Risk-Return Analysis of Selected Large-Cap Mutual Fund Schemes.

Abstract: *This quantitative study provides an exhaustive risk-return evaluation of nine prominent large-cap mutual fund regular plan schemes. Utilizing a robust dataset of performance metrics, the research assesses volatility, systematic risk, and the efficacy of active management through the lens of a Senior Financial Analyst. All analysed fundsAditya Birla Sun Life, Axis, DSP, Franklin India, HDFC, ICICI Prudential, Kotak, Nippon India, and SBI are classified under a "Very High" risk profile according to the standard Risko meter, yet display significant variance in performance efficiency. The analysis reveals a substantial 5.39% spread in Alpha between the top and bottom performers, ranging from Nippon India Large Cap Fund's 3.72 to Axis Large Cap Fund's -1.67. By examining risk-adjusted metrics such as the Sharpe and Sortino ratios alongside Information Ratios, this study identifies Nippon India Large Cap Fund and DSP Large Cap Fund - Regular Plan as the superior vehicles for alpha generation and downside protection, respectively. The high R-Squared values across the cohort suggest varying degrees of benchmark tracking, providing critical insights for investors seeking to optimize large-cap exposure.*

Keywords : Large-Cap Mutual Funds, Risk-Return Analysis, Sharpe Ratio, Beta, Jensen's Alpha, R-Square.

I. Introduction

In the contemporary investment landscape, large-cap mutual funds serve as the foundational equity allocation for institutional and retail portfolios alike. While these funds target the most capitalized and theoretically stable entities in the market, they are subject to significant systematic risks. For the sophisticated investor, a cursory review of nominal returns is insufficient; a rigorous quantitative framework is required to distinguish between market-driven gains and genuine managerial skill. This paper examines nine specific regular plan schemes to determine their risk-adjusted performance during the analysed period. By dissecting the relationship between volatility (Standard Deviation) and excess return (Alpha), we aim to provide a clear technical hierarchy of these funds, establishing whether their "Very High" risk designations are justified by commensurate performance or if certain managers are merely engaging in "closet indexing" with suboptimal outcomes.

II. Research Objectives

The primary objectives of this quantitative analysis are as follows:

- To measure the Standard Deviation and Beta of the selected schemes to determine their relative risk-sensitivity compared to the broader market.
- To assess the efficiency of each fund's return generation using the Sharpe and Sortino ratios.
- To calculate Alpha and the Information Ratio to evaluate the ability of fund managers to consistently outperform benchmarks.
- To analyze R-Squared values to understand the degree of active management versus passive benchmark replication.

III. Literature Review:

Ranjan and Gupta (2014) investigate the top five asset management companies, selected based on Assets Under Management (AUM) as of September 2014. Their study reveals that among all selected companies, the HDFC equity fund stands out as the best performer, yielding positive outcomes. Kaur (2014) examines the performance of 23 open-ended debt mutual funds by comparing the weekly returns of the selected schemes against benchmark returns. The findings indicate that none of the schemes performed better according to the Sharpe and Jensen measures, while 26 percent of the schemes outperformed the market according to the Treynor measure. Chaudhary and Chawla (2014) analyze the performance of growth-oriented equity diversified schemes based on return and risk evaluation. Their analysis illustrates that the majority of the funds selected for the study have outperformed according to both the Sharpe and Treynor ratios. Qamruzzaman (2014) evaluates the performance of 32 growth-oriented mutual funds by comparing their monthly returns with benchmark returns. This study concludes that during the research period, the selected mutual funds demonstrated positive monthly returns and an upward trend compared to market returns. Ramanujam and Bhuvaneswari (2015) analyze the growth of mutual funds from March 2000 to March 2011. In this study, the growth of Indian mutual funds is illustrated through various parameters, including the growth of assets under management, assets managed by different institutions, sector-wise mutual fund sales, sector-wise mutual fund redemption, scheme-wise resource mobilization by mutual funds, and the total number of schemes. The study shows that the AUM across all sectors, mutual fund sales, mutual fund redemptions, scheme-wise resource mobilization, and the number of schemes have all increased during the study period.

In India, Agarwal (2000) and Gupta (2001) examined mutual fund schemes focusing on risk-return performance. They found that although many funds fall short of the benchmark, some consistently shine when analyzed through risk-adjusted metrics. Chander & Priya (2014) looked at equity mutual funds using Sharpe, Treynor, and Jensen's Alpha, discovering that large-cap funds usually offer more stable returns compared to mid- or small-cap funds, even if their upside potential is somewhat limited. Singh and Vanita (2002) researched the performance of Indian mutual funds during the liberalization period and observed that funds managed by experienced and reputable AMCs tend to perform better. Bala and Ramesh (2016) compared large-cap and diversified equity funds, concluding that large-cap funds are more resilient during market declines and are a better fit for risk-averse investors. More recently, studies like that of Patel & Patel (2020) , have evaluated large-cap funds in the post-2018 SEBI reclassification era, which required clearer fund type categorization. This research revealed that while many large-cap funds offer moderate returns, their performance can vary depending on management style, stock selection, and expense ratio.

IV. Research Methodology

This study employs a comparative quantitative methodology, utilizing secondary performance data from nine selected large-cap mutual fund regular plan schemes. The analytical framework relies on a multi-dimensional review of risk and return parameters, specifically Standard Deviation, Sharpe Ratio, Sortino Ratio, Beta, Alpha, Information Ratio, and R-Squared. This comprehensive approach allows for the identification of anomalies—such as high-risk funds with negative Alpha—and provides a technical basis for recommending schemes that maximize risk-adjusted efficiency within the large-cap equity category.

To facilitate a professional-grade assessment, the following quantitative metrics are utilized:

- **Alpha:** An absolute measure of a fund's over-performance relative to a benchmark. A positive Alpha signifies value-add by the manager, while a negative Alpha indicates a failure to capture benchmark returns.
- **Beta:** A measure of systematic risk or sensitivity to market movements. A Beta below 1.0 suggests the fund is less volatile than the index, a strategy often employed to de-risk a portfolio.

- **Sharpe Ratio:** This metric calculates the risk-adjusted return relative to the fund's total volatility (Standard Deviation). A higher value indicates superior efficiency in generating returns per unit of total risk.
- **Sortino Ratio:** A refinement of the Sharpe Ratio that penalizes only downside volatility. This is a critical metric for evaluating capital preservation during bearish market phases.
- **Information Ratio (IR):** This identifies the consistency of a manager's outperformance. Calculated as Alpha divided by the "Tracking Error" (the volatility of the excess returns), a higher IR indicates a high probability of repeating past outperformance.

V. Data Analysis and Interpretation

The performance data for the selected schemes is synthesized in the following table:

Table : 1

Performance of selected funds

Funds	Riskometer	SD	Sharpe	Sortino	Beta	Alpha	IR	R-Squared
Aditya Birla Sun Life Large Cap Fund - Regular Plan	Very High	11.57	0.81	1.23	0.97	0.04	-0.15	0.98
Axis Large Cap Fund - Regular Plan	Very High	11.04	0.64	0.92	0.90	-1.67	-0.85	0.93
DSP Large Cap Fund - Regular Plan	Very High	10.85	1.04	1.83	0.88	2.87	0.47	0.91
Franklin India Large Cap Fund - Regular Plan	Very High	11.40	0.76	1.14	0.95	-0.40	-0.40	0.96
HDFC Large Cap Fund - Regular Plan	Very High	11.26	0.88	1.27	0.93	0.96	0.12	0.95

ICICI Prudential Large Cap Fund	Very High	10.98	1.06	1.62	0.91	2.94	0.75	0.95
Kotak Large Cap Fund - Regular Plan	Very High	11.53	0.83	1.14	0.97	0.30	-0.02	0.98
Nippon India Large Cap Fund	Very High	11.37	1.12	1.62	0.93	3.72	1.07	0.94
SBI Large Cap Fund	Very High	10.98	0.80	1.26	0.91	0.06	-0.31	0.95

Data Source ; value research online

Volatility and Market Sensitivity Analysis:

The Standard Deviation ranges from 10.85 to 11.57, with DSP Large Cap Fund - Regular Plan emerging as the most stable (10.85) and Aditya Birla Sun Life Large Cap Fund - Regular Plan as the most volatile (11.57). Notably, all funds maintain a Beta below 1.0 (0.88 to 0.97), indicating a universal trend of de-risking relative to the benchmark. However, high R-Squared values (0.91 to 0.98) suggest varying levels of "closet indexing." Funds like Aditya Birla Sun Life and Kotak Large Cap Fund - Regular Plan (0.98) are almost entirely dictated by market movements, whereas DSP (0.91) demonstrates higher active management potential.

Excess Return and Efficiency Analysis

The data reveals a stark divergence in managerial skill. Nippon India Large Cap Fund leads with an Alpha of 3.72, nearly 5.39 percentage points higher than Axis Large Cap Fund - Regular Plan (-1.67). While many funds maintain high risk, only a select few—Nippon India, ICICI Prudential, and DSP—successfully translate that risk into significant Alpha.

Alpha in Performance

Alpha represents the value a fund manager adds (or subtracts) relative to a benchmark's return. It is a direct indicator of excess performance.

- Positive Alpha and High Performance: Funds with high positive Alpha values typically demonstrate superior risk-adjusted performance. For example, Nippon India Large Cap Fund has the highest Alpha in the list (3.72), which correlates with its top-tier Sharpe Ratio (1.12) and Sortino Ratio (1.62). Similarly, ICICI Prudential Large Cap Fund (Alpha 2.94) and DSP Large Cap Fund (Alpha 2.87) both show strong Sharpe Ratios above 1.00.

- Negative Alpha and Underperformance: Conversely, a negative Alpha indicates the fund has underperformed its benchmark. Axis Large Cap Fund, which has the lowest Alpha (-1.67), also has the lowest Sharpe Ratio (0.64) and Information Ratio (-0.85) in the group.

Beta in Performance

Beta measures a fund's sensitivity to market movements. A Beta of 1.0 indicates the fund moves in line with the market.

- Market Sensitivity: Most funds in this list have a Beta close to 1 (ranging from 0.88 to 0.97), suggesting they generally follow market trends.
- Beta and Risk-Adjusted Returns: A lower Beta can sometimes lead to better risk-adjusted performance if the fund still generates high Alpha. For instance, DSP Large Cap Fund has the lowest Beta (0.88) but maintains a high Sharpe Ratio (1.04) due to its strong Alpha. This indicates that the fund is achieving high returns while being less sensitive to overall market volatility.

Sharpe and Sortino ratio

The significance of the Sharpe Ratio and Sortino Ratio rankings lies in their ability to measure how efficiently a fund manager generates returns relative to the risks taken. While all the large-cap funds in the source are classified as having "Very High" risk, these ratios help distinguish which funds are providing the best "bang for the buck."

1. Sharpe Ratio Rankings

The Sharpe Ratio measures the excess return of a fund per unit of its **total risk** (standard deviation).

- **Efficiency Benchmark:** A higher Sharpe Ratio indicates that a fund is more efficient at generating returns for every unit of volatility it experiences.
- **Top Performer:Nippon India Large Cap Fund** ranks highest with a Sharpe Ratio of **1.12**, meaning it provides the best risk-adjusted return relative to its overall volatility compared to the other funds listed.
- **Lower Efficiency:Axis Large Cap Fund** ranks lowest with a ratio of **0.64**, suggesting that its investors are not being compensated as effectively for the volatility they endure.

2. Sortino Ratio Rankings

The Sortino Ratio is a variation of the Sharpe Ratio that only considers downside risk (negative volatility) rather than total volatility.

- **Focus on Capital Protection:** This ranking is significant because it tells investors how well a fund protects their capital during market downturns. A higher Sortino Ratio suggests the fund has achieved higher returns without excessive harmful volatility.

- **Superior Downside Management:** Interestingly, while Nippon leads the Sharpe rankings, DSP Large Cap Fund leads the Sortino rankings with a score of 1.83. This indicates that although DSP may have slightly more total volatility than Nippon, it is the most effective at managing and avoiding large negative returns.
- **Identifying Weakness:** Again, Axis Large Cap Fund sits at the bottom with a Sortino Ratio of 0.92, which, being below 1.0, suggests it is less effective at shielding investors from downside risk compared to its peers.

R-Squared :.

R-Squared reveals the degree to which a fund's movements can be explained by movements in its benchmark index. In the context of these large-cap funds, R-Squared values provide critical insights into how closely they track the market versus how much their performance depends on the manager's unique stock selection.

Based on the data provided, here is what R-Squared reveals about these funds:

1. High Correlation with the Benchmark

All the funds in this list have very high R-Squared values, ranging from **0.91 to 0.98**. This indicates that between **91% and 98%** of these funds' returns are dictated by the performance of their benchmark index. This is typical for large-cap funds, which generally invest in the same major stocks that make up the broader market indices.

2. Reliability of Beta and Alpha

Because the R-Squared values are so high (mostly above 0.90), it reveals that the Beta and Alpha figures for these funds are highly reliable. A high R-Squared confirms that the Beta accurately reflects the fund's market sensitivity and the Alpha accurately reflects the value added by the fund manager relative to the benchmark.

3. Active Management vs. Index Tracking

The subtle differences in R-Squared values highlight which managers are diverging more from the benchmark:

- **Closest to the Benchmark:Aditya Birla Sun Life Large Cap** and **Kotak Large Cap** both have an R-Squared of **0.98**. This reveals that these funds are almost entirely driven by market movements, with only 2% of their performance attributable to unique stock picking or active management strategies.
- **Highest Active Component:DSP Large Cap Fund** has the lowest R-Squared at **0.91**. While still highly correlated to the market, this lower value suggests that 9% of its performance is due to the manager’s specific investment choices outside of the benchmark's influence. This correlates with the fund having the lowest Beta (0.88) and a strong Alpha (2.87).

Table - 2

Summary of R-Squared Rankings

Fund Name	R-Squared	Implication
Aditya Birla Sun Life / Kotak	**0.98**	Extremely high correlation; performance almost mirrors the benchmark.
HDFC / ICICI / SBI	**0.95**	High correlation; 5% of performance is due to manager's active choices.
Nippon India	**0.94**	Strong correlation; justifies its high Alpha as a reliable metric of skill.
DSP Large Cap	**0.91**	Lowest correlation in the group; indicates the most active management style relative to the index.

Data Source: value research online

Top Performers (High Risk-Adjusted Returns)

These funds demonstrate the best ability to generate excess returns for the volatility they take on:

- **Nippon India Large Cap Fund:** This fund leads the group with the highest Sharpe Ratio (1.12) and Information Ratio (1.07), indicating it provides the best return per unit of total risk and the most consistent outperformance relative to its benchmark.
- **DSP Large Cap Fund:** While its Sharpe Ratio (1.04) is slightly lower than Nippon's, it boasts the highest Sortino Ratio (1.83) in the list. This suggests it is particularly effective at managing downside risk while generating returns.
- **ICICI Prudential Large Cap Fund:** This fund also shows strong risk-adjusted performance with a Sharpe Ratio of 1.06 and a Sortino Ratio of 1.62, supported by a healthy Information Ratio of 0.75.

Moderate Performers

These funds provide mid-range risk-adjusted returns compared to the leaders:

- **HDFC Large Cap Fund:** Shows a respectable Sharpe Ratio (0.88) and Sortino Ratio (1.27), with a positive Information Ratio (0.12), suggesting it slightly outperforms its benchmark on a risk-adjusted basis.
- **Kotak, Aditya Birla Sun Life, and SBI Large Cap Funds:** These three funds cluster together with Sharpe Ratios between 0.80 and 0.83. Their Sortino Ratios (1.14 to 1.26) and near-zero or negative Information Ratios suggest they are performing closer to their benchmarks rather than significantly exceeding them after adjusting for risk.

Lower Performers (Low Risk-Adjusted Returns)

These funds have the lowest efficiency in turning risk into returns according to the source:

- **Franklin India Large Cap Fund:** This fund has a Sharpe Ratio of 0.76 and a negative Information Ratio (-0.40), indicating that its returns have not adequately compensated for the risk taken relative to the benchmark.
- **Axis Large Cap Fund:** This fund has the weakest risk-adjusted profile in the dataset, with the lowest Sharpe Ratio (0.64), Sortino Ratio (0.92), and Information Ratio (-0.85).

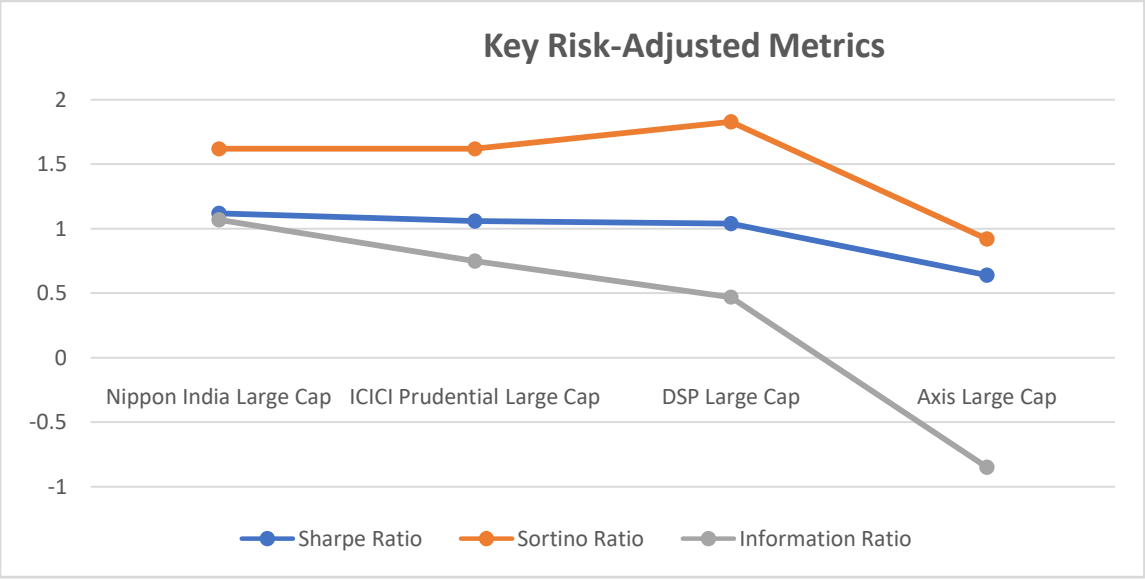
Table : 3

Summary Table of Key Risk-Adjusted Metrics

Fund Name	Sharpe Ratio	Sortino Ratio	Information Ratio
Nippon India Large Cap	**1.12**	1.62	**1.07**
ICICI Prudential Large Cap	1.06	1.62	0.75
DSP Large Cap	1.04	**1.83**	0.47
Axis Large Cap	0.64	0.92	-0.85

Data Source: value research online

Chart : 1



VI. Findings and Comparative Performance

Top Risk-Adjusted Performers

Nippon India Large Cap Fund and **ICICI Prudential Large Cap Fund** stand out as the primary choices for risk-adjusted efficiency. Nippon India records the highest Sharpe Ratio (1.12), closely followed by ICICI Prudential (1.06). Their ability to maintain high returns relative to their volatility profiles makes them superior vehicles for capital appreciation.

Superior Alpha Generation and Consistency

The leaders in active value creation are **Nippon India** (3.72 Alpha), **ICICI Prudential** (2.94 Alpha), and **DSP Large Cap** (2.87 Alpha). Nippon India's performance is particularly noteworthy due to its Information Ratio of 1.07, indicating that its outperformance is highly consistent and not merely the result of a few lucky market swings.

Downside Protection

For risk-averse investors, **DSP Large Cap Fund - Regular Plan** is the defensive benchmark. It boasts the highest Sortino Ratio (1.83) in the group despite having a lower Alpha than Nippon India. This suggests that while it may not capture the full upside of an aggressive rally, it manages downward volatility with significantly more precision than its peers.

Underperformance Observations

Axis Large Cap Fund - Regular Plan and **Franklin India Large Cap Fund - Regular Plan** are notable for their inability to generate positive Alpha (-1.67 and -0.40 respectively). Despite their "Very High" risk designation, their negative Information Ratios (-0.85 and -0.40) indicate a consistent failure to beat the benchmark, suggesting that investors in these funds are assuming significant risk without the commensurate reward.

VII. Conclusion and Investment Implications

The results of this study underscore a critical axiom in quantitative finance: a "Very High" risk profile on a Riskometer does not inherently equate to high returns. The disparity between the Alpha of Nippon India (3.72) and Axis (-1.67) highlights the risk of selecting underperforming active managers in the large-cap space.

For investors seeking aggressive growth, the Nippon India Large Cap Fund emerges as a recommended option due to its superior Alpha and high Information Ratio, which indicate consistent outperformance against the benchmark. On the other hand, for those preferring a more defensive growth strategy, the DSP Large Cap Fund – Regular Plan stands out as the

optimal choice, as it prioritizes downside protection, supported by its leading Sortino Ratio and lowest Standard Deviation among peers. At the same time, investors must exercise critical judgment while selecting funds, particularly avoiding those with high R-Squared values coupled with negative Alpha, such as Franklin India, since these funds tend to combine the risks of active management with the inefficiencies of passive returns. Therefore, using both Sharpe and Sortino ratios together remains one of the most effective approaches for evaluating the stability and performance consistency of large-cap equity investments.

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