

An Empirical Study on Risk-Adjusted Performance of Long-Term Mutual Funds in the Indian Mutual Fund Market

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Abstract

Mutual funds play a crucial role in long-term wealth creation, offering investors diverse options based on risk tolerance and financial goals. This study evaluates the performance of long-term mutual funds, analyzing returns, risk, and market impact using financial metrics such as CAGR, Sharpe Ratio, Beta, and Jensen's Alpha. The findings indicate that mid-cap and multi-cap funds provide the highest returns but exhibit higher volatility, while large-cap funds offer stability with moderate returns. Debt funds, on the other hand, ensure low-risk, consistent returns. The study also highlights the influence of macroeconomic factors such as interest rates and inflation on mutual fund performance. A comparative analysis using ANOVA confirms significant performance differences among fund categories, reinforcing the need for strategic fund selection. The results suggest that investors should diversify across fund types to optimize risk-adjusted returns while considering economic trends for informed decision-making.

Keywords: *Mutual Fund Performance, Risk-Adjusted Returns, Mid-Cap Funds, Large-Cap Funds, Debt Funds, Investment Strategy.*

I. INTRODUCTION

Mutual funds have emerged as one of the most popular investment vehicles, offering investors diversified portfolios that cater to various risk appetites and financial objectives. A mutual fund pools resources from multiple investors and allocates them across different asset classes, including equities, debt instruments, and hybrid structures. The increasing participation of retail and institutional investors in mutual funds highlights their growing significance in long-term wealth creation (Fama & French, 1992).

Performance measurement of mutual funds is crucial for investors, fund managers, and policymakers, as it aids in selecting funds that align with financial goals and risk preferences. Traditional performance evaluation metrics such as the **Sharpe Ratio** (Sharpe, 1966), **Jensen's Alpha** (Jensen, 1968), and **Treynor Ratio** (Treynor, 1965) are commonly used to assess the risk-adjusted returns of mutual funds. Studies suggest that while actively managed

funds attempt to outperform the market, they often struggle against passive index funds due to market efficiency (Tripathy, 2006).

Several empirical studies have analyzed the impact of market conditions on mutual fund performance. Kothari and Warner (2001) found that equity-oriented funds exhibit higher volatility, especially during economic downturns. Sarkar and Majumdar (2011) emphasized that mid-cap and multi-cap funds tend to outperform large-cap funds during bullish markets but are highly sensitive to economic fluctuations. Additionally, macroeconomic factors such as inflation and interest rates significantly influence fund returns, affecting investor sentiment and asset allocation decisions (Chaudhary et al., 2018).

In the Indian mutual fund market, regulatory changes and evolving investor preferences have reshaped fund performance over the years. Gupta and Sehgal (2019) highlighted that the introduction of systematic investment plans (SIPs) has enhanced retail participation, ensuring consistent capital inflows into mutual funds. Moreover, Rao and Natarajan (2024) stressed the importance of aligning investment strategies with risk tolerance, recommending a diversified approach across large-cap, mid-cap, and debt funds for optimal returns.

Given the dynamic nature of financial markets, this study aims to analyze the risk-adjusted performance of long-term mutual funds, comparing different fund categories such as large-cap, mid-cap, and debt funds. The study employs ANOVA to examine performance differences and evaluates the impact of economic factors on mutual fund returns. The findings will provide valuable insights for investors, fund managers, and policymakers in making informed investment decisions.

II. LITERATURE REVIEW

Mutual fund performance has been a widely researched topic, with several studies analyzing risk-adjusted returns, market influence, and investor behavior. Sharpe (1966) introduced the Sharpe ratio to measure risk-adjusted returns, which remains a key metric in evaluating mutual funds. Jensen (1968) further refined performance measurement by introducing Jensen's Alpha, emphasizing the role of fund managers in generating excess returns over market benchmarks. Fama and French (1992) extended this framework by incorporating multi-factor models, highlighting that fund returns are influenced by market risk, size, and value factors. In the Indian context, Tripathy (2006) examined equity mutual funds and found that actively managed funds often underperform their benchmarks, reinforcing the efficient market hypothesis. Sarkar and Majumdar (2011) analyzed risk-return trade-offs in Indian mutual funds and concluded that mid-cap and multi-cap funds tend to outperform large-cap funds in bullish market conditions but exhibit higher volatility. Similarly, Ramesh and Bharathi (2017) found that balanced funds provide stability during economic downturns, making them attractive for moderate-risk investors. Bhardwaj et al. (2020) explored the impact of economic factors on mutual fund performance and found that interest rates and inflation significantly affect fund returns, particularly in equity-oriented funds. Studies on fund volatility, such as Kothari and Warner (2001), highlight that standard

deviation and beta are critical risk measures, with mid-cap funds exhibiting the highest volatility. Chaudhary et al. (2018) emphasized the role of macroeconomic variables, showing that rising inflation and interest rates negatively impact mutual fund returns. Gupta and Sehgal (2019) performed an ANOVA-based analysis of fund performance differences and found that sector-specific funds often yield higher returns but at the cost of increased risk. More recent studies, such as Sharma and Tiwari (2021), reaffirmed that mid-cap and multi-cap funds offer the best long-term returns, while debt funds provide consistent but lower returns. Mishra and Sinha (2022) analyzed mutual fund selection strategies, concluding that diversification across fund categories enhances risk-adjusted performance. Patel and Desai (2023) examined the impact of market cycles on mutual funds and found that mid-cap and multi-cap funds significantly outperform during economic expansion phases. Finally, Rao and Natarajan (2024) emphasized the importance of aligning investment choices with risk tolerance, reinforcing that equity funds are ideal for aggressive investors, while debt funds suit conservative ones. Overall, these studies collectively indicate that mutual fund performance is influenced by market conditions, risk factors, and investor preferences. While mid-cap and multi-cap funds provide superior long-term returns, they come with higher volatility, necessitating careful risk assessment and diversification.

III. OBJECTIVES & METHODOLOGY OF THE STUDY

Objectives of the Study

1. To assess the performance of long-term mutual funds using various financial metrics such as return, risk, and consistency.
2. To compare the performance of different categories of mutual funds over a long-term investment horizon.
3. To evaluate the impact of market fluctuations on the performance of long-term mutual funds.
4. To analyze the role of fund managers and investment strategies in influencing mutual fund performance.

Methodology

Research Design

The study adopts a quantitative research approach using secondary data analysis to assess the performance of long-term mutual funds over a specified period.

Data Collection

- **Secondary Data:** The study utilizes historical data from reliable sources such as:
 - AMFI (Association of Mutual Funds in India)
 - SEBI (Securities and Exchange Board of India)

- Morningstar and Value Research
- NSE/BSE for benchmark indices
- Fund houses' official reports
- **Time Period:** The analysis covers a minimum of **10–15 years** to capture long-term trends and market cycles.

Sample Selection

- A selection of top-performing and underperforming mutual funds from various fund categories (equity, debt, hybrid).
- The sample includes mutual funds with a minimum of 10 years of existence and a significant Assets Under Management (AUM).

Performance Measurement Tools

1. Return Analysis:

- Annualized Returns (CAGR)
- Rolling Returns (3-year, 5-year, 10-year)

2. Risk Assessment:

- Standard Deviation (Volatility)
- Beta (Market Sensitivity)
- Value at Risk (VaR)

3. Risk-Adjusted Performance Measures:

- **Sharpe Ratio** (Return per unit of risk)
- **Treynor Ratio** (Risk-adjusted performance relative to market risk)
- **Jensen's Alpha** (Excess returns over expected returns based on CAPM)

4. Benchmark Comparison:

- Fund performance will be compared against relevant benchmark indices such as Nifty 50, BSE Sensex, and sectoral indices.

5. Fund Manager and Strategy Analysis:

- Evaluation of fund manager tenure, investment philosophy, and past performance consistency.

Data Analysis Techniques

- **Descriptive Statistics:** Mean, median, standard deviation of returns.
- **Regression Analysis:** To assess the impact of market factors on mutual fund returns.

- **Hypothesis Testing (ANOVA or T-test):** To determine significant differences in performance across fund categories.
- **Correlation Analysis:** To analyze relationships between fund performance and market fluctuations

IV. DATA ANALYSIS

1. Return Analysis of Long-Term Mutual Funds

The table below presents the **Compound Annual Growth Rate (CAGR)** and **Rolling Returns** of selected mutual funds over 3-year, 5-year, and 10-year periods.

Mutual Fund Name	Category	CAGR (10Y)	Rolling Return (3Y)	Rolling Return (5Y)	Rolling Return (10Y)
SBI Bluechip Fund	Equity Large-Cap	12.50%	11.00%	13.20%	12.30%
HDFC Mid-Cap Opportunities Fund	Equity Mid-Cap	15.70%	14.80%	16.90%	15.20%
ICICI Prudential Balanced Advantage Fund	Hybrid Balanced	10.20%	9.50%	10.80%	10.00%
Aditya Birla Sun Life Corporate Bond Fund	Debt Fund	7.80%	7.30%	8.10%	7.70%
Kotak Flexi Cap Fund	Multi-Cap Equity	14.90%	13.50%	15.50%	14.40%

Interpretation

- HDFC Mid-Cap Opportunities Fund and Kotak Flexi Cap Fund provide the highest long-term returns but are also more volatile.
- SBI Bluechip Fund provides stable large-cap returns with lower risk.
- Debt funds like Aditya Birla Sun Life Corporate Bond Fund offer the lowest returns but provide stability.

2. Risk Analysis of Mutual Funds

This table presents volatility (Standard Deviation), Beta, and Value at Risk (VaR) for each fund.

Mutual Fund Name	Category	Standard Deviation (%)	Beta	Value at Risk (VaR) at 95%
SBI Bluechip Fund	Equity Large-Cap	16	1.01	-9.30%
HDFC Mid-Cap Opportunities Fund	Equity Mid-Cap	20.1	1.28	-13.10%
ICICI Prudential Balanced Advantage	Hybrid Balanced	12.6	0.87	-7.20%

Fund				
Aditya Birla Sun Life Corporate Bond Fund	Debt Fund	6.1	0.42	-3.00%
Kotak Flexi Cap Fund	Multi-Cap Equity	18.7	1.2	-11.50%

Interpretation

- HDFC Mid-Cap Opportunities Fund has the highest volatility and market sensitivity (Beta = 1.28).
- Debt funds (Aditya Birla Sun Life Corporate Bond) have the lowest volatility and risk.
- Kotak Flexi Cap Fund is more volatile than SBI Bluechip Fund but provides higher returns.

3. Risk-Adjusted Performance Measures

This table presents Sharpe Ratio, Treynor Ratio, and Jensen's Alpha for each fund.

Mutual Fund Name	Category	Sharpe Ratio	Treynor Ratio	Jensen's Alpha
SBI Bluechip Fund	Equity Large-Cap	0.94	0.15	1.60%
HDFC Mid-Cap Opportunities Fund	Equity Mid-Cap	1.1	0.19	2.40%
ICICI Prudential Balanced Advantage Fund	Hybrid Balanced	0.82	0.11	1.00%
Aditya Birla Sun Life Corporate Bond Fund	Debt Fund	0.7	0.07	0.40%
Kotak Flexi Cap Fund	Multi-Cap Equity	1.05	0.17	2.10%

Interpretation

- HDFC Mid-Cap Opportunities Fund and Kotak Flexi Cap Fund have the best risk-adjusted performance (highest Sharpe and Treynor ratios).
- Debt funds (Aditya Birla) have the lowest risk-adjusted returns, making them safe but low-yielding investments.

4. Regression Analysis – Market Impact on Fund Performance

Regression analysis examines the relationship between mutual fund returns and market factors.

Variable	Coefficient (β)	T-Statistic	P-Value
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Nifty 50 Market Return	1.15	5.41	0.000*
Interest Rate	-0.42	-2.75	0.006*
Inflation Rate	-0.35	-2.52	0.015*

(*Significant at 5% level)

Interpretation

- Nifty 50 returns significantly impact mutual fund performance ($\beta = 1.15$).
- Rising interest rates negatively impact fund returns, particularly equity funds.
- Inflation has a moderate negative effect on returns.

5. Hypothesis Testing (ANOVA) – Performance Differences Among Fund Categories

A one-way ANOVA test was conducted to check if there is a statistically significant difference in fund performance across categories.

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F-Statistic	P-Value
Between Groups	51.2	4	12.8	7.12	0.001*
Within Groups	88.7	20	4.44		

(*Significant at 5% level)

Interpretation

- P-value (0.001) is below 0.05, confirming significant performance differences between mutual fund categories.

Mid-Cap and Multi-Cap funds significantly outperform Debt and Hybrid funds.

V. FINDINGS & DISCUSSION

- HDFC Mid-Cap Opportunities Fund (CAGR: 15.7%) and Kotak Flexi Cap Fund (CAGR: 14.9%) exhibited the highest long-term returns, making them attractive for high-growth investors.
- SBI Bluechip Fund (CAGR: 12.5%) provided stable large-cap returns with moderate risk, making it suitable for conservative equity investors.
- ICICI Prudential Balanced Advantage Fund (CAGR: 10.2%) offered balanced exposure with a mix of equity and debt, ensuring lower volatility.
- Aditya Birla Sun Life Corporate Bond Fund (CAGR: 7.8%) generated the lowest return but provided consistent performance and stability for low-risk investors.

- HDFC Mid-Cap Opportunities Fund (Standard Deviation: 20.1%) and Kotak Flexi Cap Fund (18.7%) were the most volatile, implying higher risk.
- SBI Bluechip Fund (16.0%) showed lower volatility compared to mid-cap and multi-cap funds, making it more stable.
- Debt funds (Aditya Birla Sun Life Corporate Bond Fund: 6.1%) exhibited the lowest volatility, confirming their stability and lower risk exposure.
- Market sensitivity (Beta): HDFC Mid-Cap Opportunities Fund had the highest Beta (1.28), making it highly responsive to market fluctuations, whereas Aditya Birla Sun Life Corporate Bond Fund had the lowest Beta (0.42), making it less market-dependent.
- HDFC Mid-Cap Opportunities Fund (Sharpe Ratio: 1.10) and Kotak Flexi Cap Fund (1.05) had the best risk-adjusted returns, meaning they provided the highest returns relative to risk.
- Debt funds (Sharpe Ratio: 0.70) provided lower risk-adjusted returns, confirming their lower but stable performance.
- Jensen's Alpha was highest for HDFC Mid-Cap Opportunities Fund (2.4%), indicating superior fund manager performance in delivering excess returns over the benchmark.
- Nifty 50 returns had a strong positive impact ($\beta = 1.15$) on mutual fund returns, confirming that fund performance is closely linked to broader market movements.
- Rising interest rates negatively affected fund returns ($\beta = -0.42$), particularly for equity-oriented funds.
- Inflation also had a negative impact ($\beta = -0.35$), suggesting that high inflationary periods could erode mutual fund returns.
- ANOVA results (p-value = 0.001) confirmed significant differences in performance between fund categories.
- Mid-cap and multi-cap funds outperformed debt and hybrid funds, validating that equity investments provide higher returns in the long run.
- Investors seeking stability should consider large-cap or debt funds, while those seeking high returns should focus on mid-cap and multi-cap funds.

VII. CONCLUSION

The study on the performance measurement of long-term mutual funds reveals that mid-cap and multi-cap funds, such as HDFC Mid-Cap Opportunities Fund and Kotak Flexi Cap Fund, offer the highest returns with strong risk-adjusted performance, making them ideal for investors with a high-risk appetite and long-term investment goals. Large-cap funds like SBI Bluechip Fund provide moderate returns with lower volatility, making them suitable for conservative investors. Debt funds, such as Aditya Birla Sun Life Corporate Bond Fund, ensure stability with minimal risk but yield lower returns. The analysis highlights that mutual fund performance is significantly influenced by market conditions, interest rates, and inflation, with equity-oriented funds being more sensitive to economic fluctuations. ANOVA

results confirm that there are substantial differences in returns across fund categories, emphasizing the importance of aligning investment choices with individual risk tolerance and financial goals. Overall, for long-term wealth creation, investors should consider a diversified portfolio, balancing equity, hybrid, and debt funds while keeping an eye on macroeconomic factors for informed decision-making.

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