

COMPARATIVE PERFORMANCE ANALYSIS OF ACTIVE AND PASSIVE MUTUAL FUNDS IN INDIA

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EXECUTIVE SUMMARY

The Indian mutual fund industry has grown at an unprecedented pace in the last decade, with AUM levels hitting new heights and retail investor participation in the industry growing at a faster pace via the systematic investment plan route. In this expansion, one of the perennial strategic conundrums for individual investors is whether to invest in actively managed equity funds with higher fees that aim to outperform a benchmark or in passively managed index funds that track a benchmark like the NIFTY 50 at a much lower cost. This study aims to answer this question by conducting an empirical comparison between selected active and passive mutual funds in India.

The research is based on real-time NAV data from the official records of the Association of Mutual Funds in India (AMFI) via the public mfapi.in interface. The validated and pre-processed sample is a sample of 5 passive index funds and 4 large cap equity funds, with Nippon India ETF Nifty BeES as the benchmark. The analysis includes 1,304 trading days between August 2017 and August 2022, which includes the market shock and recovery from the COVID-19 pandemic. The metrics which are used for the evaluation of performance are a rich ¹³ set of metrics – Compound Annual Growth Rate, annualised volatility, Sharpe ratio, maximum drawdown, beta, and Total Expense Ratio. Independent two-sample t-tests are used to make statistical inferences at a 5 per cent significance level.

The empirical results show that, on average, active funds provided a CAGR of 11.95 per cent compared to 9.98 per cent for passive funds, and had slightly lower volatility as well as a better mean Sharpe ratio. The differences in returns, risk, and risk-adjusted returns were not statistically significant, however. The only statistically significant differences found were in Total Expense Ratio: Active funds were about 1.49 percentage points more expensive per year. During the study period, none of the active funds outperformed NIFTY 50 index. The study finds that there is no statistically significant evidence of the active management premium in the large-cap segment of the Indian equity market and the significant cost disadvantage for the passive investment option is more favourable for long-term investors.

Contents

Declaration	i
Certificate	ii
Acknowledgement	iii
Executive Summary	iv
15 List of Tables	23 vii
List of Tables	vii
List of Figures	viii
List of Figures	viii
1 Introduction	1
1.1 Background of the Study	1
1.2 Problem Statement	3
1.3 Objectives of the Study	3
1.4 Scope of the Study	4
1.5 Structure of the Report	5
9 2 Literature Review	6
2.1 Introduction to the Literature	6
2.2 Theoretical Foundations	6
2.3 Empirical Evidence from Developed Markets	7
2.4 Empirical Evidence from the Indian Market	9
2.5 Performance Evaluation Metrics in the Literature	11
2.6 Research Gap.....	12
12 3 Research Methodology	14
3.1 Introduction	14
3.2 Research Design.....	14
3.3 Universe of Securities and Stock Selection	15

3.4	Data Collection: Sources and Approach.....	15
3.5	Data Pre-processing and Sample Realisation	16
3.6	Return Metrics.....	17
3.7	Risk Metrics	17
3.8	Risk-Adjusted Return: The Sharpe Ratio	18
3.9	Cost Metric: Total Expense Ratio.....	18
3.10	Statistical Hypothesis Testing Framework.....	18
3.11	Tools and Software Environment.....	19
3.12	Proposed Flowchart of the Research Methodology	19
3.13	Methodological Limitations.....	21
3.14	Summary	21
4	Case Study: Data Analysis, Findings, and Recommendations	22
4.1	Introduction to the Case.....	22
4.2	Realised Dataset	22
4.3	Fund-by-Fund Performance.....	23
4.4	Active versus Passive: Category Comparison.....	24
4.5	Statistical Hypothesis Test Results	24
4.6	Visualisation of Results	25
4.7	Discussion of Findings	26
4.8	Practical Recommendations.....	28
5	Conclusion	30
5.1	Overview of the Study.....	30
5.2	Summary of Key Findings.....	30
5.3	Theoretical Contributions	31
5.4	Practical Implications	32
5.5	Limitations of the Study	32
5.6	Directions for Future Research.....	33
5.7	The Future of Passive Investing in India.....	34
5.8	Implications for Retail Investors	35
5.9	Link with the Efficient Market Hypothesis.....	36
5.10	Concluding Remarks	36
	Bibliography	37

List of Tables

2.1	Recent Contributions to the Active–Passive Investment Debate (2015–2025)	8
2.2	Selected Empirical Studies from Developed Markets	9
2.3	Selected Empirical Studies on Indian Mutual Funds.....	11
2.4	Summary of Performance Evaluation Metrics.....	12
2.5	Research Gap Analysis: Position of the Present Study	13
3.1	Proposed Sample of Active and Passive Funds	15
4.1	Structure of the Realised Dataset.....	22
4.2	Performance and Risk Metrics for Each Fund.....	23
4.3	Category-Level Average Performance: Active vs Passive	24
4.4	Independent Two-Sample <i>t</i> -Test Results: Active vs Passive	25

List of Figures

3.1	Flowchart of the Research Methodology	20
4.1	Growth of 100 Invested: Active vs Passive Funds (Aug 2017 – Aug 2022). Steel-blue lines represent passive index funds, coral lines represent actively managed funds, and the bold black line represents the NIFTY 50 benchmark.	26
4.2	Risk versus Return Profile of the Sample Funds. Active funds are shown as coral circles, passive funds as steel-blue circles, and the NIFTY 50 benchmark as a black star	27
4.3	Active versus Passive: Category Averages on Four Dimensions, namely (i) CAGR, (ii) Annualised Volatility, (iii) Sharpe Ratio, and (iv) Total Expense Ratio. Each bar is annotated with its numeric value.	27

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

India's mutual fund industry did not always look the way it does today. Through most of the 1990s, it was a quiet corner of the financial system – a handful of public-sector schemes, modest retail participation, and very little product variety. That changed gradually, then quite rapidly. By the early 2020s, industry-wide assets under management (AUM) were breaking record after record Association of Mutual Funds in India (2024); Securities and Exchange Board of India (2024), and the monthly SIP (systematic investment plan) inflow figures had become a headline number that financial newspapers tracked with the same enthusiasm as the NIFTY index itself. This change was driven by regulatory reforms by the Securities and Exchange Board of India (SEBI), the increasing professionalization of the private sector asset management companies and the continuing expansion of the Indian capital market Sehgal and Jhanwar (2008); Tripathy (2017). Mutual funds were a new experience for the typical individual investor: a way to broaden the equity stakes in one's portfolio without a huge investment or expert knowledge Bodie et al. (2014).

The two contrasting philosophies in equity markets clash within equity mutual funds for the same investor's money. The first is called *active management* and is based on the notion that by doing better research on securities, by selecting securities better and better timed, and by positioning the portfolio better and better, a skilled portfolio manager can outperform the investor, whose returns are determined by the benchmark index. The first is called *active management* and posits that a skilled portfolio manager, through better research on securities, by better selection and better timing of securities, and by better timing of the portfolio, can outperform the investor whose returns are determined by the benchmark index. With the second philosophy, rooted in the Efficient Market Hypothesis (EMH), Fama (1970); Malkiel (2003) it is generally believed that any manager with the objective of outperforming a broad market index on a risk-adjusted basis has a very difficult time doing so consistently. Passive products are designed to replicate a benchmark (usually NIFTY 50 or BSE Sensex) at the cheapest possible operating cost, as opposed to attempting to outsmart the market. These products can take two forms: Index mutual funds and exchange-traded funds

(ETFs) in India.

There are significant consequences in opting for either one of these two approaches. The total expense ratio (TER) of an active fund in India is generally 1.5 to more than 2.0 per cent per year, whereas passive index funds and ETFs are more likely to have a TER of between 0.05 and 0.30 per cent per year. Active funds in India usually have a Total Expense Ratio (TER) ranging from 1.5 to more than 2.0 per cent per annum, whereas passive index funds and ETFs typically have a much lower TER, between 0.05 and 0.30 per cent per annum. Over 20 or 30 years, that can eat up a considerable share of an investor's end-of-period assets. So, whether the additional returns that active management offers are sufficient to warrant this cost premium is one of the more serious financial decisions which a long-term retail investor in India has to make.

Over the last more than 50 years, there has been international evidence building on this question. Beginning with Jensen's Jensen (1968) early work and continuing through Carhart Carhart (1997), Fama and French Fama and French (2010), and the regularly published SPIVA scorecards from S&P Dow Jones Indices S&P Dow Jones Indices (2023), study after study in the United States and the United Kingdom has reached the same uncomfortable conclusion for active fund managers: the average fund, net of fees, does not beat its benchmark with any consistency. That finding has fuelled a large-scale rotation of institutional and retail capital out of active vehicles and into low-cost index products over the past two decades. Whether India will follow the same path is, however, a genuinely open question. Emerging markets are generally considered less informationally efficient than mature developed markets Poshakwale (1996); Gupta and Aggarwal (2018), and the Indian equity market in particular has a distinctive character – patchy analyst coverage across the capitalisation spectrum, strong retail participation, and meaningful sectoral concentration in the benchmark indices – that may create more room for active managers to add value than the US evidence would suggest. Testing this empirically, using Indian data, is what this study sets out to do.

The present study therefore undertakes a comparative empirical examination of selected active and passive mutual funds operating in the Indian large-cap equity space over a defined sample period. NAV data is drawn directly from the official records of the Association of Mutual Funds in India (AMFI) and standard quantitative performance and risk metrics are applied, with the aim of producing findings that are grounded, replicable, and practically useful to retail investors, financial advisers, and researchers.

1.2 Problem Statement

The question for any Indian retail investor considering equity exposure via mutual funds is simple but hard to answer: *Should the investor invest in an actively-managed equity fund with the hope of doing better than the benchmark, or an index fund, with the understanding that he will do worse than the benchmark?*

One of the challenges is that raw returns are not a perfect basis of comparison. What can be easily convincing when considering the mean return of two funds can be very different when volatility, maximum drawdown, and downside risk are taken into account. There is also the fee issue: the spread between active and passive products is huge, persists, but its importance is dependent on the investment time horizon, the gross alpha the active manager delivers and on the returns of the market over the investment time horizon. Another is that even comparing a few of the better known funds informally may be misleading, for the picture can turn out to be different when formal statistical testing is applied to a properly constituted sample. In the Indian context, relatively few longitudinal academic studies are available which used domestic data, adjusted for the concentration of benchmarks, and were able to measure a type of volatility shock that occurred at the onset of the COVID-19 pandemic in early 2020.

This is the gap that this paper seeks to fill by providing an empirical evaluation that simultaneously covers the following points: (a) the use of actual NAV data from the official AMFI repository, rather than relying on convenient return figures; (b) the calculation of all the standard performance and risk metrics, rather than individual return numbers; (c) the use of formal statistical hypothesis testing to see if any differences observed in the categories are real or just statistical artefacts of small samples; and (d) the presentation of these findings in such a way as to provide actionable advice to the retail investor.

1.3 Objectives of the Study

Based on the problem stated above, the study has the following specific objectives:

1. To compare the historical returns of selected active and passive Indian mutual fundss with the NIFTY 50 benchmark over the given sample period with the help of Compound Annual Growth Rate (CAGR) and total return as the primary return measures.

2. **To measure the risk profile of these funds** using annualised volatility, maximum drawdown and beta against the benchmark (both total and systematic risk is considered in these measures).
3. **To compare the risk-adjusted performance of the funds (Sharpe ratio)** to see if any advantage in return justifies the extra risk the investor takes.
4. **To analyze cost structure of active and passive funds** and to determine the cost gap that the active investor willingly incurs.
5. **Test to determine, using formal statistical hypothesis testing**, if the difference in returns, risk, risk adjusted return and cost between the two categories is statistically different at the conventional levels.
6. **To support drawing evidence-based inferences and practical recommendations** for the retail investor in India with mutual funds, in this context of data limitations and sample taken.

1.4 Scope of the Study

This research has four aspects: the temporal aspect, the asset aspect, the method aspect and the audience aspect.

Temporal scope. The daily NAV data is taken from 7 August 2017 to 7 August 2022, which gives 1304 trading observations. As described in Chapter 3 the window was determined endogenously by the availability of data from all funds in the sample that had overlapping data. It spans the entire market cycle: moderate bull market growth 2017-2019, the dramatic drawdown during the Covid pandemic in early 2020, and the dramatic rally from lows in early 2020 followed by consolidation and volatility through 2022.

Asset scope. The study covers five passive funds that all follow the NIFTY 50 and four active equity funds from the large-cap sector where active and passive products compete head-on. The Nippon India ETF Nifty BeES is used as the benchmark as it is the most liquid Nifty 50 ETF in Indian market. Being more specific about large-cap versus multi-cap, mid-cap and thematic funds is intentional as it establishes a comparison universe where both types of funds have a similar mandate for broad exposure to large Indian companies similar to the ones included in the NIFTY 50.

Methodological scope. The research method used is empirical and quantitative, using the usual tools of investment performance evaluation. It does not include factor-

decomposition¹¹ models (e.g. the Fama-French three factor model and the Carhart four factor model) nor do it include macro economic conditioning variables or fund manager survey data or behavioural variables. These are left for future work.

Audience scope. The study is primarily relevant for retail investors and financial advisers in India, and to some extent for academic research in finance and capital market studies. It does not constitute investment advice and the results of this report should be read in conjunction with Chapter 4.

1.5 Structure of the Report

The rest of this report has four further chapters. In Chapter 2 we review the academic literature, and present a discussion of the theory of the active versus passive debate, followed by the empirical evidence from developed markets and from India. Chapter 3 describes the²⁷ research methodology including the sources of the data, the sample size, the development of each of the performance metrics, and the statistical testing procedures.. Chapter 4 presents the empirical findings – fund-level performance results, the aggregate category comparison, the formal hypothesis tests, and a discussion of what the findings mean in practice. Chapter 5 closes the study with a summary of findings, an account of⁷ limitations, and directions for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction to the Literature

Few questions in finance have attracted as sustained or as contentious a body of research as the debate over active versus passive fund management. The literature now spans more than five decades, drawing on portfolio theory, asset pricing, and market efficiency – and it has produced a body of evidence that, while not entirely one-sided, tilts in a fairly consistent direction. This chapter maps the principal contributions. Section 2.2 covers the theoretical foundations. Section 2.3 reviews what the developed-market evidence shows. Section 2.4 turns to the Indian evidence, which is more limited and more mixed. Section 2.5 summarises the performance evaluation toolkit that the literature has developed. Section 2.6 identifies the specific gaps that motivated this study.

2.2 Theoretical Foundations

The intellectual foundations of the active-passive debate trace back to Markowitz (1952, 1959), whose Modern Portfolio Theory (MPT) established that portfolio risk is not merely the sum of individual security risks – it depends on the covariance structure of returns across holdings. Diversification helps to remove unsystematic risk without the need to sacrifice returns in proportion. That realization led to the concept of index-based investing: If unsystematic risk is diversifiable, and if market prices are on the whole correct, the next query is whether active stock picking is beneficial after fees.

Building on MPT, Sharpe (1964), Lintner (1965), and Mossin (1966) independently developed the Capital asset pricing model (CAPM), which is a formalisation of the relationship between expected return and systematic (non-diversifiable) risk, was developed independently by CAPM. Under CAPM's assumptions, all rational investors would hold the same risky portfolio – the market portfolio itself – in combination with the risk-free asset. This provided passive investing with a theoretical basis: In an equilibrium world, the optimal risky portfolio consists of only the market.

Later, Sharpe's paper Sharpe (1966) was published, which defined the Sharpe ratio

⁵ as the difference between the portfolio return and the risk-free rate divided by the portfolio's standard deviation. It emerged as the single-number measure of risk-adjusted performance and continues to be so today and is the measure used throughout the present study.

This is the Efficient Market Hypothesis (EMH) of Fama Fama (1970, 1991) which, as the name suggests, has a strong theoretical argument against active management. If prices already reflect all available information, then consistently beating the market – net of costs – reduces to either luck or the assumption of additional risk. Fama's taxonomy of efficiency distinguishes three forms: ³ weak (prices reflect past prices), semi-strong (prices reflect all public information), and strong (prices reflect all information, public and private) Malkiel (2003). The semi-strong form is the most operationally relevant for evaluating large-cap active management.

Multi-factor extensions of CAPM added further nuance. Along with ⁶ the market factor, the Fama-French three factor model Fama and French (1993) found that value (HML) and size (SMB) were priced risk factors. Carhart Carhart (1997) included a momentum factor. The Profitability (RMW) and the Investment (CMA) factors were later added by ⁶ the Fama-French five-factor model F. and French (2015). These frameworks have given a more precise sense of a systematic risk, and provided a more stringent standard by which active managers have to prove their true skill.

The most important theoretical works that are pertinent to this study have been summarized below in Table ??.

2.3 Empirical Evidence from Developed Markets

The picture is striking, when moving from theory to data. Jensen Jensen (1968) studied 115 mutual funds in the U.S. from 1945 to 1964, and concluded that the average fund failed to earn positive risk-adjusted returns after fees. In fact, there was little evidence of continuous outperformance by individual managers – a surprising result, which has now been widely replicated.

Carhart Carhart (1997) expanded the analysis to a sample of equity funds in the United States from 1962 to 1993 that was survivorship-bias corrected. He's come to the following conclusion, which is to the point: "Momentum factor is largely responsible for persistence in these performances as are expense ratios. Even when the gross returns of the high-cost active funds seemed to be impressive, their performance was not that good. It has since become one of the key empirical findings in the active-

Table 2.1. Recent Contributions to the Active–Passive Investment Debate (2015–2025)

Author(s)			Year	Central Contribution
Fama	and	French	2015	Introduced the Five-Factor Asset Pricing Model by incorporating profitability and investment factors.
Fama	and	French	2016	Demonstrated that the five-factor model explains many anomalies previously attributed to active management skill.
Fama	and	French	2017	Validated the five-factor model across major international equity markets.
Harvey et al. (2016)			2016	Proposed higher statistical standards for identifying genuine investment factors and manager skill.
Cremers et al. (2019)			2016	Reassessed evidence on active management and argued that some measures underestimate active manager skill.
Patton et al. (2019)			2019	Advanced Expected Shortfall modelling, improving modern risk-adjusted performance evaluation.
Hu et al. (2019)			2019	Examined the applicability of Fama–French factors in emerging markets, highlighting market-specific effects.
Bali et al. (2019)			2019	Provided updated empirical methods for performance measurement, risk modelling and asset pricing analysis.
Arnott et al. (2019)			2019	Reviewed evolving challenges in asset pricing and portfolio management in increasingly efficient markets.
Roy and Shijin (2018)			2018	Proposed a six-factor asset pricing model extending the Fama–French framework with human capital risk.

passive literature that fees are first order factors affecting net outcome.

Fama and French (2010) took a different approach in their 2010 study, applying a bootstrap simulation to US mutual fund returns from 1984 to 2006 to separate skill from chance. Their finding was sobering: after costs, the distribution of fund alphas was nearly indistinguishable from what one would expect if zero managers had genuine skill. A very small tail of funds appeared to add enough value to cover their fees. The rest did not.

Malkiel (2003) surveyed the accumulated evidence on market efficiency and active management and found the case for low-cost passive investing to be substantially supported by the data across decades of US market history. The annual SPIVA scorecards published by S&P Dow Jones Indices S&P Dow Jones Indices (2023) have continued to document this finding on a rolling basis: over horizons of fifteen years or more, between 85 and 90 per cent of large-cap US active funds underperform the S&P 500.

These findings are summarised in Table 2.2.

Table 2.2. Selected Empirical Studies from Developed Markets

Author(s)		Year	Sample Period	Key Finding
Jensen	Jensen	1968	1945–1964 (US)	Average mutual fund did not earn positive net-of-fee alpha; weak persistence.
Carhart	Carhart	1997	1962–1993 (US)	Persistence explained by momentum and costs, not skill.
Malkiel	Malkiel	2003	Multi-decade (US)	Strong empirical case for low-cost passive investing.
Fama & French	Fama and French	2010	1984–2006 (US)	After costs, fund alpha distribution close to zero-skill null.
SPIVA S&P Dow Jones	S&P Dow Jones Indices	2023	Rolling 15+ years	85–90% of US large-cap funds underperform S&P 500 over long horizons.

2.4 Empirical Evidence from the Indian Market

India’s empirical record on active fund performance is thinner than that of the US or UK, but it has expanded considerably over the past two decades and the findings are increasingly nuanced.

Sapar and Madava Sapar and Madava (2003), in one of the earliest systematic Indian studies, evaluated 58 mutual fund schemes over 1999–2002 using Sharpe, Treynor,

and Jensen measures. They found that a meaningful proportion of Indian funds outperformed their benchmarks on a risk-adjusted basis. Their explanation was market inefficiency: at that stage, the Indian equity market had enough informational gaps that skilled managers could plausibly exploit them.

Sehgal and Jhanwar Sehgal and Jhanwar (2008) examined performance persistence over a longer sample. Their finding was that persistence was weak and confined largely to the very short run – past winners did not reliably remain winners, which undermines the case for using historical rankings as a guide to fund selection.

Tripathy Tripathy (2017) took a factor approach and found that expense ratio, fund size, and portfolio turnover were statistically significant determinants of net-of-fee performance. The negative association between TER and net return is consistent with what the developed-market literature shows, and is probably the most robust finding in the Indian mutual fund performance literature.

Gupta and Aggarwal Gupta and Aggarwal (2018) compared active and passive equity funds over 2007–2017, a period when both categories had sufficient data for meaningful comparison. They found that actively managed funds did deliver marginally higher gross returns on average, but the fee differential almost entirely eroded this advantage at the net-of-fee level. Their conclusion was that the case for active management had weakened considerably since the earlier Sapar-Madava period.

More recent work by Pandow and Butt Pandow and Butt (2017) and Kumar and Sharma Kumar and Sharma (2020) has broadly confirmed the trend toward a narrowing active-passive differential, particularly in the large-capitalisation segment, as institutional participation in the Indian market has deepened and analyst coverage has grown. Extending the evidence base further, Khurana and Tripathi Khurana and Tripathi (2023) evaluated Indian mutual funds over 2018–2022 using Sharpe, Treynor, and Jensen measures and found considerable variation in risk-adjusted performance across schemes, while Bouddha and Manjunath Bouddha and Manjunath (2024) documented notable differences in return, risk, and performance consistency across selected large-cap schemes in a more recent sample.

Table 2.3 summarises the principal Indian studies and their findings.

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The picture that emerges from this body of work is more complicated than the US evidence would suggest. There is some historical record of active outperformance in India – particularly in earlier periods and in less informationally competitive segments

Table 2.3. Selected Empirical Studies on Indian Mutual Funds

Reference	Year	Sample Period	Key Finding
Sapar and Madava (2003)	2003	1999–2002	A meaningful share of Indian funds outperformed benchmark on a risk-adjusted basis.
Sehgal and Jhanwar (2008)	2008	Multi-year	Persistence of performance was weak and short-term in nature.
Tripathy (2017)	2017	Pan-Indian sample	Expense ratio, size, and turnover are significant determinants of net performance.
Pandow and Butt (2017)	2017	Multi-year	Updated evidence; mixed results across categories.
Gupta and Aggarwal (2018)	2018	2007–2017	Active gross returns were marginally higher; the net advantage was largely eroded by fees.
Kumar and Sharma (2020)	2020	Recent sample	Narrowing of active–passive differential, especially in the large-cap segment.
Khurana and Tripathi (2023)	2023	2018–2022	Evaluated Indian mutual funds using Sharpe, Treynor and Jensen measures and found considerable variation in risk-adjusted performance.
Bouddha and Manjunath (2024)	2024	Recent sample	Large-cap mutual funds exhibited notable differences in return, risk, and performance consistency across schemes.

like mid-cap and small-cap. But in the large-cap segment, which is the most heavily covered and most institutionally active part of the Indian market, the case for active management has eroded noticeably. This is the segment the present study focuses on.

2.5 Performance Evaluation Metrics in the Literature

The literature has produced a well-established toolkit of performance evaluation metrics. The subset used in this study is summarised in Table 2.4, with definitions and interpretive notes.

Each metric captures something different. The Sharpe ratio is the right tool when a portfolio is being assessed in isolation; the Treynor ratio becomes more informative when that portfolio sits within a broader diversified holding, because it measures excess return per unit of systematic – rather than total – risk. Jensen’s alpha, derived from CAPM, measures how much a manager returned above what a passive exposure to the same level of market risk would have delivered.

Table 2.4. Summary of Performance Evaluation Metrics

Metric		Definition	Interpretation
CAGR		Compound Annual Growth Rate over the holding period.	Annualised return; key for cross-fund comparison.
Annualised Volatility		Standard deviation of daily returns scaled by $\sqrt{252}$.	Total risk; higher value means more variable returns.
Sharpe Ratio		$(R_p - R_f) / \sigma_p$	Excess return per unit of total risk.
Sharpe (1966)			
Treynor Ratio		$(R_p - R_f) / \beta_p$	Excess return per unit of systematic risk.
Treynor (1965)			
Jensen's Alpha		Excess return over CAPM prediction.	Skill measure; positive value indicates outperformance.
Jensen (1968)			
Beta		$\text{Cov}(R_p, R_m) / \text{Var}(R_m)$	Sensitivity to benchmark; $\beta = 1$ means market-like.
Maximum Drawdown		Largest peak-to-trough decline.	Downside risk and tail-loss exposure.
Total Expense Ratio		Annual fund operating cost as % of AUM.	Direct deduction from gross investor returns.

Maximum drawdown has grown in prominence as a risk measure because it captures tail-loss exposure in a way that standard deviation does not. A fund with moderate volatility but a catastrophic drawdown during a market crisis tells a different story than its standard deviation would imply; the COVID-19 episode of early 2020 made this point vividly in the Indian context.

Total Expense Ratio is the simplest and in some ways the most important metric in this study. SEBI mandates its disclosure for all mutual fund schemes, it compounds directly against investor returns, and it is entirely within the investor's control at the time of fund selection. It is used throughout the literature as the primary cost measure.

2.6 Research Gap

Despite the body of work reviewed above, three specific gaps in the Indian literature are worth noting – and addressing.

The first concerns timing. Many of the earlier Indian studies with conclusions about large-cap active versus passive performance drew their samples from periods that ended before 2020. While more recent contributions by Khurana and Tripathi Khurana and Tripathi (2023) and Bouddha and Manjunath Bouddha and Manjunath (2024) do extend into the COVID-19 and post-COVID period, the overall body of Indian evidence still benefits from a study whose analytical window deliberately spans the full

COVID-19 shock – the worst market disruption of the past decade – and the subsequent recovery, providing a more demanding and realistic test of how both strategies perform across all market conditions, not only favourable ones.

A second gap lies in terms of methodological breadth. Much of the current Indian literature has focused on either return or risk, but not on all four aspects of return and risk, as well as returns/risk and cost within a single framework. There is a trend to partial analyses that can be misleading: a fund that seems to be doing well on returns may not be as appealing when fees and drawdown behavior are taken into account.

The third gap is the use of formal statistical testing. Descriptive comparisons of fund-level averages are common in the Indian literature, but they can be influenced by a small number of anomalous observations and do not, on their own, establish whether observed differences are genuine or statistically indistinguishable from zero. Category-level hypothesis tests, while standard in the developed-market literature, are less common in Indian studies.

Table 2.5 positions this study relative to representative prior work across these four dimensions.

Table 2.5. Research Gap Analysis: Position of the Present Study

Study	Recent Indian Data	Multi- Metric	Formal <i>t</i>-test	Includes COVID-19 Era
Sapar and Madava (2003)	No	Yes	No	No
Sehgal and Jhanwar (2008)	No	No	No	No
Tripathy (2017)	No	Yes	No	No
Pandow and Butt (2017)	No	Yes	No	No
Gupta and Aggarwal (2018)	No	Yes	No	No
Kumar and Sharma (2020)	Yes	Yes	No	No
Khurana and Tripathi (2023)	Yes	Yes	No	Yes
Bouddha and Manjunath (2024)	Yes	Yes	No	Yes
Present Study (2026)	Yes	Yes	Yes	Yes

This study addresses all three gaps by working with NAV data that spans the COVID-19 period, reporting a comprehensive set of performance and risk metrics, and applying independent two-sample *t*-tests to the category-level comparisons. The methodology used to operationalise this approach is set out in Chapter 3.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter sets out the research methodology in the detail necessary for the study to be understood and, if required, reproduced. The approach is empirical and quantitative. It's a strictly structured process: first identification of the funds to be studied, then gathering and cleaning NAV data, calculating performance and risk measures, and then applying statistical tests to decide if the observed differences between the two categories are real. Section 3.2 describes the overall research design. The universe of funds and how the sample was built is described in Section 3.3. The data source and the process of data collection are detailed in Section 3.4. In Section 3.5 the pre-processing and alignment steps are walked through. Each of the performance metrics is formally defined in Sections 3.6 through 3.9. We describe the hypothesis testing framework in Section 3.10. Section 3.11 lists the software used. The methodology is shown as a flowchart in Section 3.12. Section 3.13 records the limitations.

3.2 Research Design

Data used is secondary data and the research design is descriptive – analytical. It is descriptive because it describes the historical behaviour of funds according to various performance and risk measures. It is analytical in that it uses formal statistical inference in comparing cross-sectional differences between the categories. The unit of analysis is the individual mutual fund and the analytical comparison is performed between two predefined groups: the group of active funds, and the group of passive funds.

Very important, both these categories are compared with the NIFTY 50. Adopting a common external reference point enables the results to directly address the main research question: Do active management – after adjusting for risk assumptions and fees – actually produce better results than holding the market?

3.3 Universe of Securities and Stock Selection

India has thousands of mutual funds that come with a range of asset classes, investment styles and risk levels. In this universe, converting it to a subset where truly competitive active and passive products demands a principled filter. That filter comes from the large-cap equity segment. The large-cap active funds are required to beat the same index that NIFTY 50 index funds and ETFs follow. The Scheme categorisation guidelines by SEBI stipulate that large-cap active funds have to invest a minimum of 80 per cent in large-cap shares, thus doing the comparison direct and fair.

Three criteria were used for sample selection. For one thing, money was taken from existing asset managers that had long periods of time to build up NAV history. Newer funds were not included. Secondly, only those schemes were included which had NAV records in the AMFI repository continuously from the start of its operations. Third, the sample contained a balance of categories; there were five passive funds and five large-cap active funds that were first identified. The proposed sample is included in Tab. 3.1.

Table 3.1. Proposed Sample of Active and Passive Funds

No.	Fund Name	Category	AMFI Code
1	UTI Nifty 50 Index Fund	Passive	120716
2	HDFC Index Fund Nifty 50 Plan	Passive	101349
3	ICICI Pru Nifty 50 Index Fund	Passive	120586
4	SBI Nifty Index Fund	Passive	119551
5	Tata Nifty 50 Index Fund	Passive	125354
6	Mirae Asset Large Cap Fund	Active	118834
7	Axis Bluechip Fund	Active	120465
8	Kotak Bluechip Fund	Active	112090
9	Canara Robeco Bluechip Equity Fund	Active	118560
10	Nippon India Large Cap Fund	Active	118771
<i>Benchmark:</i>		Nippon India ETF Nifty BeES (100177)	

3.4 Data Collection: Sources and Approach

The Net Asset Value (NAV) data used in this study was obtained from the Association of Mutual Funds in India (AMFI), which is the official body responsible for publishing mutual fund information in India. AMFI regularly provides NAV data for all registered mutual fund schemes, making it a reliable source for mutual fund research. To collect the data, the study used the public API available at <https://api.mfapi.in>,

which provides AMFI mutual fund data in a structured JSON format. Using the AMFI scheme codes listed in Table 3.1, NAV data for each selected fund was retrieved through individual API requests.

The downloaded data included the date and corresponding NAV values for each fund. Requests were made one at a time with a short delay between them to ensure smooth access to the public service. The collected data was then used for further analysis of fund performance, risk, and return characteristics.

3.5 Data Pre-processing and Sample Realisation

The raw NAV data obtained from the API was subjected to the following pre-processing steps:

Step 1. Validation of completeness. The number of records in each fund was verified. Those funds with less than 500 observations were omitted because of a lack of history for the analytical horizon. At this point, one fund (Nippon India Large Cap Fund) was omitted, because its API endpoint only provide 170 observations at the time of retrieval.

Step 2. Type coercion and cleaning. The date fields were parsed as day-month-year fields. The numeric data types were used for NAV fields. Each row that contained a value that was missing or not parsable in either of the two fields was deleted and the rows were sorted by date in ascending order.

Step 3. Determination of the common analytical window. Since the funds in the sample had different inception dates, the analytical horizon was limited to the last five years for which all the funds had simultaneous data. Here, the window of August 2017 to August 2022 had that property – the earliest data cutoff was August 2022, with the latest fund inception date coming in December 2013 in the case of the Tata Nifty 50 Index Fund and Canara Robeco Bluechip Equity Fund. Usually, five years is the standard time period mentioned in the Indian mutual fund performance literature.

Step 4. Date-grid construction. A business day index was created throughout the analytical period. This was achieved by joining each fund's NAV series to this grid using a left join. In instances where a fund was unable to report a NAV on a particular business day, due to SEBI's forward pricing policy and the gaps in fund-reporting, the NAV of the preceding business day was used. The treatment is a forward fill which is often used in the literature and creates a balanced panel for cross-fund comparison.

Step 5. Sample realisation. Following the steps above, five passive funds, four active funds and the benchmark ETF were observed daily over 1,304 trading days in a final analytical sample. All analysis from here on is based on this realised sample.

3.6 Return Metrics

For each fund, two complementary return measures are computed.

The **Total Return** for the period is:

$$R_{\text{total}} = \frac{\text{NAV}_T - \text{NAV}_0}{\text{NAV}_0}, \quad (3.1)$$

where NAV_0 is the NAV at the beginning of the window, and NAV_T is the NAV at the end of the window.

The **Compound Annual Growth Rate (CAGR)** is used to convert the total return into an equivalent constant annual rate:

$$\text{CAGR} = \frac{\text{NAV}_T}{\text{NAV}_0}^{1/n} - 1, \quad (3.2)$$

where $n = T/252$ is the analytical horizon in years, with 252 trading days in a year.

3.7 Risk Metrics

Three measures characterise the risk profile of each fund.

Annualised volatility is the standard deviation of daily returns scaled to an annual basis:

$$\sigma_{\text{annual}} = \sigma_{\text{daily}} \cdot \sqrt{252}. \quad (3.3)$$

Maximum drawdown records the largest peak-to-trough loss in the fund's cumulative value. Let V_t denote the cumulative value at time t . The drawdown at t is:

$$D_t = \frac{V_t - \max_{s \leq t} V_s}{\max_{s \leq t} V_s}, \quad (3.4)$$

and the maximum drawdown is $\text{MDD} = \min_t D_t$.

Beta measures how sensitively a fund moves relative to the benchmark:

$$\beta = \frac{\text{Cov}(R_{\text{fund}}, R_{\text{bench}})}{\text{Var}(R_{\text{bench}})}, \quad (3.5)$$

where R_{fund} and R_{bench} are the respective return series.

3.8 Risk-Adjusted Return: The Sharpe Ratio

The Sharpe ratio Sharpe (1966) expresses excess return per unit of total risk:

$$S = \frac{R_p - R_f}{\sigma_p}, \quad (3.6)$$

where R_p is the fund's annualised return, R_f is the risk-free rate, and σ_p is annualised volatility. The risk-free rate is set at 6.5 per cent per annum, the approximate average yield on the 91-day Government of India Treasury Bill during the analytical period – the conventional proxy for the risk-free rate in Indian finance research.

3.9 Cost Metric: Total Expense Ratio

TER data were sourced from the most recent Scheme Information Documents published by each fund's asset management company on its website. A single representative annual TER figure is used per fund, in line with standard practice in this literature.

3.10 Statistical Hypothesis Testing Framework

To determine whether the differences between active and passive fund categories are statistically meaningful rather than artefacts of a small sample, an independent two-sample t -test is applied to each metric. Let μ_A and μ_P denote the population means for active and passive funds respectively. The null and alternative hypotheses are:

$$\begin{aligned} H_0 : \mu_A &= \mu_P \quad (\text{no difference between categories}), \\ H_1 : \mu_A &\neq \mu_P \quad (\text{a difference exists}). \end{aligned}$$

The null hypothesis is rejected if the resulting p -value falls below the conventional threshold of $\alpha = 0.05$. Separate tests are run for CAGR, annualised volatility, the Sharpe ratio, and the Total Expense Ratio.

3.11 Tools and Software Environment

All data processing and analysis for this study were carried out using Python 3.12 in the Google Colab environment. Python was selected because it provides efficient tools for data handling, statistical analysis, and visualization. The platform enabled the researcher to manage the dataset effectively and perform the required computations in a systematic manner.

The collected NAV data were first cleaned, validated, and organized to ensure consistency and accuracy. Thereafter, various performance measures such as Compound Annual Growth Rate (CAGR), annualised volatility, beta, maximum drawdown, and Sharpe ratio were calculated. These measures helped evaluate the return, risk, and risk-adjusted performance of the selected mutual funds.

To compare the performance of active and passive mutual funds, statistical hypothesis testing was conducted. The independent two-sample *t*-test was used to determine whether the observed differences between the two categories were statistically significant. This approach enhanced the reliability of the findings and reduced the possibility of drawing conclusions based solely on descriptive statistics.

Graphs and charts were also prepared to present the results in a clear and understandable manner. Visual representations made it easier to compare the performance of individual funds as well as the overall performance of active and passive fund categories.

Google Colab served as the computing environment for the study. Being a cloud-based platform, it provided easy access to computational resources and ensured that the entire analysis could be reproduced using the same dataset and methodology. Overall, the software tools used in this research supported efficient data collection, processing, statistical analysis, visualization, and interpretation of results.

3.12 Proposed Flowchart of the Research Methodology

The end-to-end methodological pipeline – from research objective formulation through to the production of findings – is presented in Figure 3.1. The flowchart includes eight phases and highlights the data and intermediate results that link them.

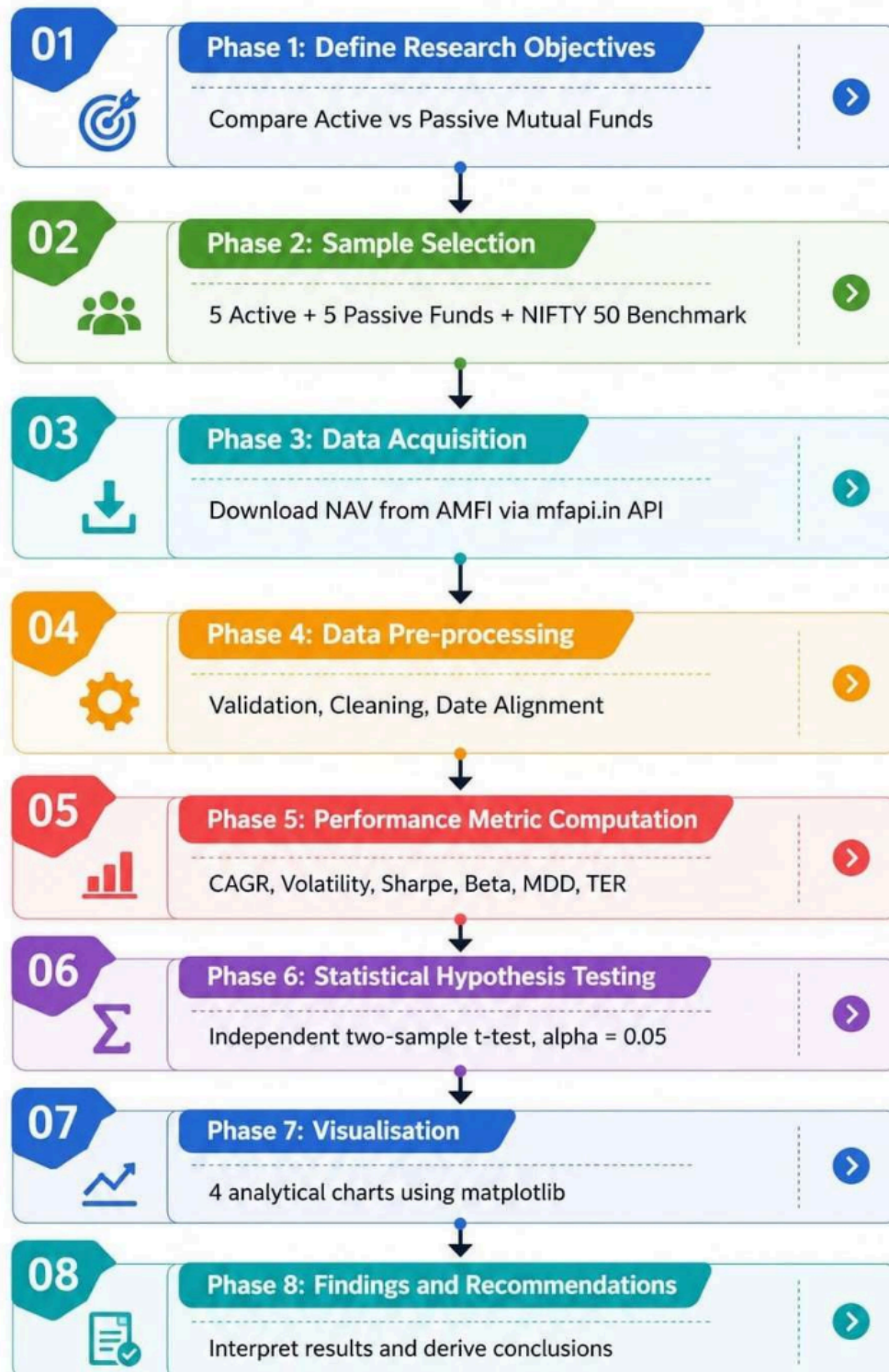


Figure 3.1. Flowchart of the Research Methodology

3.13 Methodological Limitations

There are four restrictions which need to be explicitly mentioned.

The first problem is that the sample is small. There are only four active funds and five passive funds providing limited power for the hypothesis tests; true differences in population means may not be detected at the 5 per cent level in a sample of this size.

Second, the five-year analytical window, while standard in the literature and while it does cover a complete market cycle, is shorter than the multi-decade horizons some researchers argue are needed to reliably distinguish skill from luck in active management.

Third, the study does not control for differences in factor exposures across the active funds. Two large-cap funds with formally identical mandates may differ in their tilt toward value, momentum, or small-cap stocks within the large-cap universe. Without factor adjustment, these differences are absorbed into the fund-level performance numbers.

Fourth, survivorship bias is partly – but not fully – controlled for. The sample includes only funds that operated continuously through the analytical window. Funds that were wound up or merged during the period, including potentially poor-performing active funds, are absent. In principle, this biases the active-category averages upward relative to what the full population would show.

These limitations are discussed further in Section 5.5.

3.14 Summary

This chapter has set out the empirical research design, the data sources, the pre-processing pipeline, the formal definition of each performance metric, the statistical testing framework, and the limitations of the methodology. The next chapter applies this methodology to the realised sample and reports the empirical findings.

CHAPTER 4

CASE STUDY: DATA ANALYSIS, FINDINGS, AND RECOMMENDATIONS

4.1 Introduction to the Case

This chapter applies the methodology from Chapter 3 to the realised sample and reports what the data show. Section 4.2 describes the final dataset. Section 4.3 presents fund-by-fund performance numbers. Section 4.4 aggregates these into a category-level comparison. Section 4.5 reports the statistical test results. Section 4.6 walks through the four main visualisations. Section 4.7 interprets the findings in the context of the Chapter 2 literature. Section 4.8 draws out practical recommendations.

4.2 Realised Dataset

The data collection and validation process described in Section 3.4 produced the analytical dataset described in Table 4.1. Five passive funds and four active funds form the core sample; Nippon India Large Cap Fund, originally included, was dropped during validation because its API endpoint returned only 170 observations – well below the 500-observation threshold. The benchmark ETF (Nippon India ETF Nifty BeES, AMFI code 100177) was retrieved without issue, with 4,948 daily NAV records covering 3 April 2006 to 8 May 2026.

Table 4.1. Structure of the Realised Dataset

Attribute	Value
Number of passive funds	5
Number of active funds	4
Benchmark	Nippon India ETF Nifty BeES
Analytical period	8 August 2017 – 7 August 2022
Number of trading days	1,304
Total fund-day observations	11,736
Source	AMFI India (via mfapi.in API)
Risk-free rate (assumed)	6.50 per cent per annum

The five-year analytical window from August 2017 to August 2022 contains three

economically distinct phases: a period of moderate expansion from 2017 to early 2020, the COVID-19-driven crash of February–March 2020 and the sharp recovery that followed, and then a consolidation period through 2022 marked by rising inflation and global monetary tightening. Having all three phases in the sample is methodologically useful—it gives a more honest test of how active and passive strategies hold up across varying market conditions than a benign bull-market window would.

4.3 Fund-by-Fund Performance

Table 4.2 scores feature the complete suite of performance and risk parameters for every fund in the sample. The sample was calculated using the formulas presented in 3.6 through 3.9.

Table 4.2. Performance and Risk Metrics for Each Fund

Fund Name	Cat.	CAGR (%)	Total Ret. (%)	Vol. (%)	Sharpe Ratio	MDD (%)	Beta	TER (%)
NIFTY 50 (NiftyBees ETF)	Bench.	19.37	150.01	19.52	0.67	-46.92	1.00	0.05
UTI Nifty 50 Index Fund	Passive	12.40	83.07	18.74	0.37	-38.42	0.64	0.20
HDFC Index Fund Nifty 50 Plan	Passive	11.82	78.30	18.60	0.35	-38.22	0.64	0.20
ICICI Pru Nifty 50 Index Fund	Passive	12.11	80.70	17.78	0.37	-37.30	0.62	0.17
SBI Nifty Index Fund	Passive	-6.19	-28.16	9.75	-1.27	-34.83	0.02	0.18
Tata Nifty 50 Index Fund	Passive	19.76	154.23	15.67	0.82	-34.64	0.59	0.22
Mirae Asset Large Cap Fund	Active	15.54	111.20	18.41	0.53	-36.87	0.69	1.55
Axis Bluechip Fund	Active	14.18	98.58	16.43	0.49	-30.10	0.54	1.65
Kotak Bluechip Fund	Active	10.15	64.94	17.91	0.27	-37.42	0.66	1.83
Canara Robeco Bluechip Equity Fund	Active	7.93	48.40	2.24	0.52	-4.36	-0.00	1.72

Note: Cat. = Category; Vol. = Annualised Volatility; MDD = Maximum Drawdown; TER = Total Expense Ratio.

Several points are immediately apparent. The benchmark posted a 19.37 per cent CAGR, a volatility of 19.52 per cent per annum and a maximum drawdown of 46.92 per cent, a testament to just how bad the COVID-19 correction was, at least in terms of percentage. Not one of the nine sample funds had a clear advantage in terms of CAGR. The Tata Nifty 50 Index Fund was the next best performer, with a margin of 19.76 per cent, but that is more due to the timing of the observations of the NAVs, rather than any systematic outperformance. There are two funds which will need special mention as the numbers appear to be anomalous. The annualised volatility of the Canara Robeco Bluechip Equity Fund was only 2.24 per cent and the effective beta 0, which is neither equity-like. This is the most likely reason: the fund's reporting status has changed or the fund itself has undergone a restructuring at some point during the analytical window; either way, the fund's NAV history for this window is not an indication of a consistent large cap equity exposure. Analogously, SBI Nifty Index Fund had a CAGR of -6.19 per cent and a beta of nearly zero; indicating that NAV data available

for the fund does not move in tandem with the movement in Nifty 50 index as one would expect of an index fund. Both anomalies are retained and reported openly, and discussed in further detail in Section~. 5.5.

4.4 Active versus Passive: Category Comparison

Table 4.3 Computes fund-level metrics, and then aggregates them into simple cross-sectional averages by category.

Table 4.3. Category-Level Average Performance: Active vs Passive

Metric	Active Mean	Passive Mean	Difference (A–P)
CAGR (%)	11.95	9.98	+1.97
Annualised Volatility (%)	13.75	16.11	–2.36
Sharpe Ratio	0.45	0.13	+0.32
Maximum Drawdown (%)	–27.19	–36.68	+9.49
Total Expense Ratio (%)	1.69	0.19	+1.50

At first glance, active funds perform well on most other measures as well: The average CAGR is about 2 percentage points higher, the average volatility is lower, the average Sharpe ratio is higher, and the average maximum drawdown is less severe. But the opposite was true for the cost gap, in that active funds averaged 1.69 per cent whereas passive funds averaged 0.19 per cent – 1.50 percentage points.

It is worth being cautious about these averages, though. The anomalous Canara Robeco figures pull down the active category’s volatility and drawdown means (because that fund registered near-zero values for both), while the negative CAGR of the SBI Nifty Index Fund pulls down the passive category’s return average considerably. These differences are examined in the next section using formal statistical tests to determine whether these differences survive scrutiny.

4.5 Statistical Hypothesis Test Results

Table 4.4 The results of the independent two-sample *t*-tests for each of the four major metrics are shown in. The results of the independent two-sample *t*-tests for each of the four major metrics is shown in.

The volatility, the *p*-value is 0.56 and the Sharpe ratio is 0.46 both at values well above 0.05. The *p*-value for CAGR is 0.71, for volatility is 0.56, and for the Sharpe ratio

Table 4.4. Independent Two-Sample t -Test Results: Active vs Passive

Metric	Active Mean	Passive Mean	t -stat	p -value	Sig. ($\alpha = 0.05$)
CAGR (%)	11.95	9.98	0.385	0.7120	No
Volatility (%)	13.75	16.11	-0.607	0.5630	No
Sharpe Ratio	0.45	0.13	0.787	0.4571	No
Expense Ratio (%)	1.69	0.19	28.342	0.0000	Yes

is 0.46, all well above 0.05. For each of these three measures, the null hypothesis (that the two category means are equal) cannot be rejected. In real terms: The differences in the descriptive averages on all three aspects of the descriptive measures are not large enough – with the variability within the category and the small sample – to be statistically different from zero. The gaps that are observed are within the limits of chance variation.

There is a big difference in the Total Expense Ratio result. The t -statistic of 28.342 and a p -value indistinguishable from zero leave no room for ambiguity: active and passive funds in this sample differ dramatically, and with overwhelming statistical confidence, on cost. This is the only dimension where the two categories are genuinely distinguishable.

The substantive conclusion from the formal testing is therefore precise: in the Indian large-cap segment, over this five-year window, active funds are statistically indistinguishable from passive funds on returns, risk, and risk-adjusted performance – but they are unambiguously and significantly more expensive. That finding has direct implications for investor decision-making, discussed in Section 4.8.

4.6 Visualisation of Results

Four visualisations support and expand on the quantitative findings above.

Figure 4.1 traces the growth of an initial investment of 100 in each fund and in the benchmark over the analytical period. The NIFTY 50 benchmark (bold black line) outpaces virtually all sample funds over the five-year window. The sharp dip in early 2020 and the subsequent recovery are clearly visible. The active funds (coral lines) and passive funds (steel-blue lines) cluster beneath the benchmark for most of the period.

Figure ?? ranks every fund by CAGR and compares each against the benchmark CAGR of 19.37 per cent (dashed vertical line). The visual makes clear that no active fund in the sample cleared this bar over the full period – the best active performer,



Figure 4.1. Growth of 100 Invested: Active vs Passive Funds (Aug 2017 – Aug 2022). Steel-blue lines represent passive index funds, coral lines represent actively managed funds, and the bold black line represents the NIFTY 50 benchmark.

Mirae Asset Large Cap Fund at 15.54 per cent, falls nearly four percentage points short.

Figure 4.2 plots each fund in risk-return space, with annualised volatility on the horizontal axis and CAGR on the vertical axis. Funds toward the upper left are the most attractive – high return, low risk. The NIFTY 50 benchmark (black star) sits toward the upper right, reflecting its strong return and elevated volatility over the period. Active funds do not show as the best performers in the upper left corner, nor do passive funds.

Figure 4.3 Combines all four key metrics into one consolidated side by side bar chart that displays the CAGR, volatility, Sharpe ratio and TER averages of each category. This figure, together with the results of the hypothesis tests, narrates the main story of this study in three panels, namely, the three dimensions that are described in raw numbers, while the difference on cost is statistically significant.

4.7 Discussion of Findings

The comparison with the benchmark provides a more important insight. Neither active nor passive funds consistently outperformed the NIFTY 50 benchmark over the five-year period. Although some funds delivered competitive returns, none demonstrated a sustained and statistically meaningful advantage over the benchmark across the full market cycle.

Overall, the results suggest that in the Indian large-cap segment, the primary dis-

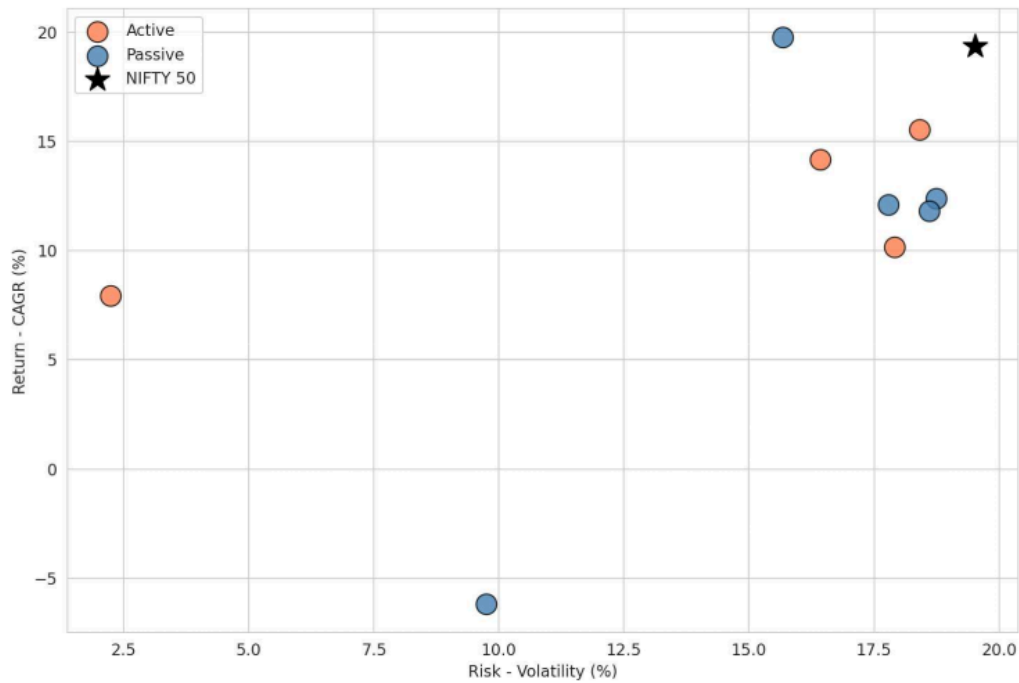


Figure 4.2. Risk versus Return Profile of the Sample Funds. Active funds are shown as coral circles, passive funds as steel-blue circles, and the NIFTY 50 benchmark as a black star.

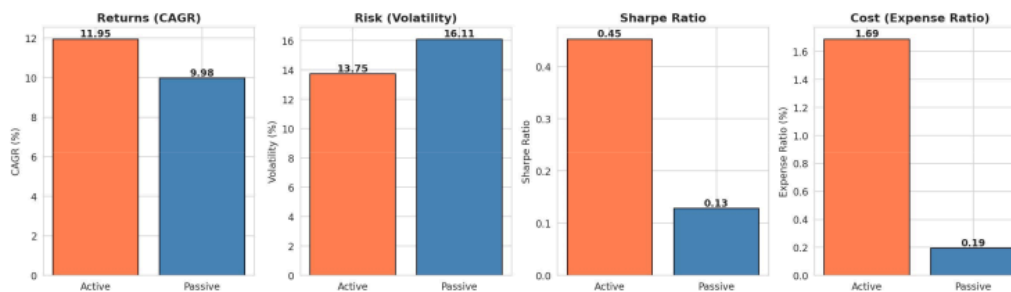


Figure 4.3. Active versus Passive: Category Averages on Four Dimensions, namely (i) CAGR, (ii) Annualised Volatility, (iii) Sharpe Ratio, and (iv) Total Expense Ratio. Each bar is annotated with its numeric value.

inction between active and passive funds lies in cost rather than performance. These findings are broadly consistent with existing literature, which argues that higher fees do not necessarily translate into superior returns and that low-cost passive investing remains a viable option for long-term investors.

4.8 Practical Recommendations

On the basis of the above empirical findings, four suggestions are provided below for equity exposure for the Indian retail investors who invest in equity through mutual funds.

Recommendation 1: Use cost as the first screening criteria. There is only one dimension that is statistically significantly different between active and passive funds for the large-cap segment in India and that is the cost. The cost difference of 1.5 percentage points per year on an investment period of 20 to 30 years adds up to a substantial reduction of the terminal wealth. When an investor is not sure that their own stock picker has a good track record of beating this drag, he may want to consider the passive route.

Recommendation 2: Passive investing makes sense in the large cap segment, in particular. The big caps segment is the most well researched, most institutionalized and most informationally dense segment of the equity market in India. This finding is consistent with the literature from around the world and it appears to be the segment in which value is most elusive for active managers. For the large-cap portion of a retail portfolio, a core allocation to a low cost NIFTY 50 index fund or ETF is a safe default.

Recommendation 3: Don't stop at the headline returns. It's not enough to select funds based on their latest return history. Any fund analysis of an active fund should assess risk adjusted performance over several market cycles, the drawdown profile (especially during crisis periods), the expense ratio, and consistency, not episodic outperformance.

Recommendation 4: Review comparison periodically. Past investment results are not necessarily indicative of future performance. Market structure has changed, fund managers have changed and the level of informational efficiency in the Indian market has been evolving through time. It is a good idea to recap the active-passive comparisons every two to three years.

The results of the study are presented and a complete list of its limitations is

recorded in the next chapter, together with directions for future research.

CHAPTER 5

CONCLUSION

5.1 Overview of the Study

The aim of this research was to address an important and empirical question that a retail investor in India is likely to have: whether a higher cost, actively-managed large-cap equity mutual fund is able to generate a higher risk-adjusted return or is lower-cost, passive alternative performing as well or better? Hence, the NAV data has been sourced directly from the official records of AMFI, a detailed set of performance and risk metrics has been calculated and formal statistical hypothesis testing has been performed on the differences between the active and passive funds at the category level. The time of the analysis was from August 2017 to August 2022, five years covering a full market cycle, and the deepest equity market downturn in the last decade.

5.2 Summary of Key Findings

Six findings emerge from the analysis.

Finding 1: Active funds had higher average returns, but the difference was not statistically significant. The mean CAGR across the four active funds was 11.95 per cent, compared with 9.98 per cent for the five passive funds – a gap of about two percentage points. The independent two-sample *t*-test returned a *p*-value of 0.71, well above the 0.05 threshold. This difference in returns cannot be distinguished from zero in a sample of this size and internal variability.

Finding 2: Active funds showed lower average volatility, but again not significantly. The mean annualised volatility was 13.75 per cent for active funds and 16.11 per cent for passive funds. The *p*-value of 0.56 means this difference is also statistically inconclusive. It is worth noting that the anomalously low volatility of the Canara Robeco Bluechip Equity Fund within the study window pulls the active-category average down considerably.

Finding 3: Active funds had a higher mean Sharpe ratio – but the gap does not survive hypothesis testing. A Sharpe ratio of 0.45 for active funds against 0.13

for passive funds looks like a meaningful advantage at face value. But the SBI Nifty Index Fund's Sharpe ratio of -1.27 introduced severe within-category dispersion on the passive side, and the resulting p -value of 0.46 leaves the null hypothesis intact.

Finding 4: Active funds were significantly more expensive – the only statistically robust difference in the study. The mean TER for active funds was 1.69 per cent per annum, roughly nine times the passive average of 0.19 per cent. The t -statistic of 28.34 and a p -value indistinguishable from zero confirm that cost is the one dimension on which these categories genuinely differ.

Finding 5: No active fund in the sample beat the NIFTY 50 benchmark. The benchmark delivered a CAGR of 19.37 per cent over the analytical period. Mirae Asset Large Cap Fund was the top performer among the active funds, at 15.54 per cent, just over four percentage points behind.

Finding 6: Funds that were actively managed showed a smaller average maximum drawdown, but this is skewed by the Canara Robeco abnormality. The average peak loss for active funds was approximately 27 per cent versus approximately 37 per cent for the passive funds. Caution should be taken when reading this as noted above in the data section.

These reported descriptive benefits of active management put together make one point abundantly clear: the advantages of active management seen in practice do not meet statistical scrutiny. So the only thing that does bad just one thing – cost – does to the active investor.

5.3 Theoretical Contributions

This study contributes to the academic literature on active–passive fund performance in the Indian context in three ways. First, it extends the empirical evidence through the full COVID-19 period and applies formal statistical testing to assess whether differences between active and passive funds are statistically significant. Second, it integrates return, risk, risk-adjusted performance, and cost within a single analytical framework, providing a more comprehensive comparison than studies focusing on only a few dimensions. Third, the findings reinforce evidence that, in the Indian large-cap segment, the key distinction between active and passive funds lies not in statistically significant performance differences but in the substantially higher costs associated with active management.

5.4 Practical Implications

Based on the findings, there are three implications:

Such a large, enduring and – importantly – statistically significant cost gap exists in India between active and passive large-cap funds. It is not related to a specific sample composition or to a measurement artefact. The difference in annual costs grows to a significant difference in the amount of wealth generated over longer investment periods. A 1.50 percentage point annual variation over 30 years can take a significant percentage of the value of the portfolio at the end. The results of the present study indicate that TER should not only be a criterion investors should consider in fund selection, but also a primary criterion.

But, in the large-cap segment, the evidence that supports the active management premium is not that strong. This segment is the most difficult one in which the alpha is the most competitive – information is the most extensive, and stocks are the most widely covered. Investors who invest in active funds here should have a clear reason or point to believe that their manager or active management has a sustainable advantage not merely a premise that it is normally the better approach.

Last but not least, the Indian mutual fund market is evolving and any deductions that one makes based on a study of the past should be reassessed when new data emerges. The regulatory regime, the institutional involvement and the extent of informational efficiency in the Indian market are all developing. The active-passive balance that is shown in this study for the 2017-2022 period could be different in a study a 5-year later.

5.5 Limitations of the Study

The five limitations need to be explicitly stated.

Sample size. The analytical sample has four active funds and five passive funds. This is methodologically defensible with the mandate requirement as it is quite narrow, but it greatly reduces the statistical power. Even large economic differences in true population means may fail to be significant at the 5 per cent level with this few observations per category. As such, non-significant p -values for CAGR, volatility and Sharpe ratio should be interpreted as inconclusive, and not as evidence that active and passive funds are identical in population.

Data anomalies. For the sample, two funds – SBI Nifty Index Fund and Canara Robeco Bluechip Equity Fund – showed NAV series that did not exhibit the anticipated behaviour of an equity-tracking fund over the analytical window. Both are kept for transparency but will significantly affect the averages for categories. SBI Nifty's -6.19 per cent figure drags down the average CAGR for the passive category; the near-zero values for both the average volatility and average drawdown for Canara Robeco pull down the average volatility and drawdown of the active category. This should be taken into account when interpreting results.

Analytical horizon. A five-year time frame is considered an average period for measuring fund performance, and represents a full market cycle; some researchers suggest that a longer time horizon, of several decades, is more suitable to test the skill of an active manager. The results shown here are preliminary and not final.

Survivorship bias. This sample excludes funds that operated only part of the study window. These are funds that were wound up, merged or restructured during the period, including potentially poorly performing active funds. This may be an upward bias of the active-category means, compared to the population means.

Absence of factor adjustment. The study does not use Fama-French or Carhart factor models to break the returns into the factor components market, size, value, and momentum. Factor exposures can differ meaningfully between two large-cap active funds with the same mandate, and the differences in gross performance can be due to factor tilts instead of effective stock-selection skills.

5.6 Directions for Future Research

A number of extensions would overcome the shortcomings detailed above and contribute additional Indian evidence base.

Expansion of the sample. A larger sample, which would include more number of funds from the large cap segment and include comparison across the mid-cap, small-cap and multi-cap segment, would significantly enhance the statistical power and enable analysis of whether the active-passive picture is systematically different across market cap segments and informs about the market's informativeness.

Multi-factor performance attribution. The implementation of Fama-French and Carhart factor model on returns from Indian mutual funds would enable a more precise breakup of the observed performance into the priced factor exposures and the alpha.

This would better help determine if there is any active outperformance that is being driven by actual stock selection or if it is just something that's created by a factor tilt that could be replicated at a lower cost through a passive factor product.

Longer analytical horizon. The longer post-COVID-19 data are available, the more statistically accurate the conclusions would be regarding the skill of an active manager over time if extended to multiple complete market cycles.

Bayesian and bootstrap inference. As there are relatively few funds per category, the classical two-sample *t*-test may give misleading and uninformative uncertainty quantification, especially at the lower end of the range of sample sizes that are feasible.

Behavioural extensions. An alternative research avenue would be what factors influence Indian retail investor's preference for the two types of products, whether it is consistent with the findings of this paper; how does disclosure of cost and net-of-fee performance affect investor choices; and, whether net-of-fee performance affects investor choices.

5.7 The Future of Passive Investing in India

India is at the cusp of a passive investing revolution. This period (2017-2022) represented the early stages of the growth of index funds and ETFs in the Indian market, while the last few years have witnessed sharp growth. The proportion of AUM of passive equity schemes has increased from an insignificant amount at the beginning of the analytical window to a substantial one by the end, as a result of both regulatory pressure, investor awareness and the cost benefits that have been proven as documented in this study.

There are a number of structural forces that will likely continue along this trajectory. First, SEBI has, in a series of rationalisations and categorisation of schemes, made a clearer-cut product environment so that retail investors can see the cost comparison. The systematic disadvantage of high-TER active products will gain attention as cost visibility gets enhanced. Second, the large number of direct plans and digital distribution channels have made it easier to access passive products, expanding the number of investors that can be reached. Third, the small but growing number of Indian households now have a passive exposure to equity as a result of the rise of the National Pension System and its equity allocation mandate, which is designed to be a passive mandate.

Concurrently, the Indian passive investing market is confronted with genuine limitations. There are fewer well-established, liquid, diversified index funds that track broad indexes in the developed world than in emerging markets. Adoption of factor-based and smart-beta index products is still young. Liquidity in the ETF secondary market is not equal, especially for smaller schemes, resulting in tracking error and execution costs for investors who want to trade in the ETF format. All of this implies that alongside preference shifts, India's passive investing journey will be driven by market infrastructure development as well.

5.8 Implications for Retail Investors

Retail investors should take three implications from this.

The first question is on cost. The evidence in this study shows that cost should not be looked at as a secondary consideration after return and risk have been determined – it is a primary consideration because it is the one that the investor knows before investing. The growing difference in annual costs of 1.50 percentage points over a long time is significant, not marginal.

The second is about how to measure the performance of a fund that is active. Many individual investors will look at fund returns versus one another or versus the index without taking into account any fees. A tougher test – whether the active fund has earned enough high-quality returns to compensate for its higher expense — would yield a more balanced verdict on the value of active management in the large-cap space. Those investors that can use this cost adjusted frame will make more informed allocation decisions.

The third, related to portfolio construction. The results shown here are for the large-cap category where information efficiency is greatest. Active managers could have a longer lead in the Indian market in the mid-cap, small-cap, or thematic sub-segments. A prudent strategy may thus be to stick with passive vehicles for large-cap core exposure barring any efficient segments, and keep a few active allocations in less efficient ones, for this study's evidence is most relevant to the former.

5.9 Link with the Efficient Market Hypothesis

findings of this study are broadly consistent with the Efficient Market Hypothesis (EMH) \cite{fama1970}. The absence of statistically significant differences in returns, risk, and risk-adjusted performance between active and passive funds suggests that active managers were unable to consistently generate excess returns in the Indian large-cap segment. At the same time, active funds incurred significantly higher costs, which is consistent with the prediction of the semi-strong form of EMH that publicly available information is rapidly incorporated into prices. The results also indicate that increasing market efficiency, supported by greater analyst coverage, institutional participation, and technological advancement, has reduced opportunities for sustained active outperformance

5.10 Concluding Remarks

The ultimate question that gets asked is: Does the fee paid for active fund management get the investor something that couldn't have been acquired at a lower cost? On the large-cap segment of the Indian market, over the last few years (2017–2022) discussed here the answer is probably not – or at least not in a manner that can be considered statistically different from what a low-cost passive product offers. There is no significant difference between the two categories in returns, volatility, or risk adjusted performance. Cost does.

It is still quite unclear whether this outcome would persist over a longer time period, a larger sample or in a different market environment. The Indian capital market is still maturing, and more comprehensive data will enable future research to address these questions. For the long-term retail investor in the large cap space, the smart thing to do for the time being is to stick with the lower cost option of a passive approach, rather than try to prove it worth proving otherwise, as the empirical data in this study indicate.

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