performed better than portfolios with low indices based on Sharpe Ratios; however, there was no substantially greater return from either portfolio as compared to market benchmarks. Cheng, Kim, & Ryu (2023) demonstrated that ESG-disclosure regarding Chinese firms, increased firm value post-COVID. They found that environmental disclosures had a significant impact to firm's valuation, however, social and governance aspect did not appear to have significant impact on firm valuation .Narula et al. (2023) examined disclosures of ESG scores by Indian firms and sluggish ESG metrics showed limited measurable outcomes in respect to firm performance during COVID, indicating that measurable financial results from adopting ESG factors are not yet established as an industry . Pramitasari (2024) used the FTSE4Good Index data to conduct analysis of portfolios that were based around ESG and those

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that were not, and found not only did the portfolios based on ESG outperformed the portfolios that were not based on ESG by 4.3% annually, the volatility of the portfolios based on ESG was also lower, and the deviation of portfolios based on ESG was also better, highlighting the case for an investment strategy based on ESG. Kusno, Hartanto, & Trilaksono (2024) focused entirely on portfolios based on Indonesian ESG comparison of risk-return using the Sharpe ratio, NAV. The finding as that the portfolios with a higher ESG score were also more performant, nevertheless, the risk attached was also greater thus making the case for need to always use the Sharpe ratio to properly adjust. Athish, R. R., & Harshitha, M. (2023) on their study evaluates the risk-return profiles of various stock combinations to optimize investment portfolios. The authors identify Bajaj Finance as yielding the highest returns and Reliance Industries Ltd as presenting the lowest risk. Notably, combinations like JSW Steel & Bajaj Finance and ICICI Bank & Titan Company offer superior returns with minimal risk, underscoring the importance of strategic asset allocation in portfolio management. Simlai (2024) also identified notable findings using a penalized regression based on Mahalanobis distance and imposing the regression to actual ESG-rating firms, and finding no statistically significant risk-adjusted return differential between portfolios based on good and poor ESG—meaning the ESG ratings alone did not significantly impact the risk-return characteristic profile of the portfolios. Jia (2024) used Markowitz's model to assess high ESG-risk firms relative to low ESG-risk firms, which were the high and low risk in the growing TMT, and was able to show the higher EVS-risk firms had overall better returns and Sharpe ratios suggesting ESG has the potential to be useful in risk management with portfolio size optimization. Hung et al. (2023) came up with a two-stage cross-efficiency data envelopment analysis (CE-DEA) approach integrating ESG metrics with financial metrics such as volatility and quality. The model presented more precise portfolio selection information than conventional financial-only methodologies. Alfaro & Cifuentes (2023) studied MSCI and S&P ESG ratings to evaluate portfolio performance employing risk and return-based measures such as CVaR and total return. They found no steady pattern for ESG scores in regard to portfolio performance, and thus investors should be careful while using ESG rankings. Bhatia & Kumar (2024) evaluated ESG portfolio performance in emerging markets based on Sharpe Ratio, Jensen's Alpha, and regression approaches. They constructed portfolios that complied with ESG criteria and found that these portfolios outperformed traditional portfolios' returns and risk-return measures, and they noted some issues with the poor quality of ESG data in some emerging markets.Cesarone et al. (2024) examined the problem of different ESG ratings from different agencies and created a multi-criteria ESG portfolio selection k-sum convex optimization model. They noted that their model outperformed traditional portfolios in simulations that used actual financial datasets. Chandana (2024) compared the performance of BSE's Greenex and Carbonex indices with BSE Sensex based on Sharpe, Treynor, and Jensen's Alpha during pre-COVID and post-COVID periods. The findings showed that Carbonex outperformed BSE Sensex in all time durations, indicating the importance of sustainability in portfolio selection. Pradeep & Simmy (2024) variables examines the BSE Sensex performance ratios on a 24 years data and holding periods valuation ratio and returns. Their findings indicate that the longer the holding period the lower the risk and that valuation ratios at

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point of entry clearly exerted influence on the returns at exit. Dutta (2023) employed ARIMA modeling to predict BSE Sensex returns, where ARIMA (3,1,1) provided high predictive power with minimal error rates. The research points to the utility of time-series forecasting in regulating short-term investment choices in Sensex-linked portfolios. Deb & Saha (2024) carried out a correlation study of BSE Sensex and five US stock indices over three periods of financial crisis. Their results indicated that there was consistently low correlation, which suggests that investments based on BSE Sensex provide geographic diversification advantages.

3. Research Methodology:

3.1. Theoretical and Conceptual Framework: This study is based on a multi-dimensional theory framework that combines the Triple Bottom Line (TBL), Resource-Based View (RBV), and Modern Portfolio Theory (MPT) to examine ESG-focused investment choice. The TBL framework promoted by Elkington (1997) prioritizes a comprehensive corporate performance measurement on three counts—People, Planet, and Profit—focusing on the equilibrium of social justice, environmental care, and economic prosperity. ESG considerations neatly fit into this context, as concrete metrics to evaluate company sustainability. The Barney (1991) Resource-Based View (RBV) assumes that companies attain long-term competitive advantage by means of distinctive, valuable, scarce, imitable, and organizationally embedded (VRIO) resources. ESG excellence measured on this VRIO is a strategic intangible asset that accounts for long-term performance and investor confidence. The ESG-based views are implemented using Modern Portfolio Theory (MPT) (Markowitz, 1952), which helps in the construction of diversified portfolios that minimize risk for a specified level of expected return. With the addition of firms that have cleared ESG screening—i.e., firms with a score above 70 using ESG Risk AI 360°—in portfolios incorporating two stocks, the research investigates the correlation, risk, and return relationships in the situation of ESG investments. Conceptually, the model evolves from ESG screening to performance benchmarking to eventual identification of best sustainable portfolios, which mirrors the strength of data-driven ESG integration in mainstream financial models.

3.2 Research Design: This study follows a quantitative research design based on descriptive and analytical approaches to examine the risk-return characteristics of ESG-compliant portfolios. The objective is to evaluate whether companies with excellent ESG scores (>70) from ESG India 360° also listed on the BSE (Bombay Stock Exchange) demonstrate superior financial and risk-adjusted performance when combined in two-asset portfolios.

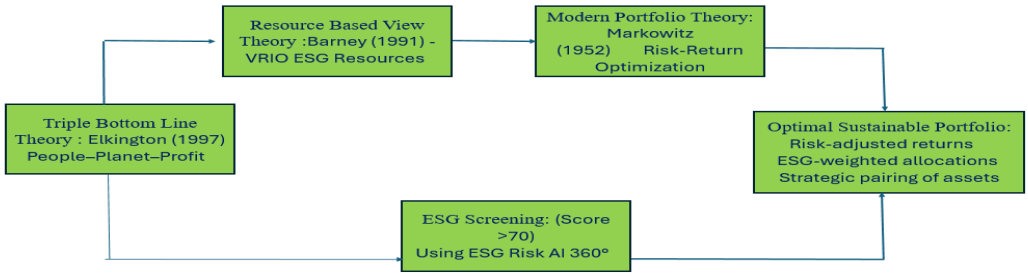

Fig 1: Represents Theoretical and Conceptual Framework.

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3.3 Sampling method and selection: The sample comprises five companies—Marico Ltd, HDFC Bank, Bharti Airtel, Tata Consumer Products Ltd, and EID Parry—all of which are rated as "Excellent" (ESG score >70) by the ESG Risk 360° scoring framework. The companies were selected to ensure industry diversity, relevance to the Indian capital market, and representation across key sectors. A purposive sampling method was employed to ensure relevance and comparability.

3.4 Variables and Metrics:

Table 1: Represents Variables and Metrics used in the study

Variable	Description
ESG Score	Composite score from ESG India 360°
Average Return ($\bar{R}$)	Arithmetic mean of annual returns over the observation period from the years 2020 to 2024.
Standard Deviation (σ)	Measures volatility (risk) of returns
Correlation Coefficient (ρ)	Measures linear relationship between asset returns
Portfolio Weights (w_1, w_2)	Equal weighting (0.5 each) to focus on asset pair dynamics
Portfolio Return (Rp)	Weighted average return of the two-stock portfolio
Portfolio Risk (σp)	Risk calculated using covariance and variance-covariance matrix

3.5 Portfolio Construction: Two-Asset Portfolio Model: Given the study's objective of evaluating risk-return trade-offs in ESG-aligned portfolios, only two-asset combinations were analyzed. The two-asset model was chosen for its:Simplicity in isolating diversification benefits, Clarity in correlating ESG strength with risk-adjusted returns. **Portfolio Weights** Assuming equal weights $W_a + W_\beta = 1$.If weights are known: W_a = Investment in Asset A / Total Investment, W_β = Investment in Asset B / Total Investment.**Portfolio Expected Return** is calculated using formula $\mathbf{R_p = W_a \times R_a + W_\beta \times R_\beta}$, R_p: Expected return of the portfolio - R_a, R_β: Expected returns of assets A and B - W_a, W_β: Portfolio weights of assets A and B and **Portfolio Risk** is calculated using formula, $\mathbf{\sigma_p = \sqrt{(W_a^2 \times \sigma_a^2 + W_\beta^2 \times \sigma_\beta^2 + 2 \times W_a \times W_\beta \times \sigma_a \times \sigma_\beta \times \rho_{a\beta})}}$, Where: - σ_p: Portfolio risk - σ_a, σ_β: Standard deviations of assets A and B, - $\rho_{a\beta}$: Correlation coefficient between asset A and B returns.

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3.6 Data Analysis Techniques: Data were analyzed using Google sheets to compute statistical analysis and microsoft power bi is used for visualizations.

3.7 Limitations:ESG ratings are subject to agency-specific methodology differences, even for "excellent-rated" stocks.The analysis assumes historical returns are representative of future performance, which may not always hold in volatile markets.

4. Analysis and Interpretation: The study was designed to test the performance of investment portfolios constructed from ESG-excellent companies in the Indian market. ESG rating, assigned using an ESG India 360° reflects the firms sustainable environmental practices, ethical social conduct and transparent governance.Hypothesis is that high ESG compliance could be a proxy for long-term stability, lower risk exposure, and possibly superior returns. All selected companies belong to different industry sectors, a strategy that ensures maximum sectoral diversification and reduces unsystematic risk. Only two-asset portfolios were formed to isolate and directly compare diversification and synergy effects between pairs.

Table 2: Summarizes the Average Return, Standard Deviation and Variance of five scripts

Stock	Average Return (%)	Standard Deviation (%)	Variance
Marico Ltd	18.07	9.03	81.63
HDFC Bank	14.23	30.10	905.90
Bharti Airtel Ltd	32.46	16.71	279.31
Tata Consumer Products Ltd	32.99	46.61	2172.25
EID Parry Ltd	44.85	27.43	752.66

Interpretation: EID Parry has the highest average return (44.85%), but also a relatively high risk (27.43% std dev), indicating higher return potential with higher volatility. Tata Consumer Products shows high average return (32.99%) but also the highest volatility, as seen in both standard deviation (46.61%) and variance (2172.25) — signifying an aggressive investment profile. HDFC Bank has the lowest average return (14.23%) with high volatility (30.10%), making it less efficient on a risk-return basis. Marico offers a balanced risk-return profile with a moderate return (18.07%) and lowest standard deviation (9.03%), indicating stability. Bharti Airtel combines a high return (32.46%) with moderate risk (16.71%), making it attractive for growth-oriented investors.

Table 3: Represents Correlation Matrix between five constituent stocks

	Marico	HDFC Bank	Bharti Airtel	Tata Consumer	EID Parry

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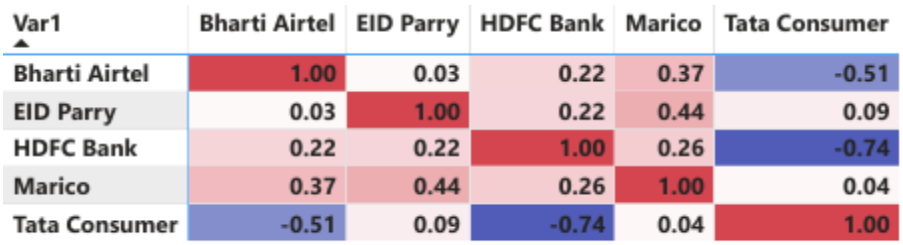
Marico	1.000	0.262	0.366	0.039	0.438
HDFC Bank	0.262	1.000	0.222	-0.735	0.219
Bharti Airtel	0.366	0.222	1.000	-0.514	0.033
Tata Consumer	0.039	-0.735	-0.514	1.000	0.092
EID Parry	0.438	0.219	0.033	0.092	1.000

Interpretation: Strong Negative Correlation: **HDFC Bank and Tata Consumer Products (-0.735)** exhibit the strongest inverse relationship among all pairs. This indicates that when HDFC Bank's stock price increases, Tata Consumer's tends to decrease, and vice versa. Such a strong negative correlation is highly beneficial for **risk mitigation** in portfolio construction. **Moderate Negative Correlation**: **Bharti Airtel and Tata Consumer (-0.514)** also show substantial negative correlation, offering further **diversification opportunities**. Combining these assets could dampen the portfolio's overall volatility. **Low to Mild Positive Correlations**: **HDFC Bank and Bharti Airtel (0.222)** share a mild positive relationship, implying some common market influences but enough dissimilarity to still support diversification. **Marico's correlations** with HDFC Bank (0.262), Bharti Airtel (0.366), and EID Parry (0.438) suggest **moderate co-movement**, limiting but not negating diversification benefits. **Near-Zero Correlation**:The relationship between **Marico and Tata Consumer (0.039)**, and **Bharti Airtel and EID Parry (0.033)**, is nearly uncorrelated, indicating **minimal co-dependence**. These pairs are optimal candidates for reducing systemic portfolio risk. **High Correlation**: **Marico and EID Parry (0.438)** show the highest positive correlation, implying that they move in similar directions. This diminishes the diversification benefit if both are included in the same portfolio.



Var1	Bharti Airtel	EID Parry	HDFC Bank	Marico	Tata Consumer
Bharti Airtel	1.00	0.03	0.22	0.37	-0.51
EID Parry	0.03	1.00	0.22	0.44	0.09
HDFC Bank	0.22	0.22	1.00	0.26	-0.74
Marico	0.37	0.44	0.26	1.00	0.04
Tata Consumer	-0.51	0.09	-0.74	0.04	1.00

Fig 2: Represents Heatmap of selected Scripts

The above picture depicts correlation of (-1 to 1) between stocks where Red coloration indicates a high degree of positive correlation, blue denotes a strong inverse correlation, and white signifies a neutral or zero correlation.

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Table 4: Portfolio weights of 10 combinations of all scripts

No.	Portfolio	Weight (Wa)	Weight (Wb)
1	Marico & HDFC Bank	0.9872	0.0128
2	Marico & Bharti Airtel	0.8968	0.1032
3	Marico & Tata Consumer	0.7080	0.2920
4	Marico & EID Parry	0.9120	0.0880
5	HDFC Bank & Bharti Airtel	0.1670	0.8330
6	HDFC Bank & Tata Consumer	1.1165	-0.1165
7	HDFC Bank & EID Parry	0.4282	0.5718
8	Bharti Airtel & Tata Consumer	1.0712	-0.0712
9	Bharti Airtel & EID Parry	0.7356	0.2644
10	Tata Consumer & EID Parry	0.2366	0.7634

Interpretation:Marico & HDFC Bank (98.72%, 1.28%) :**Extremely conservative allocation** prioritizing Marico's stable performance is Ideal for low-risk ESG-aligned investment with minimal banking exposure. **Marico & Bharti Airtel (89.68%, 10.32%) Conservative stance** with slight growth boost from telecom. Indicates confidence in Marico with moderate diversification. **Marico & Tata Consumer (70.80%, 29.20%) - Balanced growth-conservative** mix,Shows intent to enhance returns via increased consumer sector exposure while maintaining Marico's defensive role. **Marico & EID Parry (91.20%, 8.80%**) **Risk-averse structure** with dominant Marico weight. EID Parry serves as a small hedge or diversification into agri-based returns. **HDFC Bank & Bharti Airtel (16.70%, 83.30%) Aggressive growth setup**, driven by Bharti Airtel. Minimal banking exposure used for risk modulation. **HDFC Bank & Tata Consumer (111.65%, -11.65%)** Short-selling present; highly leveraged in HDFC Bank. Advanced strategy aimed at maximizing banking sector gains while hedging Tata Consumer's volatility. **HDFC Bank & EID Parry (42.82%, 57.18%) Well-balanced structure** with a slight tilt toward higher-return EID Parry. Suitable for moderate risk appetite with ESG orientation. **Bharti Airtel & Tata Consumer (107.12%, -7.12%) Aggressive and speculative portfolio** with short-selling Tata Consumer. Heavy telecom concentration for return maximization. **Bharti Airtel & EID Parry (73.56%, 26.44%) Growth-focused blend** with Bharti dominance and EID's

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sectoral balance. Suitable for investors targeting above-average returns at controlled risk. **Tata Consumer & EID Parry (23.66%, 76.34%)** Strongly favors EID Parry's agricultural/chemical exposure. Designed for growth via less-correlated sector pairs, moderate risk.

Table 5: Represents comparative table of stock pairs with portfolio risk and return

Portfolio No.	Stock Pair	Portfolio Risk (σp)	Portfolio Return (Rp)
1	Marico Ltd & HDFC Bank	9.06%	18.02%
2	Marico Ltd & Bharti Airtel	8.88%	19.55%
3	Marico Ltd & Tata Consumer Products Ltd	8.92%	18.50%
4	Marico Ltd & EID Parry Ltd	8.74%	20.42%
5	HDFC Bank & Bharti Airtel	15.85%	29.41%
6	HDFC Bank & Tata Consumer Products Ltd	30.47%	12.04%
7	HDFC Bank & EID Parry Ltd	22.38%	31.74%
8	Bharti Airtel & Tata Consumer Products Ltd	16.45%	32.42%
9	Bharti Airtel & EID Parry Ltd	18.77%	35.73%
10	Tata Consumer Products & EID Parry Ltd	42.35%	42.04%

Interpretation: Optimal Low-Risk Portfolio:Portfolio 4 (Marico Ltd & EID Parry Ltd) shows the best balance of low risk and decent return, offering: Lowest risk at 8.74% and Highest return in low-risk group at 20.42% which is Ideal for risk-averse investors preferring ESG-aligned portfolios with stable returns. **Highest Return Portfolio: Portfolio 10 (Tata Consumer Products & EID Parry Ltd)** offers the maximum return of 42.04% but comes with extremely high risk (42.35%) Suitable for aggressive investors with high risk tolerance. **Balanced Portfolios (Moderate Risk–High Return):Portfolio 9 (Bharti Airtel & EID Parry Ltd):**Return: 35.73%, Risk: 18.77%, **Portfolio 8 (Bharti Airtel & Tata Consumer Products Ltd):** Return: 32.42%, Risk: 16.45%, **Portfolio 7 (HDFC & EID Parry Ltd)**:Return: 31.74%, Risk: 22.38% These combinations show significant return enhancement for moderate to high risk levels. **Inefficient Portfolio:Portfolio 6 (HDFC Bank & Tata Consumer Products Ltd):** Despite the high-risk level (30.47%), it yields a poor return of 12.04%. This violates the risk-return trade-off principle, indicating inefficiency or poor diversification synergy. **Consistency of Marico-Based Portfolios:**

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Portfolios 1–4, all involving Marico, consistently maintain risk < 9.1% and offer returns between 18.02% and 20.42%. These portfolios are **well-diversified and stable,** aligning with ESG and conservative investing strategies.

Fig 3: Shows Risk vs Return Plot of all 10 stock combinations.

5.Findings & Discussions: Studies on ESG-excellent firms in the BSE Sensex provide valuable observations regarding the nexus between sustainability performance and financial risk-return profiles. Ten two-asset portfolios were created based on historical series of returns, standard deviations, and two-asset pairwise correlation. The findings reveal extreme heterogeneity of portfolio efficiency based on the assets.

Interestingly, the portfolio of Marico Ltd and EID Parry Ltd showed the lowest risk of the portfolio (8.74%) but a return of 20.42%, which is most suitable for risk-averse, ESG-conscious investors. The Tata Consumer Products Ltd and EID Parry Ltd portfolio showed the highest return of 42.04% but a proportionately higher risk of 42.35%, which is most suitable for aggressive investors looking for high-risk, high-return investments.

These results align with prior research that has shown that ESG integration decreases or increases portfolio risk based on sector composition and stock correlation (Pan et al., 2025; Jia, 2024). Low asset return correlation and industry diversification are critical when building efficient ESG portfolios, as posited by the Modern Portfolio Theory theory (Markowitz, 1952) and resource-based view strategies (Barney, 1991).

The scatterplot graph and heatmap confirmed that strategic ESG-based matching allows for successful positioning along the efficient frontier. Just like the conclusions of Kusno et al. (2024)

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and Sandu (2024), this study also emphasizes that it is not enough to make portfolio choice on the basis of ESG scores, but when used in conjunction with quantitative optimization methods, it can vastly improve performance results. Furthermore, the study supports global perspectives on ESG risk and financial materiality (Wei & Chengshu, 2023; Narula et al., 2023), substantiating that ESG perfection is not a guarantee of superior returns unless supported by sound financial fundamentals and effective allocation strategies. The converging methodology of ESG ratings with conventional portfolio theory offers a sophisticated system for green investment decisions in developing economies like India (Gadekar et al., 2024; Devi & Y, 2024).

6. Conclusion: Here, in this study, the risk-return relationship of ESG-excellent BSE Sensex-listed companies was empirically tested through two-asset portfolio pairs. Through the use of ESG India 360° ratings and the principles of Modern Portfolio Theory, the research showed that at the level of high ESG performers itself, strategic matching is a major contributor to portfolio efficiency. Specifically, whereas Marico Ltd and EID Parry Ltd were the most risk-efficient, Tata Consumer Products Ltd and EID Parry Ltd gave the highest return at higher risk. These results validate the hypothesis that ESG integration, when measured systematically, can assist in making the best investment choices in various risk appetites.

The study contributes to the growing literature on sustainable finance in emerging markets (Gadekar et al., 2024; Devi & Y, 2024), suggesting that the use of ESG scores in complementing risk and return quantitative models is key to the effective building of investment portfolios. The study also confirms that ESG investments are not risk-averse or return-averse but can be constructed to suit any investor category (Pan et al., 2025; Jia, 2024).

7. Future Policy Implications: ESG Rating Standardization: Regulators should encourage standardized ESG scoring models to minimize rating differences, thereby improving investor confidence and comparability (Cesarone et al., 2024). **Incentivizing ESG Investment:** Policymakers can apply tax incentives or reduced capital gains tax rates on ESG-excellent company portfolios to encourage sustainable capital deployment.**Integration with Retirement Funds:** Pension and sovereign funds that are backed by the government should have ESG integration as the default approach to long-term stability and ethical governance (Hung et al., 2023). **Compulsory ESG Disclosures:** Enhancing disclosure requirements under SEBI and harmonizing them with international best practices (e.g., GRI, TCFD) can enhance disclosure and foreign institutional investment (Narula et al., 2023; Cheng et al., 2023). **Capacity Building:** Asset managers and institutional investors need to be trained and equipped with ESG-specific financial analytics tools to enable them to make well-informed, impact-based decisions.

References:

1. *Alfarizzi, M. M., Purnamasari, V. D., & Abidin, Z. (2024). ESG scores, stock price, and profitability: Evidence from Indonesian public companies. Kompartemen, 22(2). https://doi.org/10.30595/kompartemen.v22i2.23828*

https://doi.org/10.64151/psgcare-7

ISSN 2394 - 9554

2. *Alfaro, J., & Cifuentes, A. (2023). ESG rating variability and portfolio construction. Journal of Environmental, Social, and Governance Investing, (Advance online publication).* https://doi.org/10.3905/jesg.2023.1.071
3. *Athish, R. R., & Harshitha, M. (2023). Managing portfolio – Risk & return analysis of selected scripts. International Journal of Management, 14(5), 100–122.* https://doi.org/10.17605/OSF.IO/V3A29I
4. *Barney, J. B. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99–120.* https://doi.org/10.1177/014920639101700108
5. *Bhatia, K., & Kumar, A. (2024). ESG investing in emerging markets: Performance and risk measures. Journal of Investment and Emerging Research, 4(3).* https://doi.org/10.52783/jier.v4i3.1916
6. *Cesarone, F., Colucci, S., Tardella, F., & Nguyen, H. (2024). ESG portfolio optimization under rating inconsistency. Computers & Operations Research, (Advance online publication).* https://doi.org/10.1016/j.cor.2024.106766
7. *Chandana, S. (2024). ESG indices vs. BSE Sensex: A comparative risk-adjusted performance study. International Journal of Finance and Management Research, 6(6).* https://doi.org/10.36948/ijfmr.2024.v06i06.30157
8. *Chelawat, C. H., & Trivedi, I. V. (2015). Does ESG investment enhance investment returns? Business Review, 10(2), 100–115.* https://doi.org/10.54784/1990-6587.1356
9. *Cheng, C., Kim, J., & Ryu, J. (2023). ESG disclosures and firm valuation in post-COVID China. Asia-Pacific Journal of Accounting & Economics, (Advance online publication).* https://doi.org/10.1080/10293523.2023.2218124
10. *Deb, S., & Saha, A. (2024). Correlation between BSE Sensex and American indices: Evidence from crises. International Journal of Applied Research in Commerce, Management and Social Sciences, 7(4i).* https://doi.org/10.62823/ijarcmss/7.4(i).6977
11. *Devi, P., & Y, S. (2024). ESG performance and financial returns: Evidence from Indian listed firms. Journal of Investment and Management, (Advance online publication).* https://doi.org/10.1177/jinm.241242865
12. *Dutta, D. (2023). Time-series forecasting of BSE Sensex using ARIMA. Modern Journal of Applied Research, 3(6), 1.* https://doi.org/10.54741/mjar.3.6.
13. *Elkington, J. (1997). Cannibals with forks: The triple bottom line of 21st-century business. Capstone Publishing.* https://doi.org/10.4324/9781849773348
14. *Fulton, M., Kahn, B., & Sharples, C. (2012). Sustainable investing: Establishing long-term value and performance. SSRN Electronic Journal.* https://doi.org/10.2139/ssrn.2222740
15. *Gadekar, M., Sharma, E., & Polat, A. Y. (2024). ESG performance and firm profitability: Evidence from S&P BSE ESG Index. International Management Review and Finance, 21(4).* https://doi.org/10.21511/imfi.21(4).2024.15
16. *Halid, S., Rahman, R. A., Mahmud, R., Mansor, N., & Wahab, R. A. (2023). ESG and firm performance: A systematic literature review. International Journal of Academic Research in Accounting, Finance and Management Sciences, 13(1).* https://doi.org/10.6007/ijarafms/v13-i1/15101
17. *He, Y., Lu, J., Zhang, Z., & Chen, L. (2023). ESG portfolios and sector diversification in the S&P 500. Asian Journal of Business Management, 5(11).* https://doi.org/10.25236/ajbm.2023.051102
18. *Hung, S. W., Lee, Y. C., Lin, Y. C., & Wang, C. H. (2023). ESG-integrated portfolio evaluation using CE-DEA. Engineering Universe, (2023.03.31).* https://doi.org/10.46254/eu6.20230331
19. *Jia, R. (2024). ESG-risk classification and portfolio optimization using Markowitz's model. Journal of Quantitative Investment Strategies, (Advance online publication).* https://doi.org/10.54097/2dksd066
20. *Kim, S., & Li, Z. (2021). Understanding the impact of ESG practices in corporate finance. Sustainability, 13(7), 3746.* https://doi.org/10.3390/su13073746
21. *Krappel, T., Bogun, A., & Borth, D. (2021). Heterogeneous ensemble for ESG ratings prediction. arXiv preprint arXiv:2109.10085.* https://doi.org/10.48550/arXiv.2109.10085

https://doi.org/10.64151/psgcare-7

ISSN 2394 - 9554

22. *Kusno, S., Hartanto, F., & Trilaksono, P. A. (2024). ESG scores and mutual fund performance in Indonesia: A Sharpe ratio perspective. International Research Journal of Business Studies, 17(2), 199–212.* https://doi.org/10.21632/irjbs.17.2.199-212
23. *Liang, H., & Renneboog, L. (2020). Corporate social responsibility and sustainable finance: A review of the literature. European Corporate Governance Institute – Finance Working Paper No. 701/2020.* https://doi.org/10.2139/ssrn.3698631
24. *Liang, H., & Renneboog, L. (2020). Corporate social responsibility and sustainable finance: A review of the literature. European Corporate Governance Institute – Finance Working Paper No. 701/2020.* https://doi.org/10.2139/ssrn.3698631
25. *Markowitz, H. (1952). Portfolio selection. The Journal of Finance, 7(1), 77–91.* https://doi.org/10.2307/2975974
26. *Narula, S. A., Yadav, R., & Singhania, M. (2023). ESG reporting in India: Does it influence firm value? International Review of Economics & Finance, (Advance online publication).* https://doi.org/10.1016/j.iref.2023.08.024
27. *Pan, J., Luo, Y., Li, B., & Guo, Y. (2025). ESG portfolios and Markowitz optimization: Empirical evidence from MSCI-rated stocks. Journal of Sustainable Investment Research, (Advance online publication).* https://doi.org/10.61173/j4zwch46
28. *Pradeep, S., & Simmy, J. (2024). Valuation ratios and long-term returns in BSE Sensex: A 24-year empirical study. International Journal of Accounting and Business Finance, 10(1).* https://doi.org/10.4038/ijabf.v10i1.151
29. *Pramitasari, I. (2024). Risk and return analysis of ESG and non-ESG portfolios: Evidence from FTSE4Good Index. Economics and Journal of Management Evaluation, 12(4).* https://doi.org/10.26418/ejme.v12i4.82793
30. *Sandu, M. (2024). ESG performance and portfolio returns: Evidence from European markets. Proceedings of the International Conference on Business Excellence, 18(1).* https://doi.org/10.2478/picbe-2024-0038
31. *Shrimal, K., Kumar, S., & Shukla, A. (2024). ESG ratings and stock price: A study of Nifty 50 companies. International Journal of Business Research and Innovation, 12(Special Issue).* https://doi.org/10.21863/ijbri/2024.12.sp.iss.002
32. *Simlai, P. (2024). Penalized regression models in ESG performance and stock returns. Journal of Risk and Financial Management, 17(5), 211.* https://doi.org/10.3390/jrfm17050211
33. *Wei, X., & Chengshu, W. (2023). Institutional investor preferences and ESG performance: Evidence from Chinese listed firms. Business Ethics: A European Review.* https://doi.org/10.1111/beer.1260

https://doi.org/10.64151/psgcare-7