

Empirical Investigation of Market Efficiency and Mutual Fund Performance in India: A Quantitative Approach

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ABSTRACT

This study examines 30 Indian mutual funds' performance, persistence, and market timing skills between August 2019 and August 2024—a time frame that saw substantial changes in the economy. The study shows that almost 63% of fund managers produced positive risk-adjusted returns using risk-adjusted performance metrics and the Treynor-Mauzy and Henriksson-Merton models, indicating skilful stock selection. For a selection of funds, evidence of market timing abilities was discovered. According to the IR measures, the industry as a whole has demonstrated reasonable performance, with about 30% of schemes being skilfully handled by fund managers, despite the lack of performance persistence. This demonstrates that investors can rely on their stock selection skills in the expanding Indian mutual fund sector. There may be greater policy ramifications for the fund management sector if fund management expertise is taken into consideration. To improve our comprehension of fund performance in the Indian context, future studies should use conditional market timing models, increase the sample size, and include fund features.

Keywords: Jensen's Alpha, Treynor Ratio, Sharpe Ratio, Market Efficiency, Market Timing, Risk-Adjusted Returns

I. INTRODUCTION

Background and Motivation

Due to growing investor engagement, earnings, and digitalization, the mutual fund sector in India has grown rapidly, reaching USD 176 billion as of March 2024. There are still questions about how much active managers contribute in comparison to passive approaches.

Research Problem

Given recent economic developments (COVID-19, the IL&FS crisis, and regulatory changes), a reassessment of fund performance is necessary due to the dearth of post-2019 study of Indian mutual funds. Importance of the Study: This study evaluates fund management tactics, influences investment choices, and offers information for regulatory supervision. Study Structure a literature review, a description of the technique, an empirical analysis, a conclusion, limitations, and references are all included in the study.

The Indian financial market has undergone significant evolution, presenting a compelling case for empirical investigation into its efficiency and the performance of

mutual funds. Understanding market efficiency is crucial as it underpins the ability of market prices to reflect all available information. In an efficient market, it's theoretically impossible to consistently earn abnormal returns. Simultaneously, mutual funds play a pivotal role in the Indian investment landscape, offering a diversified avenue for both retail and institutional investors. A quantitative approach to analyzing their performance allows for an objective assessment of whether these funds genuinely add value or merely mirror market movements.

This introduction sets the stage for an in-depth empirical study. It aims to leverage quantitative methods to examine the degree to which the Indian market exhibits various forms of efficiency (weak, semi-strong, and strong) and, in parallel, to rigorously evaluate the performance of Indian mutual funds across different categories. The investigation will seek to identify whether fund managers possess the ability to consistently outperform the market and if any factors, such as fund size, age, or expense ratios, significantly influence their returns. By combining these two critical

areas of inquiry, this research endeavors to provide valuable insights for investors, regulators, and fund managers operating within the dynamic Indian financial ecosystem.

II. LITERATURE REVIEW

1. Soman, D. (2001). "Effects of Payment Mechanism on Spending Behavior" – Journal of Consumer Research

Soman's research shows that deferred payment mechanisms like credit cards—and by extension EMI/BNPL—reduce the “pain of paying” and increase willingness to spend. In the Indian context, BNPL schemes evoke similar psychological triggers, encouraging impulse buying and increased cart values, especially among millennials.

2. PwC India (2022). "The BNPL Opportunity in India" This industry report highlights that BNPL adoption in India surged due to fintech growth, e-commerce integration, and consumer credit demand. The report shows how BNPL leads to higher frequency of purchases in fashion, electronics, and lifestyle segments. Young, digitally native consumers increasingly use BNPL for convenience and cash flow management, altering traditional buying behaviors.

3. Kumar, A., & Gupta, V. (2021). "A Study on the Influence of EMI Financing on Consumer Purchase Intentions" – International Journal of Research in Marketing

This study finds that EMI options increase affordability perception and reduce purchase hesitation for high-ticket items like smartphones, appliances, and furniture. EMI schemes particularly influence middle-income groups, encouraging them to upgrade to premium products they might not otherwise afford upfront.

4. McKinsey & Company (2023). "Digital Lending and Consumer Credit Evolution in India"

This report notes that India's growing fintech ecosystem is redefining consumer credit through instant EMI and BNPL offerings. It highlights that trust, transparency, and zero-cost EMI offers are key factors influencing consumer uptake. BNPL usage is highest in Tier I and II cities, driving growth in discretionary spending categories.

5. RBI Working Paper (2022). "Credit Access and Consumer Spending in India's Digital Economy"

This paper explores how digital credit models—like BNPL—are reshaping consumer finance. It suggests that easy access to deferred payment plans influences not just

the volume but also the timing and type of purchases. However, it also cautions about over-leverage risk and advocates for better regulation of digital lending norms

III. RESEARCH METHODOLOGY

Study methodology Type:

To profile the performance of Indian mutual funds and look at the connections between fund attributes, performance metrics, market timing skills, and perseverance, a descriptive and quantitative study methodology was used. **Rationale:** Data and patterns can be systematically explored through descriptive design.

□ **Sources of Data:** For the months of August 2019–August 2024, AMFI, NSE, Morningstar India Direct, Value Research, and Bloomberg provided daily NAV, market index, and risk-free rate data.

□ **Sample Selection:** A total of thirty mutual fund schemes representing a range of debt, equity, and balanced funds from different fund companies were purposefully chosen. Data accessibility and fund representation across categories were given top priority during the selection process. In order to combat survivorship bias, monies were excluded.

□ **That were combined or liquidated in order to obtain accurate results, however this may result in data consistency bias since only historical data will be accessible, which could limit our study.**

□ **Variables:** Market timing coefficients (gamma from TM and HM models), fund returns, and performance metrics (Sharpe, Treynor, and Jensen's alpha) were dependent variables. Fund size (AUM), expense ratio, and dummy variables for significant economic events (such as the COVID-19 pandemic) were examples of independent variables.

□ **Performance Measures:** Treynor ratio, Sharpe ratio, Jensen's alpha, M2, IR, and Sortino ratio calculation formulas were provided (see to Chapter 3).

□ **Market Timing Models:** Treynor-Mazuy (TM) and Henriksson-Merton (HM) models explained in detail, with special attention to the beta/gamma indicators for effective output.

□ **Persistence Analysis:** a thorough description of the ranking method for examining performance on a quartile basis.

□ **Statistical Methods:** Robust linear regressions, panel data regressions, and other regression and time series analysis forms were the primary methods used that sought in-depth study.

- Robustness Checks: To ensure there are no deviations, a number of validity tests will be conducted. Additionally, alternate data is accessible, and some sensitivities would require a close examination.

Research Objectives

- To use the Treynor, Sharpe, Jensen's alpha, M-squared, Sortino, and information ratios to measure the risk-adjusted performance of Indian mutual funds.
- To use the Treynor-Mazuy (TM) and Henriksson-Merton (HM) models to evaluate fund managers' stock selection and market timing abilities.
- To use regression and performance ranking techniques to ascertain the mutual funds' performance persistence over time.
- To use regression analysis to examine how fund attributes (such as fund size and expense ratio) affect performance.

Hypotheses Of Study

H1: After taking into consideration risk, costs, and pertinent market indicators over the sample period, Indian mutual fund managers typically do not outperform a benchmark index.

H2: According to the TM and HM models, a statistically significant subset of Indian mutual fund managers have market timing abilities.

H3: Past performance has little bearing on future performance, and Indian mutual fund performance is not very persistent.

H4: The performance of Indian mutual funds is negatively impacted by fund size; diseconomies of scale cause larger funds to have poorer risk-adjusted returns.

H5: The significance of cost effectiveness in producing superior performance is demonstrated by the higher risk-adjusted returns shown by funds with lower expense ratios as opposed to funds with larger expense ratios.

IV. DATA ANALYSIS AND INTERPRETATION

Description Of Sample Mutual Funds

A summary of the 30 mutual fund schemes that were part of the sample is given in this section. It describes their investment goal (income, growth), fund type (equity, debt, balanced), AUM, and expense ratio.

In-depth Analysis: 0.02% is the average daily market return, with 1.66% as the standard deviation. The average daily returns of 18 mutual fund schemes are positive, meaning they outperform the daily market returns. Thirteen mutual fund schemes have

underperformed, yielding returns that fall short of benchmarks. The returns on the LIC Nomura and Taurus infrastructure funds are negative. Compared to the market, seven mutual fund strategies are riskier.

LIC Nomura infrastructure fund and Taurus infra fund are taking higher risk than the market risk but provided negative return to the investors. Other funds are taking more risk than market risk but provide positive return to investors. The kurtosis of all mutual fund returns is positive. These schemes have high statistics for the Jarque-Bera statistic. They are leptokurtic, and the distribution is tilted to the right. All 30 mutual fund schemes have Jarque-Bera statistics that are significantly bigger than zero, indicating the presence of heteroscedasticity and non-normality in all the series.

Comprehensive Analysis: In terms of Treynor ratio, 19 mutual fund schemes surpass the benchmark return. A higher Sharpe ratio means that funds are doing better in the market and investors are receiving greater return per unit of risk.

Twenty schemes have positive alpha values, demonstrating a superior capacity to choose suitable MFs schemes. The Treynor, Sharpe, and Jensen's alpha ratios show that 19 mutual fund schemes are doing very well in the market across all investment time periods. When risk is taken into account, all of these schemes perform better and have positive values.

Positive IR denotes consistent performance, and nine mutual fund schemes have positive IRs, indicating that the fund managers are doing a good job of managing them. Mutual fund schemes outperform the market, as evidenced by the 27 schemes with positive M-squared values. By utilizing the market's downward volatility in the sortino ratio, 19 methods demonstrate positive returns.

Analysis of Treynor-Mazuy (TM) Model Results:

- Market Timing Ability: The gamma (γ) coefficient, which shows the fund manager's capacity for market timing, is the main emphasis of the TM model.
- Positive and Statistically Significant Gamma: A positive and statistically significant gamma indicates that the fund manager was effective in timing the market by boosting exposure to the market prior to times of rising market returns and lowering exposure prior to those of falling markets. At the 5% significance level, this capacity is shown by 13 out of 30 funds (43%). This demonstrates how well Indian mutual funds are

performing in terms of return, market timing, and investor revenue generation.

□ A negative and statistically significant gamma indicates that the fund management mistimed the market, increasing exposure prior to downturns and decreasing exposure prior to upturns. The incapacity of the funds to perform the analysis and work is demonstrated by the following results: LIC Mid Cap Fund (growth), HBSC Equity Growth Fund, ICICI PRU Balanced Fund, Reliance Pharma Fund, and UTI Bond Fund.

□ Insignificant Gamma: This signifies that there is no statistically significant capacity for market timing.

□ Alpha (α): The alpha coefficient shows the excess return of the fund regardless of changes in the market. Funds that have substantial and positive alpha values are thought to have better stock picking abilities, which aids businesses in increasing profits and returns.

□ R-squared: The R-squared figure shows how much of the fund's return may be attributed to the market timing and return components. A higher R-squared value indicates that the data and the model fit each other well. There must always be some kind of sound.

V. FINDINGS

Evolving Market Efficiency: The Indian market is an emerging market, and its efficiency is continually evolving. Some studies suggest a partial rejection of weak-form efficiency, implying potential avenues for profitable trading strategies, while others indicate increasing efficiency over time. This makes it difficult to generalize findings across different periods.

□ **Regulatory Changes:** The Indian mutual fund industry is subject to regulations by SEBI (Securities and Exchange Board of India). Changes in regulations can impact fund structure, investment strategies, and reporting, making comparisons across different regulatory regimes challenging.

□ **Dominance of Retail Investors:** The behavior of retail investors, who may be driven by sentiment or herd mentality, can introduce inefficiencies or anomalies that are difficult to model.

□ **Limited Access to Private Information:** Fund managers might have access to private or semi-private information that is not publicly available, making it difficult for an empirical study to fully account for all information impacting their decisions.

VI. SUGGESTION & RECOMMENDATIONS

- Businesses should integrate flexible payment options to attract and retain customers but must ensure transparent communication of terms.
- Fintech companies should invest in consumer education to mitigate risks of overspending and debt accumulation.
- Policymakers should develop regulations to protect consumers from predatory practices and promote responsible lending.
- Consumers should be encouraged to understand the total cost of purchases, including any fees or interest, rather than focusing solely on the monthly payment amount.
- Financial literacy programs should include modules on digital credit and responsible borrowing.
- Retailers and fintech companies should collaborate to offer value-added services such as budgeting tools and financial planning resources.
- Credit reporting mechanisms should be strengthened to prevent multiple borrowing and ensure responsible lending.

VII. CONCLUSION

This study examined 30 Indian mutual funds' performance, market timing skills, and performance persistence between August 2019 and August 2024. The analysis can help identify investment and future decision making, which is crucial for the analysis. The study demonstrates that funds are having their market and are operating sufficiently.

This quantitative investigation into market efficiency and mutual fund performance in India reveals a complex interplay of forces. While strong-form efficiency remains largely elusive, suggesting opportunities for active management, evidence for semi-strong form efficiency is more nuanced, with some market segments exhibiting rapid price adjustments to publicly available information. Despite this, the study found that, on average, Indian mutual funds struggled to consistently outperform their respective benchmarks after accounting for fees and risk.

This suggests that while market inefficiencies may exist, they are not easily exploitable by the majority of active managers, highlighting the continued relevance of passive investment strategies and the importance of thorough due diligence for investors seeking alpha in the Indian market.

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