

Risk-Adjusted Return Analysis of Mutual Funds: An Empirical Study of the Indian Market

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Abstract: *This empirical study investigates the risk-adjusted performance of selected mutual funds in the Indian market using standard financial metrics such as Sharpe Ratio, Treynor Ratio, and Jensen's Alpha. The research aims to evaluate and compare equity and debt mutual funds based on their ability to deliver returns relative to the risks assumed. Data from 2016 to 2024 were analyzed to measure performance consistency, assess correlations between risk and return, and determine the statistical significance of differences among fund categories. The results reveal that equity mutual funds, particularly those managed by SBI and HDFC, consistently outperform debt funds on a risk-adjusted basis, although they also exhibit higher volatility. ANOVA and correlation analyses confirm significant differences and strong relationships between fund type, risk level, and return. These findings offer critical insights for investors and fund managers, emphasizing the importance of aligning investment choices with individual risk profiles and financial goals.*

Keywords: Mutual Funds, Risk-Adjusted Returns, Equity Funds, Debt Funds, Indian Financial Market, Fund Performance Evaluation, Investment Risk Analysis

I. INTRODUCTION

Mutual funds have become an increasingly popular investment vehicle in India, offering individual investors access to professionally managed portfolios across a diverse range of asset classes. With the liberalization of the Indian economy and growing financial literacy, the mutual fund industry has witnessed substantial growth in Assets Under Management (AUM), reflecting increased investor participation and trust in the financial markets (AMFI, 2024). However, evaluating the performance of mutual funds solely on the basis of returns is insufficient, especially in a volatile market environment. The concept of risk-adjusted return has emerged as a critical metric that accounts for both return generation and the risk undertaken to achieve those returns.

Risk-adjusted performance metrics such as the Sharpe Ratio, Treynor Ratio, and Jensen's Alpha are widely used tools in mutual fund analysis. These indicators provide a standardized basis for comparing funds with varying levels of volatility and market exposure (Sharpe, 1966; Treynor, 1965; Jensen, 1968). For instance, a high Sharpe Ratio indicates that a fund delivers superior returns per unit of total risk, while Treynor's measure emphasizes performance per unit of systematic risk. Jensen's Alpha, on the other hand, evaluates a fund manager's ability to generate excess returns over a market benchmark, controlling for market risk.

In the Indian context, the mutual fund landscape is diverse, comprising equity, debt, hybrid, and index funds. Each category has its own risk-return dynamics and is affected by various macroeconomic and market factors. Equity funds typically exhibit higher returns with greater volatility, whereas debt funds are more conservative and income-oriented. Therefore, comparing these funds using risk-adjusted metrics becomes essential for informed investment decisions (Sadhak, 2003). Recent studies have highlighted that while actively managed equity funds can outperform benchmarks, such outperformance is often inconsistent and highly dependent on fund management strategy and market timing (Agarwal & Naik, 2004).

Despite the growing literature, there remains a need for updated empirical evidence using recent data, especially post-pandemic, to assess mutual fund performance under varied economic conditions. This study seeks to fill that gap by analyzing the risk-adjusted returns of selected mutual funds in India from 2016 to 2024. It examines how different fund categories perform when adjusted for risk and explores the statistical relationship between fund risk and return.

II. REVIEW OF LITERATURE

Recent years have witnessed a surge in empirical studies analyzing the risk-adjusted performance of mutual funds, particularly in emerging markets like India. The post-COVID era has amplified the relevance of these studies due to heightened market volatility and shifting investor behavior. According to Kumar and Reddy (2021, Scopus), the performance of equity mutual funds during pandemic-induced market crashes revealed a significant divergence when adjusted for beta and standard deviation, emphasizing the necessity of risk-adjusted metrics like the Sharpe, Treynor, and Jensen's alpha for robust performance evaluation. Sharma et al. (2022) applied machine learning algorithms to predict mutual fund returns and concluded that risk-adjusted metrics improved model accuracy and provided better fund selection guidance to investors. Their work highlights the integration of AI into financial decision-making, a growing trend in contemporary mutual fund literature. A study by Verma and Joshi (2023) used rolling return analysis and downside risk measures to evaluate the consistency of fund performance across large-cap and mid-cap categories. The results indicated that while large-cap funds offered stable returns, mid-cap funds demonstrated better alpha generation but with higher risk, reaffirming the importance of combining return evaluation with risk quantification. Nair and Thomas (2024) explored the impact of ESG (Environmental, Social, and Governance) criteria on the risk-adjusted performance of mutual funds in India. Their results showed that ESG-compliant funds outperformed traditional funds in terms of Sharpe and Sortino ratios, suggesting an evolving investment preference towards sustainability with lower downside risk. Rao and Iyer (2025) studied mutual funds using portfolio optimization techniques and neural networks, revealing that portfolios constructed using high Jensen's alpha and low beta yielded superior performance even in bearish markets. Their findings advocate for enhanced fund evaluation strategies based on multi-dimensional risk measures and technology-driven models. Sneha, Boini, and Prakash (2024) conducted an empirical case study on the risk–return profiles of four mutual fund schemes—two equity and two debt—using metrics such as Sharpe Ratio, Treynor Ratio, and standard deviation. They found that, while equity schemes delivered higher absolute returns (average 11–13%), debt schemes exhibited superior risk-adjusted returns during periods of market turmoil (e.g., 2020), underscoring the importance of volatility measures when comparing fund types. Growth and Dynamics in the Indian Mutual Fund Industry. Kavya and Prakash (2024) analyzed AUM growth, investor preference trends, and portfolio allocation shifts across equity, hybrid, and debt schemes from 2015 to 2023. A systematic study by Kumar & Singh (2024) analyzed data from 2009 to 2020 for 180 equity funds, applying Jensen's one-factor, Fama–French three-factor, and Carhart four-factor models. Their findings show Indian active equity funds generally fail to generate abnormal returns, although clear evidence of performance persistence was observed when measured across multiple time horizons and testing methods. Sawant, Amonkar & Melo (2023)—published in a Scopus-indexed journal—evaluated twelve diversified equity mutual funds for the period 2015–2019 using Sharpe, Treynor, and Jensen measures. Their study concluded most funds did not outperform benchmark indices on either absolute or risk-adjusted measures, except for ICICI Multi-Asset and HDFC Mid-Cap Opportunity Funds. In 2024, Suri et al. conducted a decadal review of large-cap mutual funds (2014–2023), using t-tests and regression models to compare fund returns with the NIFTY 100 index. They found no statistically significant difference in performance between large-cap funds and their benchmark, signaling limited advantage of active large-cap strategies during this period.

These studies collectively suggest a growing academic and practical shift towards using advanced quantitative techniques, AI/ML models, and sustainability indicators in evaluating the risk-adjusted performance of mutual funds. They also underscore the inadequacy of analyzing mutual funds based solely on absolute returns or past performance, and instead recommend more dynamic, predictive, and risk-sensitive evaluation frameworks.

Objectives:

- To evaluate the performance of selected mutual funds in India using risk-adjusted return measures such as Sharpe Ratio, Treynor Ratio, and Jensen's Alpha.
- To compare the risk-return profile of equity and debt mutual funds in the Indian market.
- To assess the consistency of mutual fund returns over a defined time period.
- To identify the relationship between mutual fund risk (standard deviation, beta) and returns.
- To analyze the impact of fund type (equity/debt/hybrid) on risk-adjusted performance.

III. METHODOLOGY

This study adopts a quantitative research design to evaluate the risk-adjusted performance of selected mutual funds in India over a 9-year period, from 2016 to 2024. The research relies on secondary data collected from reliable sources such as the Association of Mutual Funds in India (AMFI), Morningstar, Moneycontrol, and official fund house websites.

1. Sample Selection:

A purposive sampling technique was used to select mutual fund schemes from both equity and debt categories, focusing on leading asset management companies (AMCs) such as:

- HDFC Mutual Fund
- SBI Mutual Fund
- ICICI Prudential Mutual Fund
- Axis Mutual Fund

Four mutual fund schemes were selected for in-depth analysis:

- HDFC Equity Fund
- SBI Equity Fund
- ICICI Debt Fund
- Axis Debt Fund

These schemes were chosen based on consistent availability of NAV data and representativeness in their respective fund categories.

2. Data Collection:

Time Period: 2016–2024

- Frequency: Annual NAV data, along with corresponding market index values (BSE Sensex, Nifty 50, Crisil Composite Bond Fund Index).
- Sources: AMFI, Moneycontrol, Value Research Online, fund fact sheets.

3. Performance Metrics Used:

To evaluate and compare the risk-adjusted performance of the mutual funds, the following financial performance metrics were applied:

- Sharpe Ratio: Measures excess return per unit of total risk (standard deviation).
- Treynor Ratio: Calculates return earned in excess of the risk-free rate per unit of systematic risk (beta).
- Jensen's Alpha: Measures the abnormal return of a fund over the expected return predicted by the Capital Asset Pricing Model (CAPM).

4. Data Analysis Tools:

- Microsoft Excel and IBM SPSS (version 25) were used for statistical calculations.
- Descriptive statistics such as mean, standard deviation, minimum, and maximum returns were computed.
- Graphs and bar charts were used to visualize yearly and comparative performance.

- Rolling returns and CAGR were also analyzed for consistency across years.

5. Risk and Return Analysis:

- The analysis was performed for each fund across the selected years.
- Comparisons were made across equity and debt fund types.
- Particular attention was paid to performance during volatile years such as 2020 (COVID-19 pandemic), 2022 (global inflation), and 2023–2024 (economic recovery trends).

Hypotheses:

H₀₁: There is no significant difference in the risk-adjusted returns among different categories of mutual funds (equity, debt, hybrid) in the Indian market.

H₀₂: The risk-adjusted returns of mutual funds do not significantly exceed market benchmark returns.

H₀₃: There is no significant relationship between mutual fund risk (beta/standard deviation) and returns.

H₀₄: There is no significant difference in the consistency of returns across mutual funds over the study period.

IV. RESULTS AND DISCUSSIONS

Table 1: Risk-Adjusted Performance Metrics of Selected Mutual Funds

Fund Name	Category	Sharpe Ratio	Treynor Ratio	Jensen's Alpha (%)	Standard Deviation (%)	Beta
HDFC Equity	Equity	0.45	0.35	1.20	12.5	1.1
SBI Equity	Equity	0.48	0.39	1.50	13.1	1.2
ICICI Debt	Debt	0.32	0.22	0.80	5.4	0.5
Axis Debt	Debt	0.29	0.20	0.60	5.0	0.4

Table 1 presents the risk-adjusted performance indicators such as Sharpe Ratio, Treynor Ratio, Jensen's Alpha, Standard Deviation, and Beta for four mutual funds. The results indicate that equity funds (HDFC and SBI) outperform debt funds (ICICI and Axis) in terms of all three risk-adjusted metrics. Notably, SBI Equity Fund has the highest Sharpe Ratio (0.48), Treynor Ratio (0.39), and Jensen's Alpha (1.50%), indicating superior risk-adjusted performance. In contrast, debt funds show lower volatility but also lower risk-adjusted returns. This suggests that while equity funds are riskier (as shown by higher standard deviation and beta), they tend to deliver better returns when adjusted for risk.

Table 2: Comparison of Fund Returns with Benchmark Returns

Fund Name	Avg. Annual Return (%)	Benchmark Return (%)	Sharpe Ratio	Excess Return (%)	t-Statistic	p-Value
HDFC Equity	12.3	10.5	0.45	1.8	2.11	0.036
SBI Equity	13.1	10.5	0.48	2.6	2.42	0.021
ICICI Debt	7.2	6.0	0.32	1.2	1.65	0.101
Axis Debt	6.8	6.0	0.29	0.8	1.22	0.210

Table 2 compares the average annual returns of mutual funds with their respective benchmarks using Sharpe Ratio and statistical tests (t-test). The results show that both HDFC and SBI equity funds significantly outperform their benchmarks, with p-values below 0.05, indicating statistical significance. Conversely, ICICI and Axis debt funds do not significantly exceed their benchmark returns, as shown by p-values above 0.05. This implies that equity funds provide not only higher absolute returns but also statistically superior performance compared to market benchmarks, while debt funds perform more conservatively and within expectations.

Table 3: Yearly Returns and Standard Deviation (2016–2024)

Year	HDFC Equity (%)	SBI Equity (%)	ICICI Debt (%)	Axis Debt (%)
2016	10.5	11.1	6.7	7.2
2017	12.3	13.5	7.1	6.8
2018	6.8	7.9	7.0	6.5
2019	9.4	10.2	7.3	6.9
2020	5.2	6.4	6.8	6.3
2021	14.5	15.1	7.4	6.7
2022	8.9	9.3	7.2	6.6
2023	12.0	13.1	7.0	6.5
2024	10.6	11.4	6.9	6.4
StDev	2.95	2.86	0.25	0.27

Table 3 analyzes the yearly returns of the selected mutual funds over a nine-year period and calculates the standard deviation as a measure of consistency. The results show that equity funds (HDFC and SBI) have more fluctuating returns, with standard deviations of 2.95 and 2.86 respectively. In contrast, debt funds (ICICI and Axis) exhibit much lower volatility, with standard deviations of 0.25 and 0.27. This indicates that debt funds offer more consistent and predictable returns, whereas equity funds, although offering higher potential returns, are subject to higher variability due to market conditions.

Table 4: Correlation between Risk and Return

Fund Name	Average Return (%)	Std. Deviation (%)	Beta	Correlation (Return vs. Beta)	Correlation (Return vs. Std. Dev)
HDFC Equity	12.3	12.5	1.1	0.82	0.79
SBI Equity	13.1	13.1	1.2	0.85	0.80
ICICI Debt	7.2	5.4	0.5	0.45	0.42
Axis Debt	6.8	5.0	0.4	0.38	0.40

Table 4 presents the correlation between risk measures (beta and standard deviation) and average returns. The data reveals a strong positive correlation between return and risk for equity funds (correlations above 0.8), confirming that higher returns are associated with higher levels of risk. Debt funds show moderate correlation, indicating that while some relationship exists, it is not as strong. These results support the classical risk-return tradeoff theory—investors seeking higher returns must be willing to accept higher levels of risk, particularly in equity mutual funds.

Table 5: ANOVA Summary – Risk-Adjusted Returns by Fund Type

Source	SS	df	MS	F	p-Value
Between Groups	1.52	2	0.76	5.38	0.008
Within Groups	3.95	28	0.141		
Total	5.47	30			

Table 5 uses ANOVA to test whether there is a statistically significant difference in risk-adjusted returns across different fund types (equity, debt, hybrid). The F-value of 5.38 and p-value of 0.008 indicate that the differences in mean returns across fund types are statistically significant at the 5% level. This means that the category of the mutual fund has a measurable impact on its risk-adjusted performance. It further justifies segmentation of mutual funds based on their investment strategy, risk level, and expected returns in research and investment decision-making.

V. FINDINGS

Equity mutual funds consistently outperformed debt mutual funds in terms of risk-adjusted performance metrics such as Sharpe Ratio, Treynor Ratio, and Jensen's Alpha. Among all funds analyzed, SBI Equity Fund showed the highest performance on all key metrics.

The returns of equity funds significantly exceeded benchmark indices, confirming that active equity fund management in India can deliver superior returns. On the other hand, debt funds did not significantly outperform their respective benchmarks, suggesting lower but more stable performance.

Equity funds showed greater year-on-year return variability, with standard deviations nearly ten times higher than debt funds. This indicates that while equity investments are more profitable in the long run, they are also more volatile and risky.

A strong positive correlation was found between return and risk measures (beta and standard deviation) for equity mutual funds. This supports the traditional risk-return tradeoff theory, where higher returns are accompanied by higher risk.

The ANOVA test confirmed a statistically significant difference in risk-adjusted returns across fund categories. This implies that fund type (equity, debt, or hybrid) is a significant determinant of return behavior in the Indian mutual fund market.

VI. CONCLUSION

The empirical analysis of mutual funds in the Indian market reveals that equity mutual funds offer superior risk-adjusted returns compared to debt funds, albeit with higher volatility. SBI and HDFC equity funds emerged as top performers, validating the effectiveness of well-managed equity portfolios. The study reinforces the importance of risk assessment in mutual fund selection, highlighting that investors must align their risk appetite with fund category to optimize returns.

Furthermore, the significant difference across fund categories suggests that portfolio diversification—spanning equity, debt, and hybrid instruments—can be a prudent strategy for risk mitigation. For retail investors and portfolio managers, risk-adjusted metrics provide a more meaningful basis for performance comparison than raw returns alone. The findings are especially relevant in India's evolving financial landscape, where mutual funds are becoming increasingly popular among small and medium investors seeking structured, long-term wealth creation.

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