

Strong Form Market Efficiency: Empirical Evidence From Performance Appraisal Of Mutual Funds

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ABSTRACT

Investing, as an activity, is very individualistic. It is subjective based on the needs and intentions of an individual and this guides the investor in their choice of securities and required rate of returns. Mutual Funds present an unconventional style of investing in this regard. They are a versatile product that is professionally tailored for an investor's needs. Moreover, the funds are based off of financial securities and are consequential in the respective securities markets. Hence, the interest over price efficiency of these funds arises. For the purpose of this study, 48 Equity Mutual Fund schemes from 5 Asset Management Companies (AMCs) (Based on Asset Under Management) have been considered. Daily Returns from 31st March 2009 to 31st March 2019 was calculated from the historical NAVs of the funds. The study focuses on testing Strong form of price efficiency, as such, performance measures of Sharpe Ratio, Treynor's Ratio and Jensen's Alpha are calculated for the funds as well as the benchmark indices to measure the performance of mutual funds against the benchmark and appraise the efficiency of professionally managed securities.

Keywords: Equity Mutual Funds, Sharpe's Ratio, Treynor Ratio, Jensen's Alpha, Strong Form Price Efficiency

INTRODUCTION (As per AMFI)

A mutual fund is a pool of money managed by a professional Fund Manager. It is a trust that collects money from a number of investors who share a common investment objective and invests the same in equities, bonds, money market instruments and/or other securities. And the income / gains generated from this collective investment is distributed proportionately amongst the investors after deducting applicable expenses and levies, by calculating a scheme's "Net Asset Value" or NAV. Simply put, the money pooled in by a large number of investors is what makes up a Mutual Fund. As Mutual Funds are based on Market securities, Market forces affect the prices of the funds' units. Hence, most theories pertaining to the markets must apply to these funds as well. One such theory is Efficient Market Hypothesis.

Efficient Market Hypothesis (EMH) states that share prices reflect all information and consistent alpha generation is impossible. In other words, the fair prices of securities will always be reflected and investors cannot realize abnormal returns by outperforming the market by any means at one's disposal. The only way to earn returns would be by purchase of riskier securities. In Fama's 1970 review paper, he categorized efficiency on the basis of the degree of information reflected by the securities' prices, being;

- Weak Form
- Semi - Strong Form
- Strong Form

REVIEW OF LITERATURE

- 1) Russ Wermers (2000), in their paper "Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions cost and Expenses" discusses that mutual fund managers hold stocks that beat the market portfolio by almost enough to cover their expenses and transaction costs. Moreover, costs and the fund managers' insight are crucial in ensuring the level of returns on the actively managed funds.
- 2) S. P. Kothari, Jerold B. Warner (2001) in their paper "Evaluating Mutual Fund Performance" surmises that the ability to detect abnormal performance of an individual fund is not answerable given the circumstances.

Moreover, the standard mutual fund performance measures are unreliable and could result in false interpretations.

- 3) Ms Nidhi Walia, Dr (Ms) Ravi Kiran (2010) in their paper “Efficient Market Hypothesis, Price Volatility and Performance of Mutual Funds” suggests the inability of the fund managers to outperform the market as stock prices follows random walk.
- 4) Prof. A. Q. Khan, Sana Ikram (2011) in their paper “Testing Strong Form Market Efficiency of Indian Capital Market: Performance Appraisal of Mutual Funds” measures performance of funds and market to establish strong form efficiency and concludes that the markets are not efficient in the strong form.
- 5) Dhanalakshmi K (2013) in their paper “A Comparative Analysis on Performance of SBI and HDFC Equity, Balanced and Gilt Mutual Fund” compares the performance of various Mutual Fund schemes of SBI and HDFC using Beta, Alpha measure, Sharpe Ratio, Treynor Ratio and Jensen’s Measure and concluded that investment in HDFC schemes is the better option.
- 6) Venkata Rajasekhar Ryaly, R. S. R. K. Kiran Kumar, Bhargava Urlankula (2014) in their paper “A Study on Weak-form of Market Efficiency in Selected Asian Stock Markets” suggests the existence of weak form of market efficiency among select Asian stock markets (indices) over a period of 16 years using parametric and non-parametric tests.
- 7) Venkata Rajasekhar Ryaly, G. V. Subba Raju, Bhargava Urlankula (2017) in their paper “Testing the Weak-Form Market Efficiency in the Indian Stock Market: Evidence from the Bombay Stock Exchange Index (BSE) SENSEX” provides that the Indian Stock markets are efficient in the weak form by providing sufficient empirical evidence of the same.

NEED FOR STUDY

Securities markets are a complex system and are reflective of investors’ perceptions and sentiments. This incorporates a host of variables that influence prices and returns. The ever-growing need to maximize returns and control risk of an investor is challenged by the very intricacies that are in play across the system. This renders markets to become “unpredictable”, at least in theory. The study focuses on assessing the existence of Strong Form Efficiency based on existence of abnormal returns while expanding the boundaries of our understanding to the maximum extent.

OBJECTIVES OF THE STUDY

- 1) To compare the performance of mutual funds with the benchmark indicator
- 2) Testing for the existence of Strong form price efficiency in the market by evaluating performance of funds and benchmark.

METHODOLOGY

Selection of Companies: Top 5 AMCs on the basis of AUMs for the period of January to March 2019 as per AMFI were taken into consideration in selecting the AMCs. The 5 AMCs that were selected for the study are Aditya Birla Sun Life Mutual Fund, HDFC Mutual Fund, ICICI Prudential Mutual Fund, Nippon India Mutual Fund and SBI Mutual Fund.

Selection of Schemes: All Pure Equity schemes of selected AMCs were selected in the study.

Time Period: Daily NAVs of 5 AMCs and Daily Prices of 17 Indices for a period of 10 years (31st March 2009 to 31st March 2019) is taken into consideration in the study.

Source: The data was collected from secondary sources which include AMCs’ websites, AMFI Database, NSE website, BSE websites and various other databases.

Performance Evaluation Measures: Daily Returns were calculated using the formula; $(P_t - P_{t-1})/P_{t-1}$ and average daily fund returns (R_1) was calculated subsequently using Arithmetic Mean. Standard Deviation (SD) which is required for calculation of Sharpe Ratio was calculated using the Excel Function of standard deviation

$$s_N = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \bar{x})^2}$$

“=STDEV.P” which represents the formula; . Standard Deviation is a representation of the fund’s volatility.

Risk Free Rate (R_F) was ascertained to be 6.66% and average daily risk-free rate was ascertained to be $(6.66\%/365) = 0.01825\%$. Sharpe ratio was calculated using the formula $(R_1 - R_F)/SD$. Beta (β) was calculated on the basis of correlation, i.e. Cov_{xy}/Var_x . Here X represents the Benchmark of the fund and Y represents the

fund returns. Covariance of the Fund returns and Market returns was calculated using excel function “=Covariance.P(arrayY,arrayX)”. Similarly, Variance of X was calculated using the function “=Variance.P(arrayX)”. The two values were placed as mentioned in the formula and Beta was calculated. Treynor Ratio was subsequently calculated using the formula $(R_I - R_F)/\beta$. Finally, Jensen’s Alpha or Jensen’s Measure was calculated using the formula $R_I - (R_F + \beta \times (R_M - R_F))$. R_M represents average daily returns on the respective benchmark prices.

LIMITATIONS

- 1) The study is limited to Equity schemes only, all other schemes have been ignored in this study
- 2) The choice of funds was based on the AMC’s selected for study which was in turn selected on the basis of Asset Under Management and only 5 AMC’s were selected
- 3) The time period is restricted to 10 years, irrespective of how crucial this time period may be.

DATA ANALYSIS_(Refer Appendix)

The aforementioned Formulae were applied and the results are as given below. The measures of Beta and Standard Deviation were calculated for a period of 10 years on a Daily basis for the funds and the Benchmark Indices. These values would be used for calculating the required performance measures of Sharpe, Treynor and Jensen. Moreover, average returns over the period were calculated for the fund and for the Indices and Risk-free rate was ascertained at 6.66% p.a. being return on 10-Years Government Bonds. The funds were also been ranked on the bases of the various performance measures

When comparing schemes under HDFC Mutual Fund, HDFC Midcap Opportunities Fund is the best performer, ranking 2nd in terms of Sharpe Ratio and 4th in both Jensen’s Alpha and Treynor’s Measure. However, many funds seem to have ranked low in terms of the three performance measures with HDFC Midcap Opportunities fund and HDFC Small Cap Fund performing better, relatively. Only One scheme is underperforming, being HDFC Growth Opportunities Fund.

ICICI Prudential Mutual Fund has one of the best performing funds out of the 48 schemes selected for the study, that being ICICI Prudential Technology Fund. It has a good performance relative to its Benchmark. Apart from that, many of the funds are performing well in terms of all three performance measures with most schemes ranking in the top 30 in terms of the three performance measures. There are 2 schemes that are underperforming in terms of Sharpe and Treynor Ratios and One Scheme as per Sharpe Ratio, Treynor and Jensen’s Measures , they being ICICI Prudential Infrastructure Fund and ICICI Prudential Large & Midcap Fund.

Out of 10 schemes of Nippon , Nippon India Pharma Fund is the best overall performer. 7/10 schemes in Nippon India are performing well, with high ranks in all the three performance measures. 3 schemes i.e. Power & Infra Fund, Quant Fund and Vision Fund are under performing in the Nippon AMC, no other AMC has as many schemes underperforming as Nippon.

SBI Focused Equity Fund is also similar to ICICI Prudential Technology Fund in terms of performance but the ranking of the fund with regards to measures that make use of systematic risk is lower (i.e. Treynor and Jensen’s Measure). An overview of the funds reveals an average performance but all the funds are capable of outperforming their respective benchmarks exceptSBI Contra Fund.

Aditya Birla Sun Life Mutual Fund also, has an average performance overall as most schemes manage to score a lower rank and only two schemes manage to stay in the top 10 ranks on the basis of the performance measures

In the Table we can observe that out of 48 schemes, only 8 schemes have exhibited signs of underperformance in comparison to the benchmarks (highlighted above). Both Sharpe and Treynor Ratios of the remaining 40 schemes have shown signs of outperformance and only 5 of the schemes show negative alpha values(HDFC Growth Opportunities Fund, ICICI Prudential Infrastructure Fund, Nippon India Power &Infra Fund, Nippon India Quant Fund and Nippon India Vision Fund)

CONCLUDING REMARKS_(Refer Appendix)

Comparing Sharpe Ratios of all the funds, SBI Focused Equity has the best performance out of the 48 schemes and places 3rd when comparing Treynor Ratio and 2nd in case of Jensen’s Alpha. The fund that has the best performance in terms of Treynor’s Measure is ICICI Prudential Technology Fund and it places 4th and 1st in terms of Sharpe ratio and Jensen’s Alpha. Therefore, in terms of Jensen’s Alpha, ICICI Prudential Technology Fund is the best performer. However, comparing all the performance measures of the funds reveals both ICICI Prudential Technology fund and SBI Focused Equity to be performing at a relatively similar level. However, since ICICI Technology Fund ranks 1st in terms of Treynor and Jensen’s measures, it can be implied that the fund reacts in a more desirable fashion when subject to systematic risk and relative to the benchmark, it has an optimum performance in comparison to other schemes

Based on the results, we observe a general outperformance of the funds in comparison to their benchmarks in 40 schemes in Sharpe, 41 schemes in Treynor's and 48 schemes in Jensen's Alpha. Moreover, 41 out of 48 schemes had more returns during the period as compared to the benchmark (HDFC Growth Opportunities Fund, ICICI Prudential Infrastructure Fund, ICICI Prudential Large & Midcap Fund, Nippon India Power and Infra Fund, Nippon India Quant Fund, Nippon India Vision Fund and SBI Contra Fund had average returns less than the benchmark returns). In case of Beta values, most funds are closely following the indices as their beta values are closest to 1. The lowest Beta value being 0.4988 for Nippon India Pharma Fund. Only Two Beta Values among 48 funds is found to be more than 1 being Nippon India Banking Fund and ICICI Prudential Banking and Financial Services Fund. Irrespective of the Beta values, majority of the funds are performing better than their respective benchmarks and end up realising abnormal returns.

The fact that the funds are earning higher returns than benchmark is in itself an evidence of outperformance. The measures calculated contribute to the validity of said remark even more. In case of Sharpe ratio, as already pointed 83% of the schemes revealed signs of outperformance and 85% schemes outperformed based on Treynor's Ratio. Moreover, only 4 schemes' Alpha values are negative, the remaining 44 schemes' values are indicative of returns over expected returns. This would normally suggest a general trend of abnormal returns on the funds. Based on how efficiency is defined, earning abnormal profits should not be possible if prices take into account all information before any investor can take favourable action using such information, as is the case in Strong Form Efficiency. As such, it could be interpreted that fund managers have access to information that is not readily available to the public, allowing them to earn such abnormal returns and that would be a hindrance to attaining efficiency in the Strong form. Based on the analysis and observations, we can suggest a general lack of Strong Form Efficiency as fund managers are capable of earning abnormal returns. This does not imply that the markets are inefficient altogether. The prices may be efficient in other forms, but that is not within the scope of this study.

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APPENDIX

Performance Measure and comparison between Funds and Benchmark

Table 1 showing Beta Values, Average Returns, Sharpe Ratio, Treynor ratio of Funds and Benchmark and Jensen’s Alpha over a period of 10 Years.