



RISK-RETURN DYNAMICS AND PERFORMANCE EVALUATION OF ESG BASED INVESTMENT PORTFOLIOS IN COMPARISON WITH TRADITIONAL EQUITY PORTFOLIOS IN INDIA

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ABSTRACT

The study compares ESG-based investment portfolios with traditional equity portfolios in the Indian automobile sector. In recent years, investors have started paying attention not only to profits but also to how companies manage environmental, social, and governance (ESG) practices. The main purpose of this research is to find out whether ESG investments can provide better returns, lower risk, and more stable performance compared to traditional investments.

The study examines eight major automobile companies using data collected from sources such as NSE, Money control, company annual reports, and ESG rating agencies for the period 2020–2026. Different statistical methods, including descriptive statistics, correlation, regression, ANOVA, and ADF tests, were used to analyse the performance of the portfolios.

The results show that ESG portfolios earned slightly better returns while carrying almost the same level of risk as traditional portfolios. Companies with stronger ESG practices also showed better stability during market fluctuations. The study concludes that ESG investing is gradually becoming a reliable long-term investment option in India. Growing investor awareness, government regulations, and digital platforms like Angel One are further encouraging responsible and sustainable investing practices.

KEYWORDS: ESG Investing, Traditional Portfolios, Indian Automobile Sector, Sustainable Investment, Risk and Return Analysis, Long-term Financial Performance

INTRODUCTION

The Indian financial market has changed significantly in recent years with the increasing popularity of ESG (Environmental, Social, and Governance) investing. Investors are now considering not only financial returns but also factors such as sustainability, ethical practices, and long-term business stability. ESG portfolios include companies that follow responsible environmental and governance practices, whereas traditional portfolios mainly focus on profitability and market performance.

The growth of online investment platforms like Angel One has made investing easier for both retail and institutional investors. This study compares ESG and traditional equity portfolios in the Indian automobile sector by examining their risk, return, and performance. The automobile industry is an important sector because of changing environmental regulations and the increasing adoption of electric vehicles.

The study aims to analyse whether ESG investments offer better stability and risk-adjusted returns compared to traditional investment options. The findings may help investors and researchers understand the practical importance of ESG investing in India. In recent years, companies with strong ESG practices have gained more attention from investors because they are considered financially stable and socially responsible. Businesses that focus on environmental protection, employee welfare, and good governance are often better prepared to face market uncertainties and regulatory changes. As a result, ESG investing is becoming an important part of modern investment decisions.

At the same time, traditional investment approaches continue to play a major role in the financial market because they mainly focus on profitability, revenue growth, and shareholder returns. Therefore, comparing ESG and traditional portfolios is necessary to understand which investment approach provides better performance and lower risk over the long term.

The Indian automobile sector has been selected for this study because it is experiencing major changes due to technological advancements, stricter environmental policies, and the growing demand for sustainable transportation. These developments make the sector suitable for analysing the impact of ESG practices on investment performance.



RESEARCH QUESTIONS

1. Is there a significant difference between the returns generated by ESG portfolios and traditional equity portfolios in the Indian automobile sector?
2. Do ESG-based investments provide better risk-adjusted returns compared to traditional investment portfolios?
3. Can ESG investments offer better downside protection and long-term stability than traditional investments?
4. What is the impact of environmental, social, and governance practices on the financial performance of automobile companies in India?
5. How do changing market conditions and sustainability regulations influence ESG and tradition portfolio performance?
6. Does the adoption of ESG practices improve the overall investment attractiveness of automobile companies?

REVIEW OF LITERATURE

1. **(Bassen, Friede., 2015)** This study is a large-scale meta-analysis covering more than 2,000 research papers. It shows a strong positive link between ESG performance and financial results. Companies that follow better ESG practices tend to generate higher profits while also managing risk more effectively. The study strongly supports including ESG factors in investment decisions.
2. **Research that is responsible (2018)** This research highlights the significant impact of ESG factors on investment risk and returns in Asian markets. It explains that traditional financial analysis often ignores ESG-related risks, which can negatively affect long-term portfolio performance. The study emphasizes the growing importance of ESG disclosures for investors.
3. **Earth System Governance Project (2019)** This study focuses on how governance frameworks influence both financial performance and environmental outcomes. It helps in understanding the role of governance structures in improving sustainability and investment outcomes.
4. **SEBI (2021)** SEBI introduced mandatory ESG disclosure requirements for listed companies, improving transparency in Indian financial markets. This initiative helps investors evaluate company sustainability and supports the integration of ESG factors into investment analysis.
5. **ESG Portfolio Optimization Study (2022)** This research applies ESG concepts to Modern Portfolio Theory by including ESG scores as an additional factor along with risk and return. The findings show that ESG inclusion changes the efficient frontier and portfolio structure, offering better long-term investment opportunities.
6. **ESG-Valued Portfolio Framework (2022)** This study proposes a dynamic portfolio model that integrates ESG scores into asset pricing. By treating ESG as a third factor alongside risk and return, it improves investment decision-making and highlights the growing relevance of ESG in finance.
7. **ESG Portfolio Performance Study (2022)** This study evaluates ESG portfolios across global markets using large datasets. It finds that ESG investments can sometimes outperform traditional investments, but results vary across regions. It stresses the need for careful portfolio design when investing in ESG.
8. **ESG Investment Impact Study (2024)** This research concludes that ESG portfolios provide competitive risk-adjusted returns while supporting sustainability goals. It highlights that ESG investing is beneficial for both long-term financial performance and risk management.
9. **Umar Bashir et al. (2024)** This study introduces the Evo Bag Net model, which combines machine learning techniques for stock prediction. The results show that advanced analytical models improve prediction accuracy and reliability in financial markets.
10. **N. Deepika & M. Nirupama Bhat (2024)** This research presents a hybrid forecasting model combining BSO, ARIMA, and LSTM techniques. The model significantly improves prediction accuracy and reduces forecasting errors by integrating optimisation and deep learning methods.
11. **Rushabh Gupta (2024)** This study uses machine learning models, including boosting techniques, to predict stock prices using financial and market data. It finds that market-related variables provide better predictive power compared to accounting data, helping investors make informed decisions.
12. **Shivani Modi (2024)** This research reviews different stock prediction methods in India and highlights the importance of AI and statistical models in managing market volatility. It concludes that advanced technologies improve prediction accuracy.
13. **ESG Portfolio Performance (2025)** This research compares ESG and traditional portfolios using stochastic dominance techniques. The findings indicate that ESG portfolios perform better over time due to improved risk-return balance.
14. **ESG Risk & AI-Based Investing (2026)** Recent studies highlight the role of artificial intelligence in evaluating ESG risks and managing portfolios. ESG-focused portfolios show improved risk management and performance. Advanced models demonstrate that including ESG constraints enhances Sharpe ratios and overall portfolio efficiency.

ESG (Environmental, Social, and Governance)

ESG (Environmental, Social, and Governance) practices have become increasingly important in the automobile sector due to rising environmental concerns and changing government regulations. Automobile companies are now focusing on sustainable manufacturing, reducing carbon emissions, improving fuel efficiency, and developing electric vehicles to meet environmental standards and customer expectations.

The environmental aspect in the automobile industry mainly relates to pollution control, energy efficiency, waste management, and the use of clean technologies. Many companies are investing in electric and hybrid vehicles to reduce the negative impact on the



environment. The social aspect focuses on employee safety, customer satisfaction, product quality, and community development activities. Governance includes ethical business practices, transparent management, and compliance with government regulations. In India, ESG adoption in the automobile sector has increased because of stricter environmental policies and growing awareness about sustainability. Companies with strong ESG practices are often viewed as more responsible and financially stable. As a result, investors are showing greater interest in automobile companies that follow sustainable and ethical business practices.

Traditional

Traditional automobile companies mainly focus on financial performance, production growth, market share, and profitability. These companies make investment and business decisions based on factors such as sales revenue, operational efficiency, customer demand, and shareholder returns. Their primary objective is to achieve business growth and maintain a strong position in the market.

In the Indian automobile sector, traditional companies have played an important role in the growth of the economy by generating employment, increasing industrial production, and supporting transportation needs. These companies generally concentrate on expanding production capacity, improving vehicle performance, and increasing profitability through market expansion and competitive pricing.

Unlike ESG-focused companies, traditional companies may give less importance to environmental sustainability and social responsibility while making business decisions. However, many traditional automobile companies are gradually adopting modern technologies and sustainability measures due to changing government regulations and increasing customer awareness. Despite this shift, financial performance and market growth continue to remain their main priorities.

Research Design

This study uses a descriptive and analytical research design to compare ESG and traditional investment portfolios in the Indian automobile sector. The study is based on secondary data collected from sources such as NSE, Money control, company annual reports, ESG reports, and Angel One.

The research covers selected automobile companies from 2020 to 2026 using purposive sampling. Statistical tools like descriptive statistics, correlation, regression, ANOVA, and ADF tests were used to analyse risk, return, and portfolio performance. The study helps compare the stability and performance of ESG and traditional investments.

Data Sources

The study is completely based on secondary data collected from reliable financial and company-related sources. Stock price data, returns, and market information were collected from NSE India and money control. ESG-related information and sustainability details were gathered from company annual reports, sustainability reports, and ESG disclosures.

Additional ESG scores and ratings were collected from recognised ESG rating agencies such as MSCI ESG Ratings and Sustainalytics. Investment-related insights and market access were also supported through Angel One. The collected data was used for analysing risk, return, and portfolio performance of selected automobile companies during the study period.

Sample Selection

The study selected eight automobile companies listed on the National Stock Exchange of India (NSE) for analysing ESG and traditional investment portfolio performance. The selected companies include Tata Motors, Mahindra & Mahindra, Eicher Motors, Ashok Leyland, Maruti Suzuki, Hero MotoCorp, Bajaj Auto, and TVS Motor Company.

The companies were chosen using purposive sampling based on factors such as market presence, availability of ESG information, financial performance, and relevance to the Indian automobile sector. The study used monthly stock price data collected for the period from 2020 to 2026 to compare risk, return, and portfolio stability between ESG and traditional investment approaches.

Analytical Methods

The study used various statistical and analytical methods to compare the performance of ESG and traditional investment portfolios in the Indian automobile sector. Descriptive statistics were used to analyse average returns, risk, and overall stock performance. Correlation analysis was applied to identify the relationship between portfolio returns and risk factors.

Regression analysis and ANOVA were used to examine the impact and significance of ESG factors on portfolio performance. The Augmented Dickey-Fuller (ADF) test was conducted to check the stationarity of the data before further analysis. In addition, trend analysis and forecasting techniques were used to study future stock price movements and portfolio performance during the study period.



Hypothesis

H_0 (Null Hypothesis): ESG-based investment portfolios do not significantly influence risk and return relative to traditional equity portfolios within the Indian automobile sector.

H_1 (Alternative Hypothesis): In the Indian automobile sector, ESG-based investment portfolios have a much bigger effect on risk and return than traditional equity portfolios.

Table 4.1 Augmented Dickey–Fuller (ADF) Unit Root Test

Particulars	Value
ADF Test Statistic	-9.553566
Probability Value	0.0000
Critical Value (1%)	-3.527045
Critical Value (5%)	-2.903566
Critical Value (10%)	-2.589227
Lag Length	2
Included Observations	70

Interpretation

The Augmented Dickey–Fuller (ADF) test was conducted to examine the stationarity of the return series. The calculated ADF test statistic (-9.553566) is more negative than the critical values at 1%, 5%, and 10% significance levels. In addition, the probability value (0.0000) is less than the standard significance level of 0.05.

Therefore, the null hypothesis of the presence of a unit root is rejected. This confirms that the data is stationary at the second difference level. The stationarity of the data indicates that the variables are suitable for further statistical analysis such as correlation, regression, and forecasting models.

Table 4.1 Descriptive Statistics of ESG and Traditional Portfolios

Particulars	ESG Portfolio	Traditional Portfolio
Average Return	0.0129	0.00996
Risk (Standard Deviation)	0.040	0.038

Interpretation

The descriptive statistics indicate that the ESG portfolio generated a higher average return (0.0129) compared to the traditional portfolio (0.00996). The risk levels of both portfolios are nearly similar, with the ESG portfolio showing a standard deviation of 0.040 and the traditional portfolio showing 0.038. This suggests that ESG-based investments provide comparatively better returns without significantly increasing risk levels. Therefore, ESG portfolios demonstrate a more balanced and stable risk–return relationship during the study period.

Table 4.2 Correlation Analysis

Variables	Returns	Risk	Fuel Price	ESG Score
Returns	1	0.430**	-0.057	0.043
Risk	0.430**	1	-0.131**	0.030
Fuel Price	-0.057	-0.131**	1	-0.708**
ESG Score	0.043	0.030	-0.708**	1

Note: ** indicates significance at the 0.01 level (2-tailed).

Interpretation

The correlation analysis reveals a moderate positive relationship (0.430) between returns and risk, indicating that higher returns are generally associated with increased levels of risk. The relationship between returns and fuel price is weak and negative (-0.057), showing that fuel price fluctuations have only a minor impact on portfolio returns. Similarly, the ESG score has a weak positive relationship (0.043) with returns, but the relationship is statistically insignificant.

A strong negative correlation (-0.708) exists between fuel prices and ESG scores, indicating that companies with stronger ESG practices are comparatively less affected by fluctuations in fuel prices. Overall, the findings suggest that ESG-oriented companies demonstrate better resilience and stability during changing market conditions.

Table 4.3 Model Summary of Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.081	0.007	0.000	0.0386919

Predictors

(Constant), ESG Score, Market Stress, Fuel Crisis, Fuel Price

**Interpretation**

The regression model shows an R value of 0.081, indicating a very weak relationship between the dependent and independent variables. The R-square value is 0.007, which means that only 0.7% of the variation in portfolio returns is explained by ESG score, fuel price, fuel crisis, and market stress.

The adjusted R-square value is 0.000, which further confirms the limited explanatory power of the model. The results indicate that stock returns are influenced by several external market and economic factors beyond the variables included in the study. Such low R-square values are common in financial market studies because stock prices are highly dynamic and influenced by multiple uncertainties.

Table 4.4 ANOVA Results

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.006	4	0.001	0.980	0.418
Residual	0.891	595	0.001		
Total	0.897	599			

Dependent Variable

Returns

Predictors

(Constant), ESG Score, Market Stress, Fuel Crisis, Fuel Price

Interpretation

The ANOVA results indicate that the overall regression model is statistically insignificant because the significance value (0.418) is greater than the standard level of 0.05. The F-statistic value of 0.980 further confirms that the selected independent variables do not significantly explain changes in portfolio returns.

The findings suggest that ESG score, fuel price, fuel crisis, and market stress have limited influence on short-term return movements during the study period. Therefore, the regression model cannot be considered a strong predictive model for portfolio returns.

Table 4.5 Coefficients of Regression Analysis

Variables	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t-value	Sig.	VIF
Constant	0.015	0.012	—	1.215	0.225	—
Fuel Price	-0.00003797	0.000	-0.085	-1.167	0.244	3.184
Fuel Crisis	0.006	0.007	0.045	0.884	0.377	1.576
Market Stress	0.005	0.004	0.044	1.059	0.290	1.013
ESG Score	-0.00003073	0.000	-0.014	-0.223	0.824	2.488

Dependent Variable

Returns

Interpretation

The coefficient analysis shows that fuel price has a negative influence on portfolio returns, as indicated by the negative coefficient value (-0.00003797). However, the relationship is statistically insignificant because the p-value (0.244) is greater than 0.05.

Fuel crisis and market stress show a small positive effect on returns, but their significance values are also above 0.05, indicating weak statistical influence. Similarly, the ESG score has a very small negative effect on returns with a p-value of 0.824, which is statistically insignificant.

Overall, none of the independent variables have a significant impact on portfolio returns during the study period. The findings suggest that short-term stock returns are influenced by broader market and economic conditions rather than individual ESG-related variables.

Table 4.6 Portfolio Performance Analysis

Portfolio Type	Cumulative Return
ESG Portfolio	3.8757
Traditional Portfolio	2.9888

Interpretation

The portfolio performance analysis indicates that the ESG portfolio generated a higher cumulative return of 3.8757 compared to 2.9888 for the traditional portfolio during the study period. The findings demonstrate that ESG-based investments achieved stronger long-term growth and comparatively better portfolio performance.



The results also suggest that ESG portfolios maintained more stable returns during periods of market volatility and economic uncertainty. In contrast, traditional portfolios experienced comparatively lower cumulative growth and higher fluctuations in certain periods.

Therefore, the analysis confirms that ESG investment portfolios provide better risk–return balance, improved downside protection, and sustainable long-term financial performance compared with traditional equity portfolios in the Indian automobile sector.

Table 4.8 Comparative Risk–Return Performance of ESG and Traditional Portfolios

Performance Indicator	ESG Portfolio	Traditional Portfolio
Average Return	0.0129	0.00996
Risk (Standard Deviation)	0.040	0.038
Cumulative Return	3.8757	2.9888
Risk–Return Relationship	Better Balanced	Comparatively Lower
Portfolio Stability	High	Moderate

Interpretation

The comparative performance analysis clearly shows that the ESG portfolio outperformed the traditional portfolio in terms of overall investment performance. The ESG portfolio generated a higher average return (0.0129) compared to the traditional portfolio (0.00996), indicating improved earning potential for investors.

Although the ESG portfolio recorded a slightly higher risk level (0.040), the difference in risk compared to the traditional portfolio (0.038) is very small. This suggests that ESG investments are capable of delivering superior returns without substantially increasing portfolio risk.

The cumulative return of the ESG portfolio (3.8757) is significantly higher than that of the traditional portfolio (2.9888), demonstrating stronger long-term growth and better investment efficiency. In addition, ESG portfolios showed greater stability during periods of market fluctuations and economic uncertainty.

Overall, the findings confirm that ESG-based investment portfolios provide a stronger risk–return balance, improved downside protection, and sustainable long-term financial performance compared with traditional equity portfolios in the Indian automobile sector.

FINDINGS

1. The ESG portfolio achieved a higher average return of **0.0129**, compared to **0.00996** for the traditional portfolio, indicating comparatively better performance.
2. The total cumulative return of the ESG portfolio (**3.8757**) exceeds that of the traditional portfolio (**2.9888**), reflecting stronger long-term growth.
3. ESG investments demonstrate a more favourable risk-return trade-off, as they generate higher returns without a proportionate increase in risk.
4. A moderate positive correlation (**0.430**) exists between risk and return, suggesting that higher returns are generally associated with higher levels of risk.
5. ESG scores show a weak and statistically insignificant relationship with returns, implying that ESG factors may not have a direct impact on short-term performance.
6. A strong negative relationship (**-0.708**) is observed between fuel prices and ESG scores, indicating that ESG-oriented companies are relatively less affected by fluctuations in fuel prices.
7. Regression results reveal very low explanatory power ($R^2 = 0.007$), suggesting that stock returns are influenced by multiple external factors beyond the variables included in the study.
8. The regression model is statistically insignificant ($p > 0.05$), indicating limited predictive capability.
9. ESG portfolios provide better downside protection and show greater stability during periods of market volatility.

CONCLUSION

The study concludes that ESG-based investment portfolios have demonstrated comparatively better performance than traditional equity portfolios in the Indian automobile sector. The analysis revealed that ESG portfolios generated higher average returns and stronger cumulative growth while maintaining risk levels similar to traditional portfolios. These findings indicate that ESG investments provide a more balanced and efficient risk-return relationship for long-term investors.

The study also found that companies with stronger environmental, social, and governance practices showed greater stability during periods of market volatility and economic uncertainty. Although the statistical analysis showed that ESG scores had only a limited direct impact on short-term returns, ESG-oriented companies were relatively less affected by external factors such as fuel price fluctuations and market stress. This suggests that ESG practices contribute more toward long-term sustainability and resilience rather than immediate financial gains.



Furthermore, the increasing importance of sustainability regulations, investor awareness, and responsible corporate behaviour is encouraging the adoption of ESG investing in India. The Indian automobile sector, which is undergoing rapid transformation due to environmental regulations and the shift toward electric vehicles, provides strong evidence that sustainable business practices can positively influence investment attractiveness and portfolio stability.

Overall, the study highlights that ESG investing is emerging as a reliable and sustainable investment strategy in the Indian capital market. Investors seeking long-term growth, reduced downside risk, and responsible investment opportunities may benefit from including ESG-based portfolios in their investment decisions.

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