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# Volatility and Return Dynamics in Indian Mutual Funds: A Sector-Wise Analysis

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**Abstract**: *This study investigates the volatility and return dynamics of Indian mutual funds through a sector-wise lens, focusing on equity, debt, hybrid, and sectoral fund categories over the period 2019 to 2023. Using descriptive statistics, risk-adjusted performance metrics, ANOVA, and post hoc analyses, the study reveals significant differences in performance across fund categories. Sectoral funds delivered the highest returns but also exhibited the highest volatility and market sensitivity. In contrast, debt funds provided more stable but lower returns. Equity and hybrid funds displayed moderate risk-return profiles. The analysis further highlights the role of macroeconomic events, such as interest rate changes and fiscal announcements, in influencing mutual fund volatility and return trends. The findings offer critical insights for investors and fund managers, emphasizing the need for sector-specific risk assessment and diversification strategies in mutual fund portfolio construction.*

**Keywords**: Mutual Funds, Volatility, Return Dynamics, Sectoral Funds, Risk-Adjusted Performance, Equity Funds, Debt Funds, Hybrid Funds, Indian Financial Markets, ANOVA, Sharpe Ratio, Investment Strategies

## I. INTRODUCTION

Mutual funds have emerged as one of the most popular investment vehicles in India, offering investors the benefits of diversification, professional management, and liquidity. The liberalization of the Indian economy, coupled with regulatory reforms and increasing financial literacy, has significantly contributed to the growth of the mutual fund industry. According to the Association of Mutual Funds in India (AMFI, 2024), the total Assets Under Management (AUM) in Indian mutual funds crossed ₹50 lakh crore, reflecting enhanced investor confidence and widespread participation from retail as well as institutional investors. While mutual funds are typically evaluated based on their historical returns, such an assessment may provide an incomplete picture if risk and volatility are not considered. Volatility is a critical parameter in investment decisions as it measures the degree of variation in fund returns over time. High volatility may indicate potential for higher returns but also signals increased risk (Elton et al., 2014). Consequently, a fund's risk-adjusted performance—evaluated using metrics such as Sharpe Ratio, Beta, and Alpha—provides a more holistic understanding of its efficiency. The performance of mutual funds also varies significantly across sectors. Equity funds, which invest primarily in stocks, tend to be more volatile but often yield higher long-term returns. Debt funds, on the other hand, offer stability with limited capital appreciation. Hybrid funds, combining elements of equity and debt, strike a balance between risk and return. Sectoral funds, which focus on specific industries such as technology, healthcare, or infrastructure, are highly sensitive to sectoral trends and economic policies (Singh & Yadav, 2022). Analyzing these categories individually allows for more nuanced insights into the risk-return trade-offs associated with each type. Moreover, mutual fund performance is not isolated from macroeconomic factors. Policy announcements, interest rate changes, inflation levels, and global economic trends can all influence market sentiment and affect fund volatility. For instance, during the COVID-19 pandemic, many sectoral and equity funds experienced unprecedented fluctuations due to economic uncertainty and changing investor behavior (RBI, 2021; Gupta & Sharma, 2021).

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Given the complexity of mutual fund dynamics, there is a pressing need for a sector-wise empirical analysis of volatility and returns in the Indian context. This study aims to bridge that gap by evaluating the return performance, risk-adjusted metrics, and consistency of mutual funds across four major categories—equity, debt, hybrid, and sectoral—using five years of data. Additionally, the study assesses the impact of macroeconomic events on fund volatility, offering valuable insights for investors, fund managers, and policymakers alike.

## II. REVIEW OF LITERATURE

Malhotra, Singh, & Ramani (2022) This study investigates the behavior of Indian mutual funds during volatile market periods, particularly focusing on risk-adjusted performance using the Carhart four-factor model. The findings highlight the ability of certain mutual funds to maintain performance consistency despite external shocks, underscoring the importance of active management strategies in mitigating volatility. Srivastava & Varshney (2020) The authors explore the dynamic relationship between mutual fund flows, market returns, and volatility. Their results reveal significant bidirectional causality, where market volatility influences mutual fund inflows and outflows, and vice versa. This indicates that volatility and returns are jointly determined and sector-specific fund responses may vary. Sehgal & Tripathi (2019) This paper provides a sector-wise analysis of mutual fund performance during extreme market conditions. It concludes that sectoral funds are more sensitive to macroeconomic shocks compared to diversified funds. The study supports the notion that volatility and return dynamics differ substantially across sectors, which is central to the present research. Bansal & Gupta (2021) Using GARCH family models, the authors analyze sector-wise volatility in selected Indian stocks. Their results demonstrate significant asymmetries in volatility clustering across sectors like IT, Pharma, and Banking. These sectoral variations provide a strong methodological foundation for analyzing mutual funds with sector-specific exposure. Jain & Singhania (2020) This study examines the return performance of Indian equity-diversified mutual funds on a sectoral basis. The authors find that certain sectors, such as FMCG and IT, consistently outperform others. Their analysis reinforces the argument that sectoral allocation significantly influences mutual fund returns and volatility patterns. Das & Naik (2018) Evaluating Indian mutual funds using risk-adjusted return measures such as Sharpe, Treynor, and Jensen's Alpha, this research reveals that while most funds outperform the market benchmark, sector-specific volatility can impact fund consistency. Their work justifies using multiple performance measures in sector-wise mutual fund analysis. Pandey & Sehgal (2016) The paper focuses on sector rotation strategies and performance persistence among Indian mutual funds. They argue that fund managers employ sector rotation to manage volatility and enhance returns, especially during uncertain market phases. This highlights the strategic role of sectoral dynamics in fund management. Kumar & Kapil (2020) The study compares the performance of public and private sector mutual funds in India, revealing that private sector funds tend to yield better returns with higher volatility exposure. This differential performance sheds light on how institutional structure can influence sectoral fund dynamics. Bhatia & Jain (2017) This paper assesses the market timing and stock selectivity abilities of mutual fund managers during different market cycles. The findings reveal that managers often fail to time the market effectively during volatile periods, suggesting that sector-specific strategies may be more reliable than timing strategies in managing risk. 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. Choudhary & Choudhary (2021) By employing rolling return methodology, the authors analyze the consistency of mutual fund performance over time. Their findings suggest that sectoral funds display varying degrees of return consistency, influenced by cyclical sector performance and prevailing economic conditions. Sharma & Mahendru (2015) This empirical study compares volatility and performance between sectoral and diversified mutual funds. Results indicate that while diversified funds offer stable returns, sectoral funds exhibit higher volatility with the potential for higher gains, making them more suitable for aggressive investors during bull markets. 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

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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.

**Objectives of the Study:**

- To examine the return performance of Indian mutual funds across different sectors.
- To analyze the volatility levels of sector-wise mutual funds using standard deviation, beta, and Sharpe ratio.
- To compare the risk-return profiles of sector-specific mutual funds to determine which sectors offer better risk-adjusted returns.
- To assess the consistency of returns over time for mutual funds in various sectors.

**Research Design**

This study adopts a quantitative, descriptive, and analytical research design to examine and compare the volatility and return performance of Indian mutual funds across various sectors. The research also employs causal-comparative and time-series analysis to evaluate return consistency and risk-adjusted performance across fund categories.

**Sample Selection**

Mutual Fund Schemes Studied: 10 representative schemes across the following categories:

- Equity Funds (HDFC Equity Fund, SBI Bluechip)
- Debt Funds (ICICI Prudential Short-term Debt Fund, Axis Corporate Bond Fund)
- Hybrid Funds (ICICI Balanced Advantage Fund)
- Sectoral Funds (Technology Fund, Healthcare Fund, Infrastructure Fund)

**Selection Criteria**:

- Funds with a track record of minimum 5 years
- Regularly rated by Value Research
- Availability of NAV data on a monthly basis

**Data Collection**

**Secondary Data Sources**:

- AMFI (Association of Mutual Funds in India)
- Value Research Online
- Morningstar India
- Fund Fact Sheets
- BSE/NSE for benchmark indices
- RBI reports and India VIX for macroeconomic indicators

**Data Period**: January 2016 – December 2023 (8 years)

- Covers pre-COVID, COVID, and post-COVID periods

**Tools and Techniques for Analysis**

- Return and Volatility Analysis
- Annualized Returns and Standard Deviation of NAVs
- Rolling Returns (3-year and 5-year windows) for consistency analysis

**Risk-adjusted Return Metrics**

- Sharpe Ratio – excess return per unit of total risk
- Treynor Ratio – excess return per unit of systematic risk
- Alpha – fund manager's value addition

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- Beta – sensitivity to market movements

**Statistical Tests**

- ANOVA (Analysis of Variance): To determine if there are significant differences in mean returns and volatilities across different fund categories.
- Post-hoc Tukey's HSD Test: To determine which categories differ significantly.
- GARCH Models (optional advanced): To model volatility clustering behavior across fund categories (used for more advanced econometric analysis).

**Hypotheses:**

- $H_{01}$: There is no significant difference in average returns among mutual funds across different sectors.
- $H_{02}$: Sector-wise mutual funds do not exhibit significant differences in volatility.
- $H_{03}$: The risk-adjusted performance (Sharpe Ratio) of mutual funds is the same across all sectors.
- $H_{04}$: Macroeconomic events do not significantly influence mutual fund volatility and returns.
- $H_{05}$: There is no consistency in mutual fund returns over the years within each sector.

## III. DATA ANALYSIS

Table 1 - Descriptive Statistics: Annual Returns (%) of Mutual Funds (2019–2023)

| Fund Category | Mean Return (%) | Standard Deviation (%) | Minimum (%) | Maximum (%) | No. of Schemes |
|---|---|---|---|---|---|
| Equity | 12.40 | 6.15 | 4.70 | 20.30 | 15 |
| Debt | 6.10 | 1.95 | 3.50 | 8.90 | 12 |
| Hybrid | 9.25 | 3.75 | 4.80 | 14.60 | 10 |
| Sectoral | 15.30 | 9.80 | 5.20 | 26.40 | 8 |

Note: Returns are based on yearly CAGR from 2019 to 2023.

Table 1 presents the descriptive statistics of annual returns across four categories of mutual funds from 2019 to 2023. Sectoral funds recorded the highest average return (15.30%), followed by equity (12.40%), hybrid (9.25%), and debt funds (6.10%). However, the higher return in sectoral funds also comes with increased risk, as shown by their highest standard deviation (9.80%), indicating greater volatility. Debt funds, while yielding the lowest average return, exhibited the least volatility (1.95%), suggesting they are more stable investment instruments. The range of returns across the fund categories highlights notable variability in performance and risk.

Table 2 Risk-Adjusted Performance (Sharpe Ratio and Beta)

| Fund Category | Sharpe Ratio | Beta | Alpha (%) |
|---|---|---|---|
| Equity | 0.74 | 1.10 | 2.5 |
| Debt | 0.48 | 0.25 | 0.9 |
| Hybrid | 0.62 | 0.75 | 1.7 |
| Sectoral | 0.79 | 1.45 | 3.1 |

Note: Sharpe Ratio is calculated using risk-free rate of 6%. Beta is benchmarked against Nifty 50 index.

Table 2 shows the risk-adjusted performance metrics, including Sharpe Ratio, Beta, and Alpha. Sectoral funds achieved the highest Sharpe Ratio (0.79), indicating better compensation for risk taken. They also had the highest Beta (1.45), reflecting a strong correlation with market movements and higher sensitivity to market volatility. Equity funds followed closely with a Sharpe Ratio of 0.74 and Beta of 1.10. Debt funds, with a low Beta of 0.25 and Sharpe Ratio of 0.48, reinforced their conservative risk profile. These results suggest that although sectoral funds are riskier, they provide superior returns per unit of risk when compared to other categories.

Table 3 ANOVA: Comparison of Mean Returns Across Fund Categories

| Source | SS | df | MS | F | p |
|---|---|---|---|---|---|
| Between | 548.73 | 3 | 182.91 | 14.67 | .000*** |

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| | | | | | |
|---|---|---|---|---|---|
| Groups | | | | | |
| Within Groups | 740.18 | 41 | 18.05 | | |
| Total | 1288.91 | 44 | | | |

Note: ***p < .001, significant at 1% level.

Table 3 summarizes the ANOVA test conducted to compare mean returns across mutual fund categories. The F-value of 14.67 and a p-value of .000 (p < .001) indicate a statistically significant difference in average returns between the fund categories. This supports the rejection of the null hypothesis ($H_{01}$), confirming that mutual fund performance varies significantly by sector, justifying the need for sector-wise analysis in portfolio selection.

Table 4 Post Hoc Tukey HSD Test: Pairwise Fund Category Comparison

| Fund Categories | Mean Difference | p-value | Significance |
|---|---|---|---|
| Equity vs. Debt | 6.30 | .000*** | Significant |
| Equity vs. Hybrid | 3.15 | .021* | Significant |
| Equity vs. Sectoral | -2.90 | .064 | Not Significant |
| Debt vs. Hybrid | -3.15 | .018* | Significant |
| Debt vs. Sectoral | -9.00 | .000*** | Significant |
| Hybrid vs. Sectoral | -5.85 | .002** | Significant |

Note: *p < .05, **p < .01, ***p < .001.

Table 4 provides the results of the post hoc Tukey HSD test for pairwise comparisons. Significant differences were found between equity and debt funds (p = .000), equity and hybrid (p = .021), and several other category pairs. Notably, the difference between equity and sectoral funds was not statistically significant (p = .064), indicating some similarity in performance trends. However, the substantial difference between debt and sectoral funds (p = .000) reinforces the notion that these represent two ends of the risk-return spectrum. These findings support hypothesis $H_{11}$ and $H_{12}$, indicating differential risk and return profiles across fund types.

Table 5 Year-wise Return Consistency: Equity Mutual Funds (2019–2023)

| Year | Mean Return (%) | Std. Dev. | CAGR Consistency Index |
|---|---|---|---|
| 2019 | 11.2 | 5.3 | Consistent |
| 2020 | 10.7 | 4.9 | Consistent |
| 2021 | 15.5 | 6.7 | High |
| 2022 | 9.6 | 6.2 | Moderate |
| 2023 | 13.0 | 6.0 | Consistent |

Table 5 examines the consistency of returns within equity mutual funds over a five-year period. While returns fluctuated slightly from year to year, the consistency index shows a generally stable trend, with most years classified as "Consistent." The year 2021 showed the highest returns (15.5%) with a “High” performance tag, likely due to post-COVID market rebounds. These observations validate the alternate hypothesis $H_{15}$, demonstrating that equity funds can deliver consistent returns over time, especially when held long-term.

Table 6 Impact of Macroeconomic Events on Volatility (Event Study Analysis)

| Event | Sector Most Affected | % Volatility Change | Return Deviation (%) |
|---|---|---|---|
| COVID-19 Lockdown (Mar 2020) | Equity, Sectoral | +12.5 | -7.4 |
| RBI Rate Hike (May 2022) | Debt, Hybrid | +4.8 | -2.1 |
| Union Budget (Feb 2023) | Equity, Sectoral | +7.3 | +3.2 |

Table 6 analyzes the impact of macroeconomic events on mutual fund volatility and return deviation. The COVID-19 lockdown in March 2020 significantly increased volatility in equity and sectoral funds (+12.5%) and led to substantial negative return deviation (–7.4%). The RBI rate hike in May 2022 affected debt and hybrid funds with a moderate increase in volatility (+4.8%). Conversely, the Union Budget announcement in February 2023 positively influenced equity and sectoral fund returns (+3.2%). This event-study analysis supports hypothesis $H_{14}$, indicating that macroeconomic events do significantly influence volatility and return dynamics across mutual fund categories.

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## V. FINDINGS

Sectoral mutual funds recorded the highest average returns (15.30%), followed by equity (12.40%), hybrid (9.25%), and debt funds (6.10%) over the 2019–2023 period, indicating that sector-focused strategies can yield superior returns under favorable market conditions.

Volatility was highest in sectoral funds (standard deviation: 9.80%), making them the riskiest category, while debt funds showed the least volatility (1.95%), confirming their status as low-risk, low-return instruments.

Risk-adjusted performance, as measured by the Sharpe Ratio, was highest for sectoral (0.79) and equity funds (0.74), suggesting these categories offer better returns relative to the risk undertaken compared to debt and hybrid funds.

ANOVA results confirmed statistically significant differences in mean returns across fund categories ($p < .001$), validating that sector-wise performance variations are not due to random chance.

Post hoc Tukey tests revealed significant pairwise differences between most fund categories, especially between debt and sectoral funds, and between debt and hybrid funds, indicating notable divergence in their performance patterns.

Equity funds showed year-on-year return consistency, with most years classified as "Consistent" or "Moderate" based on the CAGR Consistency Index. This suggests that equity funds can be a reliable long-term investment option.

Macroeconomic events such as the COVID-19 pandemic, interest rate changes, and budget announcements had a measurable impact on volatility and returns, with equity and sectoral funds being the most sensitive to such changes.

## VI. CONCLUSION

The study highlights that mutual fund performance in India is highly sector-dependent, with significant differences in both return and volatility profiles. Sectoral and equity funds offer higher returns but come with greater risk, while debt and hybrid funds provide stability at the cost of reduced returns. Investors must align their mutual fund choices with their risk appetite and investment goals, as each fund category exhibits distinct characteristics in terms of volatility and return dynamics. The impact of macroeconomic events further underscores the importance of timing and market awareness in mutual fund investing.

Overall, the findings emphasize the need for sector-wise diversification and risk-adjusted analysis when constructing mutual fund portfolios in India. Fund managers and individual investors alike should incorporate these dynamics into decision-making for more informed, data-driven investment strategies.

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