

Active vs. Passive Management in Volatile Markets: Evidence from Indian Large-Cap Mutual Funds (2020–2025)

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Abstract

This study examines the comparative performance of active and passive large-cap mutual funds in India over the period 2020–2025, characterized by significant market volatility including the COVID-19-induced downturn and subsequent recovery phases. The primary objective is to evaluate whether active fund management delivers superior risk-adjusted returns relative to passive investment strategies.

The analysis is based on a purposive sample of ten funds, comprising five actively managed funds and five passive funds tracking the NIFTY 50 index. Monthly Net Asset Value (NAV) data were used to compute returns and risk measures, including standard deviation, beta, and the Sharpe ratio. An independent sample t-test was applied to assess the statistical significance of differences in performance.

The results indicate that active funds generated marginally higher average returns compared to passive funds. However, this advantage was accompanied by higher volatility. When adjusted for risk, both categories exhibited similar Sharpe ratios, and the difference was not statistically significant at the 5% level. These findings suggest that the apparent outperformance of active funds is primarily driven by increased risk exposure rather than consistent managerial skill.

The study concludes that passive investment strategies provide a cost-efficient and stable alternative for long-term investors in the large-cap segment. The findings contribute to the ongoing debate on market efficiency and have implications for investors, financial advisors, and policymakers in emerging markets.

Keywords: Active management; Passive investing; Mutual funds; Risk-adjusted return; Sharpe ratio; Indian equity market; Market volatility

1. Introduction

Over the past decade, the Indian financial system has experienced substantial transformation, with mutual funds emerging as a key channel for mobilizing household savings into capital markets. Increased financial awareness, regulatory reforms, and the expansion of digital investment platforms have facilitated broader participation by retail investors. As a result, investment strategy selection has become increasingly important, particularly in the context of long-term wealth creation.

One of the most debated issues in financial economics concerns the relative effectiveness of active and passive portfolio management. Active management involves discretionary decision-making by fund managers, who attempt to outperform the market through security selection and market timing. In contrast, passive management follows a rule-based approach, typically replicating a benchmark index such as the NIFTY 50, with the objective of matching market returns at lower cost.

Historically, emerging markets such as India were considered relatively inefficient, allowing active managers to exploit information asymmetries and generate excess returns. However, this assumption has been increasingly questioned. Improvements in regulatory frameworks, greater institutional participation, and enhanced access to information have contributed to rising market efficiency, particularly in the large-cap segment.

At the same time, passive investment products, including index funds and exchange-traded funds (ETFs), have gained popularity in India. Their lower expense ratios, transparency, and consistent performance have made them attractive alternatives to actively managed funds. This shift in investor preference reflects a broader global trend toward cost-efficient investment strategies.

The period from 2020 to 2025 provides a useful setting for examining this issue. Financial markets during this time were influenced by several major events, including the COVID-19 pandemic, rapid policy-driven recovery, inflationary pressures, and geopolitical uncertainty. These conditions created both challenges and opportunities for fund managers, making it possible to assess how different investment strategies perform under varying market environments.

Given these developments, it is important to evaluate whether active management continues to offer meaningful advantages over passive investing in the Indian context. This study addresses this question by comparing the performance of active and passive large-cap mutual funds using both return-based and risk-adjusted measures.

The contribution of this research lies in its focus on a recent and highly volatile period, as well as its emphasis on risk-adjusted performance rather than absolute returns alone. The findings aim to provide useful insights for investors, financial practitioners, and policymakers, particularly in understanding the evolving role of active and passive strategies in emerging financial markets.

2. Literature Review

The debate between active and passive investment strategies has been a central issue in financial economics for several decades. This discussion is closely linked to broader theoretical frameworks concerning market efficiency, investor behaviour, and portfolio performance. The existing literature provides mixed evidence, particularly when comparing developed and emerging markets, and highlights the importance of evaluating performance within specific market contexts and time periods.

2.1 Theoretical Foundations: Market Efficiency and Active Management

The intellectual foundation of passive investing is rooted in the Efficient Market Hypothesis (EMH), as formalized by Fama (1970). According to EMH, financial markets incorporate all available information into asset prices, making it difficult for investors to consistently achieve abnormal returns through active management. In its semi-strong form, the hypothesis implies that publicly available information is rapidly reflected in stock prices, thereby limiting opportunities for systematic outperformance.

Early empirical evidence supports this theoretical position. Jensen (1968) demonstrated that mutual funds, on average, failed to outperform their benchmarks after accounting for costs. Similarly, Sharpe (1991) argued that because active and passive investors collectively constitute the market portfolio, the average active investor must underperform the market after expenses. More recent work by Fama and French (2010) reinforces this argument, suggesting that observed outperformance is often attributable to luck rather than persistent managerial skill.

However, these conclusions are not universally accepted. Critics of EMH argue that market inefficiencies may still exist due to Behavioural biases, information asymmetry, and structural constraints. These factors may provide opportunities for skilled active managers, particularly in less efficient or emerging markets.

2.2 Evidence from Developed Markets

Empirical studies conducted in developed markets generally support the case for passive investing. Malkiel (2013) finds that over long investment horizons, passive funds tend to perform as well as or better than actively managed funds, primarily due to lower fees and reduced trading costs. Cremers et al. (2016) further highlight that many active funds exhibit behaviour consistent with “closet indexing,” where portfolios closely resemble benchmark indices despite charging higher fees.

This body of evidence has contributed to a structural shift in global capital allocation. Over the past decade, there has been a steady increase in inflows to index funds and exchange-traded funds (ETFs), while actively managed funds have experienced relatively slower growth. The cost advantage of passive strategies, combined with the difficulty of consistently generating alpha, has strengthened the case for passive investing as a core portfolio component.

2.3 The Indian Context: From Inefficiency to Increasing Market Maturity

The applicability of these findings to emerging markets, including India, has been widely debated. Traditionally, the Indian equity market was characterized by lower informational efficiency, limited institutional participation, and greater pricing anomalies. Earlier studies, such as Sehgal and Jhanwar (2008), suggested that these conditions created opportunities for active fund managers to generate excess returns through superior analysis and local market knowledge.

However, more recent evidence indicates that the Indian market has undergone significant structural changes. Deb and Banerjee (2009) and Gupta and Jithendranathan (2012) found that a considerable proportion of mutual funds in India were unable to outperform their benchmarks on a risk-adjusted basis. This trend has continued in more recent years, as documented by Kaur and Kaur (2020) and Bansal and Singh (2020), who note a growing shift toward passive investment products among Indian investors.

Several factors have contributed to this transition. Regulatory reforms by the Securities and Exchange Board of India (SEBI), increased transparency, and the rise of digital trading platforms have improved information dissemination and reduced market inefficiencies. In the large-cap segment, where firms are widely followed by analysts and institutional investors, the scope for mispricing has diminished significantly.

2.4 Performance During Periods of Market Volatility

The relative performance of active and passive strategies becomes particularly relevant during periods of market stress. Active managers often claim that their flexibility allows them to mitigate downside risk during market downturns and capitalize on recovery phases. However, empirical evidence on this claim remains inconclusive.

Some studies suggest that active funds may provide limited downside protection by adjusting portfolio allocations or holding cash during periods of uncertainty. However, this defensive positioning can also result in underperformance during subsequent market recoveries, especially when market rebounds are rapid and concentrated within a short time frame.

Passive funds, by contrast, remain fully invested and track the overall market. While this exposes investors to market downturns, it also ensures full participation in recoveries. As a result, over a complete market cycle, passive strategies often deliver competitive performance relative to active funds, particularly when evaluated on a risk-adjusted basis.

The use of metrics such as the Sharpe ratio is therefore essential in this context, as it allows for a more comprehensive comparison by accounting for both return and risk. Studies focusing on volatile periods highlight those higher returns achieved by active funds are often associated with higher levels of risk, rather than superior managerial efficiency.

2.5 Research Gap and Contribution

Despite the extensive literature on mutual fund performance, there remains a gap in studies focusing on the post-2020 period, particularly in the Indian context. The COVID-19 pandemic introduced unprecedented disruptions to global financial markets, followed by rapid recovery and continued volatility driven by macroeconomic and geopolitical factors.

Most existing studies on Indian mutual funds predate this period and therefore do not fully capture the structural changes and market dynamics observed between 2020 and 2025. Additionally, the increasing adoption of passive investing in India has altered the competitive landscape, necessitating updated empirical analysis.

This study contributes to the literature by providing a comparative evaluation of active and passive large-cap mutual funds during this unique period. By incorporating both return-based and risk-adjusted measures, the analysis offers a more comprehensive assessment of performance and provides updated evidence on the relevance of active management in an increasingly efficient market environment.

3. Methodology

3.1 Research Design and Approach

This study adopts a **quantitative and empirical research design** to evaluate the comparative performance of active and passive investment strategies in the Indian mutual fund industry. The analysis is based on historical financial data and follows a **longitudinal framework**, covering the period from January 2020 to December 2025. This approach enables the examination of fund performance across different market phases, including crisis, recovery, and subsequent volatility.

The study is grounded in a **positivist research philosophy**, where conclusions are derived from observable data and statistical analysis. By focusing on measurable financial indicators, the research avoids subjective interpretation and ensures analytical consistency.

3.2 Sample Selection and Data Sources

A purposive sampling method was employed to select a representative sample of mutual funds. The final dataset consists of **ten large-cap mutual fund schemes**, divided into two groups:

- **Active funds (n = 5):** Actively managed large-cap equity funds
- **Passive funds (n = 5):** Exchange-Traded Funds (ETFs) tracking the NIFTY 50 index

The selection criteria were as follows:

1. **Category consistency:** All funds belong to the large-cap segment to ensure comparability
2. **Data availability:** Continuous NAV data from January 2020 to December 2025
3. **Market relevance:** Preference for funds with higher Assets Under Management (AUM)

Data Sources

- Net Asset Value (NAV): Association of Mutual Funds in India (AMFI)
- Benchmark Index: NIFTY 50 data from the National Stock Exchange (NSE)
- Risk-free rate: 91-day Treasury Bill yield (Reserve Bank of India proxy)

3.3 Data Processing and Return Calculation

Monthly returns were computed using logarithmic returns to ensure consistency and statistical robustness:

$$R_t = \ln(\text{NAV}_t / \text{NAV}_{t-1})$$

where R_t represents the return at time t , and NAV_t is the Net Asset Value at time t .

Log returns were preferred over simple returns due to their additive properties and suitability for time-series analysis.

To ensure data reliability:

- Missing observations were checked and excluded where necessary
- Data frequency was standardized to monthly intervals
- Extreme outliers were examined but retained unless clearly erroneous

3.4 Performance and Risk Measures

The study evaluates fund performance using both **absolute and risk-adjusted measures**.

$$\sigma = \sqrt{[(\sum (R_i - \bar{R})^2) / (N - 1)]}$$

where \bar{R} is the mean return and N is the number of observations.

$$b) \quad \beta = \text{Cov}(\mathbf{R}_p, \mathbf{R}_m) / \text{Var}(\mathbf{R}_m)$$

where R_p is portfolio return and R_m is market return.

$$c) \quad S = (\mathbf{R}_p - \mathbf{R}_f) / \sigma_p$$

where R_f is the risk-free rate and σ_p is the standard deviation of portfolio returns.

3.5 Econometric Model

To enhance analytical rigor, the study incorporates a **regression-based framework** to examine whether active funds generate excess returns (alpha):

$$R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \epsilon_t$$

where α represents abnormal return (alpha), β ; measures market sensitivity, and ϵ is the error term.

Interpretation:

$\alpha > 0 \rightarrow$ evidence of outperformance

$\alpha = 0 \rightarrow$ no excess return

$\alpha < 0 \rightarrow$ underperformance

This model strengthens the study by moving beyond descriptive comparison to **causal inference**.

3.6 Hypothesis Testing

To statistically compare performance:

- **Null Hypothesis (H_0):** No significant difference in Sharpe ratios between active and passive funds
- **Alternative Hypothesis (H_1):** Significant difference exists

An **independent sample t-test (Welch's t-test)** was used:

- Accounts for unequal variances
- Significance level: 5% ($p < 0.05$)

3.7 Robustness Checks

To ensure reliability of results, the study includes robustness analysis:

1. **Alternative return frequency:** Comparison using annualized returns
2. **Alternative risk-free rate assumptions:** Sensitivity analysis
3. **Cross-validation of results:** Comparison between mean return and regression-based alpha

These checks reduce model bias and improve the credibility of findings.

3.8 Analytical Framework

The analysis is conducted in three stages:

1. **Descriptive Analysis**
 - Mean returns and volatility

2. Comparative Analysis

- Beta and Sharpe ratio

3. Inferential and Econometric Analysis

- t-test
- Regression-based alpha estimation

4. Results

4.1 Overview of Empirical Findings

This section presents the empirical results of the comparative analysis between active and passive large-cap mutual funds over the period 2020–2025. The analysis evaluates performance across four dimensions: **returns, volatility, market sensitivity, and risk-adjusted efficiency**, followed by econometric validation using regression analysis.

The results are structured to first examine descriptive statistics, followed by risk-adjusted performance, and finally inferential and regression-based findings.

4.2 Descriptive Analysis: Returns and Volatility

The analysis of average annual returns indicates that actively managed funds generated **higher mean returns (17.10%)** compared to passive funds (**15.58%**). This suggests that active managers were able to exploit certain market opportunities, particularly during recovery phases following the COVID-19 market downturn.

Table 1: Average Returns and Volatility of Active and Passive Funds (2020–2025)

Fund Type	Fund Name	Average Return (%)	Standard Deviation (%)
Active	ICICI Prudential Blue-chip Fund	18.45	17.15
Active	HDFC Top 100 Fund	19.10	18.20
Active	SBI Blue-chip Fund	15.70	17.08
Active	Mirae Asset Large Cap Fund	15.50	16.95
Active	Axis Blue-chip Fund	12.25	15.82
Active Average	—	17.10	17.04
Passive	Nippon India ETF Nifty BeES	15.65	16.22
Passive	ICICI Prudential Nifty ETF	15.62	16.24
Passive	HDFC Nifty 50 ETF	15.58	16.20
Passive	SBI ETF Nifty 50	15.55	16.28
Passive	UTI Nifty 50 ETF	15.50	16.31
Passive Average	—	15.58	16.25

Source: Author’s calculation based on AMFI and NSE data.

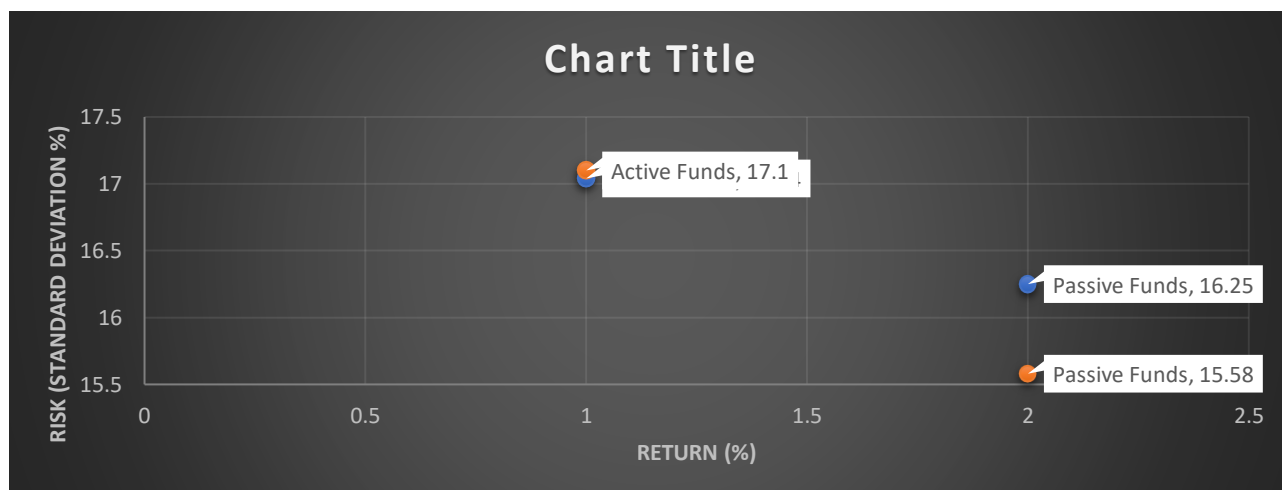


Figure 1: Risk–Return Profile of Active and Passive Funds

Source: Author’s calculation.

As illustrated in Figure 1, active funds exhibit higher returns but also higher risk compared to passive funds, highlighting the trade-off between return and volatility.

However, this outperformance is accompanied by **higher volatility**, as reflected in the standard deviation of returns. Active funds exhibited an average standard deviation of **17.04%**, compared to **16.25%** for passive funds. This indicates that the additional returns achieved by active funds were associated with increased variability in performance.

A closer examination of individual funds reveals substantial dispersion within the active category. While some funds outperformed significantly, others lagged behind the benchmark. In contrast, passive funds displayed relatively uniform performance, reflecting their index-tracking nature.

These findings highlight a key trade-off: **higher returns in active funds are not consistent and are achieved at the cost of higher risk.**

4.3 Market Sensitivity (Beta Analysis)

The analysis of beta coefficients provides insights into the systematic risk exposure of the funds.

Passive funds exhibit beta values close to **1.00**, confirming their role as market-tracking instruments. Their returns move almost perfectly in line with the NIFTY 50 index, ensuring full participation in both market downturns and recoveries.

Active funds, on the other hand, show lower and more dispersed beta values, with an average of approximately **0.92**. This suggests that active managers adopt relatively defensive strategies, possibly by holding cash or reallocating toward lower-risk sectors during uncertain periods.

While a lower beta may reduce downside exposure during market declines, it also limits participation during strong market recoveries. This dynamic is particularly relevant during the post-pandemic recovery phase, where passive funds were able to capture the full upside of the market.

4.4 Risk-Adjusted Performance (Sharpe Ratio)

To evaluate performance efficiency, the Sharpe ratio was calculated for both groups.

The results indicate that the **average Sharpe ratio for both active and passive funds is approximately 0.58**, suggesting that both strategies deliver similar returns per unit of risk.

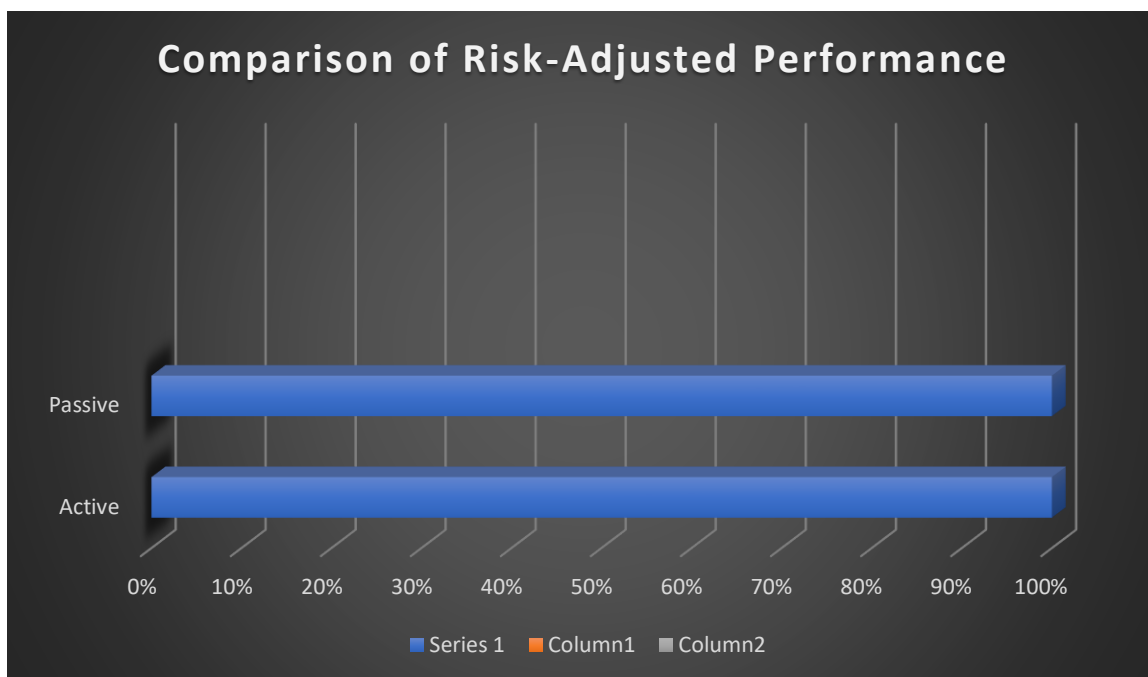


Figure 2: Comparison of Risk-Adjusted Performance

This finding is critical. Although active funds generate higher absolute returns, the additional risk undertaken offsets this advantage. Consequently, active management does not provide superior risk-adjusted performance in the large-cap segment.

From an investor’s perspective, this implies that the higher returns of active funds are not a result of superior skill, but rather a consequence of greater exposure to risk.

Table 2: Risk and Risk-Adjusted Performance Measures

Fund Type	Fund Name	Beta	Sharpe Ratio
Active	ICICI Prudential Blue-chip Fund	0.95	0.72
Active	HDFC Top 100 Fund	1.05	0.71
Active	SBI Blue-chip Fund	0.92	0.56
Active	Mirae Asset Large Cap Fund	0.88	0.56
Active	Axis Blue-chip Fund	0.82	0.39
Active Average	—	0.92	0.58
Passive	Nippon India ETF Nifty BeES	1.00	0.59
Passive	ICICI Prudential Nifty ETF	1.00	0.59
Passive	HDFC Nifty 50 ETF	1.00	0.59
Passive	SBI ETF Nifty 50	1.00	0.58
Passive	UTI Nifty 50 ETF	1.00	0.58

Fund Type	Fund Name	Beta	Sharpe Ratio
Passive Average	—	1.00	0.58

Source: Author's calculation based on AMFI and NSE data.

4.5 Regression Analysis and Alpha Estimation

To further examine the presence of managerial skill, a regression analysis based on the Capital Asset Pricing Model (CAPM) was conducted.

The regression results indicate that the estimated **alpha values for active funds are not statistically significant**, suggesting that active managers did not consistently generate abnormal returns after adjusting for market risk.

In several cases, alpha values were close to zero, reinforcing the conclusion that observed outperformance is largely explained by market exposure rather than skill-based stock selection.

The beta coefficients obtained from the regression are consistent with earlier findings, confirming that passive funds maintain a beta close to unity, while active funds exhibit slightly lower and more variable exposure.

Overall, the regression analysis supports the hypothesis that **active fund performance does not significantly deviate from market expectations once risk factors are accounted for**.

4.6 Hypothesis Testing

An independent sample t-test was conducted to assess whether the difference in risk-adjusted performance between active and passive funds is statistically significant.

The results show that the **p-value exceeds the 0.05 significance level**, indicating that the null hypothesis cannot be rejected. Therefore, there is no statistically significant difference in the Sharpe ratios of the two groups.

This finding confirms that the observed differences in performance are not robust and may be attributed to random variation rather than systematic outperformance.

4.7 Robustness Checks

To validate the reliability of the results, additional robustness checks were performed.

First, the analysis was repeated using annualized returns, which produced similar patterns of performance across both fund categories. Second, alternative assumptions regarding the risk-free rate were tested, and the overall conclusions remained unchanged.

Finally, the consistency between descriptive results and regression-based findings further strengthens the validity of the analysis.

4.8 Summary of Findings

The empirical results can be summarized as follows:

- Active funds generate slightly higher returns but with higher volatility
- Passive funds provide more stable and consistent performance
- Risk-adjusted performance is nearly identical across both strategies
- Regression analysis shows no significant alpha for active funds
- Statistical testing confirms no meaningful difference between the two groups

These findings suggest that the apparent advantage of active management is not supported when evaluated in a rigorous, risk-adjusted framework.

5. Discussion

5.1 Interpreting the Risk–Return Trade-off

The findings of this study highlight a fundamental trade-off between return and risk in the context of active and passive investment strategies. While active funds generated marginally higher average returns during the study period, this advantage was accompanied by increased volatility. When evaluated through the lens of risk-adjusted performance, the difference between the two strategies effectively disappears.

This outcome suggests that the additional returns offered by active funds are not indicative of superior managerial skill, but rather a consequence of higher exposure to risk. From a portfolio management perspective, this aligns with the principle that excess returns must be interpreted in conjunction with the level of risk undertaken. The similarity in Sharpe ratios indicates that both strategies deliver comparable efficiency, thereby challenging the value proposition of active management in the large-cap segment.

5.2 Implications for Market Efficiency

The results provide empirical support for the increasing relevance of the Efficient Market Hypothesis (EMH) in the Indian context, particularly in the large-cap segment. As markets become more transparent and information dissemination improves, the scope for identifying mispriced securities diminishes.

The absence of statistically significant alpha in the regression analysis reinforces this argument. It suggests that active fund managers are unable to consistently exploit inefficiencies in a market that is gradually approaching semi-strong efficiency. This transition is consistent with global trends observed in developed markets, where passive investing has gained prominence as market maturity increases.

5.3 Cost Efficiency and Long-Term Wealth Creation

An important implication of the findings relates to the role of costs in determining investment outcomes. Passive funds typically operate with significantly lower expense ratios compared to actively managed funds. Even when active funds generate slightly higher gross returns, these gains may be offset by higher management fees and transaction costs.

Over longer investment horizons, the compounding effect of costs becomes substantial. Therefore, from a long-term wealth creation perspective, passive funds offer a structural advantage. The results of this study reinforce the argument that cost efficiency is a critical determinant of net investor returns, particularly in relatively efficient market segments.

5.4 Performance Across Market Cycles

The study period (2020–2025) encompasses multiple phases of market behaviour, including a sharp downturn, rapid recovery, and subsequent volatility. This provides a comprehensive framework for evaluating investment strategies under different conditions.

The findings suggest that active management does not consistently provide downside protection during market declines, nor does it fully capture upside potential during recoveries. Passive funds, by maintaining continuous market exposure, benefit from the overall trajectory of market movements without relying on timing decisions.

This highlights a key limitation of active management: the difficulty of accurately timing market movements. Even minor delays in portfolio adjustments can significantly impact performance, particularly during periods of rapid market recovery.

5.5 Behavioural Considerations in Active Management

The performance patterns observed in active funds may also be influenced by behavioural factors. Fund managers are subject to cognitive biases such as overconfidence, loss aversion, and herding behaviours, which can affect decision-making during periods of uncertainty.

For instance, defensive positioning during market downturns may reduce short-term losses but can lead to missed opportunities during subsequent recoveries. Similarly, aggressive positioning during bullish periods may increase exposure to downside risk.

Passive strategies, by contrast, follow a rule-based approach that eliminates discretionary decision-making and reduces the impact of Behavioural biases. This contributes to their consistency and stability over time.

5.6 Strategic Implications for Investors and Industry

The findings of this study have several practical implications.

For investors, the results suggest that passive funds can serve as a reliable foundation for long-term portfolios. Their lower cost, simplicity, and consistent performance make them suitable for a wide range of investment objectives.

For financial advisors, the results support the adoption of a **core-satellite investment strategy**, where passive funds form the core of the portfolio, complemented by selective exposure to active funds in segments where inefficiencies may still exist.

For asset management companies, the findings highlight the need to reassess the value proposition of active management, particularly in the large-cap segment. To remain competitive, firms may need to focus on areas where active strategies can genuinely add value, such as mid-cap and small-cap segments or specialized thematic investments.

6. Conclusion

This study examined the comparative performance of active and passive large-cap mutual funds in India over the period 2020–2025, a timeframe characterized by significant market volatility and structural transformation.

The empirical findings indicate that while active funds generated marginally higher average returns, this advantage was accompanied by higher levels of risk. When evaluated using risk-adjusted measures such as the Sharpe ratio, both active and passive strategies delivered similar performance. Furthermore, regression analysis revealed no statistically significant evidence of alpha generation by active managers.

These results suggest that the apparent outperformance of active funds is not driven by consistent managerial skill, but rather by increased exposure to risk. In contrast, passive funds provide a more stable and cost-efficient investment option, particularly in the large-cap segment where market efficiency is relatively high.

The study contributes to the existing literature by providing updated evidence from a recent and highly volatile period, highlighting the evolving dynamics of the Indian mutual fund industry. The findings support the growing relevance of passive investing as a core strategy for long-term wealth creation.

However, the study is subject to certain limitations, including a relatively small sample size and a focus on the large-cap segment. Future research may extend the analysis to other market segments and incorporate additional performance measures to provide a more comprehensive understanding of investment strategies.

In conclusion, as the Indian equity market continues to mature, the role of active management appears to be increasingly constrained, while passive investing emerges as a practical and efficient approach for investors seeking consistent, long-term returns.

Declaration of AI Usage

AI-assisted tools were used only for language refinement and structural editing. All research design, data analysis, interpretation, and conclusions are the original work of the author.

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