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MULTIDIMENSIONAL EVALUATION OF MUTUAL FUNDS USING PERFORMANCE RATIOS: A CRITICAL EXAMINATION OF TECHNOLOGY SECTOR MUTUAL FUNDS IN INDIA

Abstract:

Over the years, a number of performance indicators have been developed and used to assess the performance of mutual funds. The choice of these performance measures completely rests on the perception of the investor as to which measure conveys the information sought after by the investor and which information the investor considers would be meaningful in deciding the fate of his investments. **Objective & Methodology:** To evaluate the risk and return of selected technology sector mutual funds and to analyse the composite information conveyed by Sharpe's ratio, Treynor's ratio, upside and downside capture ratios.

Results & Discussion: When the funds were analysed using Sharpe ratio, Treynor's ratio upside capture ratio and downside capture ratio, the funds that performed the best in consideration to a particular measure may not be termed best when analysed with another performance gauges stressing on the fact that all the ratios should be analysed with an integrated perspective to derive any underlying information on the performance of the fund and that the choice of the benchmark which stands as a basis to assess performance of the fund is crucial.

Keywords:

Mutual funds; sharpe ratio; Treynor's ratio; upside capture ratio; downside capture ratio

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Introduction

A rational individual has a plethora of investment avenues available. Investment in gold, real estate, shares of companies are some of the most sought after investment options. The quantum of money available for investment and the risk taking aptitude and expectation on return of investment vary among individuals. Of the available investment opportunities, mutual fund is one of the best options that give an investor a varied variety of choices - with regard to amount of money that can put aside for an investment, as schemes such as systematic investment plans provide opportunity for small investors to those who have a huge amount for investment, the different types of funds like debt funds, growth funds, balanced funds etc., help an investor choose on the basis on one's risk appetite, funds like sectorial funds/index funds etc, provide a choice to invest in sectors they assess have greater prospects or help in investing in a more diversified portfolio.

Over the years, a number of performance indicators have been developed and used to assess the performance of mutual funds. The choice of these performance measures completely rests on the perception of the investor as to which measure conveys the information sought after by the investor and which information the investor considers would be meaningful in deciding the fate of his investments. The objective of the study is (i) to evaluate the performance of selected technology sector mutual funds and by studying the risk and return of various categories of funds of all the asset management companies in India belonging to technology sector on basis of their Net Asset Value (NAV) and (ii) To analyse the composite

information conveyed by evaluation criteria's like Sharpe's ratio, Treynor's ratio, upside capture ratio and downside capture ratio.

Review of Previous Research

[1] examines the existing and prospective mutual fund companies institutional and individual investors, researchers and policy makers to get an idea of the nature of relationship between the investment styles and performance of the mutual funds in the Indian context, which will have broader implications for developing competitive strategies and to develop appropriate policies conducive to the healthy growth of Indian Mutual Funds by conducting a risk adjusted performance evaluation of Indian mutual fund schemes. The study clearly brings out the fact that the most of the Growth plans (16 out of 21, approximately 76%) are better than Dividend plans in terms of superior returns and in terms of risk 18 out of 21 Growth plans had lesser risk (approximately 86%) had lesser risk and in terms of risk per unit return 16 out of 21 Dividend plans had higher coefficient of variation (approximately 76%) than Growth plans. [4] attempt to analyse various mutual fund schemes pertaining to technology sector. In this context an attempt has been made by the researcher to examine the growth, risk-return pattern of the mutual fund industry with regard to sector mutual funds. Thus, the study examined entire technology mutual funds over a period of 05 years from 2008-09 to 2012-13. Accordingly, funds have been ranked by taking into account their performance measures using Beta, Sharpe and Treynor's Index. Thus, a fund that scored the highest of the average of the said parameters has been ranked as the best and same method has

been adopted in ranking the rest of the funds. From the study conducted it can be inferred that IT sector funds at present have lost their charm and past glory probably due to technology meltdown and IT sector may be at its elastic end point which warrants IT companies to focus on vortex of IT business so as to redefine, rethink their business. Results of the study which strongly refute established view point that IT assures better return.

[3] conducted an empirical investigation on the performance of mutual funds schemes and the main purpose of the study is to identify which of the month and year schemes provided highest return and minimize the risk in the technology sector funds. The study was mainly intended to analyse the performance of Indian mutual funds based on the performance of close-end and open-end mutual fund schemes over the period 2002-03 to 2012-13 financial year. The researcher has adopted Price Earnings ratio, Book Price Ratio, Return and Net Asset value and Assets Under Management. Further take to considering the performance index model. Sharpe performance evaluation model, Jensen model, Treynors performance model. The study constructs portfolio with maximum Sharpe ratios from an equity diversified schemes and income, balance and index to identified the selection of funds.

The study conducted by [2] attempts to analyse the growth and performance of Equity and Hybrid Schemes of 10 Mutual funds from 2002-03 to 2010-11. It also studies the perception of 200 mutual fund investors in Punjab with the help of a pre-tested questionnaire. The analysis of secondary data reveals that majority of mutual fund schemes

whether they belong to growth schemes or balanced schemes have medium risk. All the growth schemes of IT sector schemes of mutual funds have performed well above the benchmark indices as compared to balanced fund schemes of selected mutual funds. On the basis of both Sharpe and Treynor measures, majority of the schemes have outperformed the benchmark indices from 20012-13 to 20015-16.

A study conducted by [5] mainly focused on conducting an empirical analysis and the interpretation of secondary and primary data for performance evaluation of sectoral mutual fund schemes with various tools like Sharpe ratio, Treynor Ratio, Jensen Alpha model, Fama's decomposition model, coefficient of correlation, rank correlation and factor analysis. It also analysed the performance of dedicated infrastructure funds vis-a-vis the diversified equity fund and also examines the performances of DIFs and diversified equity fund over Bull and Bear phases. He concluded the study that at the time of bull phase technology sector funds perform better than any other schemes of funds and return and risk is high for the technology scheme funds.

From the study conducted by [6] evaluates the performance of Indian Mutual Funds, which is carried out through relative performance index, risk-return analysis, Treynor's ratio, Sharp's ratio, Sharp's measure, Jensen's measure, and Fama's measure. The data used is daily closing NAVs. In his study finding he suggests that the investment in SBI contra funds with moderately high risk perform well in market.

Methodology

For this study, top ten technology sector growth funds that were existent in the last three financial years have been selected for the purpose of evaluation. The monthly closing Net Asset Value (NAVs) for the period a period of three years ending on 30th April 2019 have been extracted from the database of Association of Mutual Funds in India (AMFI) and the Standard and Poor's Bombay Stock Exchange Information Technology Index (S&P BSE IT index) of the Bombay Stock Exchange, India has been chosen as the benchmark index. Then, the total return, alpha - a measure of the difference between a fund's actual returns and its expected performance, given its level of risk as measured by beta, standard deviation and beta were calculated for the respective schemes to gather an idea of their actual earnings, risk and volatility respectively. Alpha and beta are calculated by least squared regression of the fund's excess return (or fund's return over treasury bills chosen as the risk free interest rate) and excess returns of the S&P BSE IT index. The standard deviation was calculated using the trailing monthly returns for a period of three years and all the monthly standard deviations were annualised.

The performance of various mutual fund schemes offered by the different Asset Management Companies (AMC) were evaluated and measured using relative performance index like, Treynor's Ratio, Sharpe Ratio, Upside ratio and downside ratio as follows:

Treynor's Ratio

[8] Treynor was the first researcher to develop a composite measure of portfolio performance. The ratio measures the portfolio's efficiency using the

relationship between risk adjusted return and the market risk, beta.

$$\text{Treynor's Ratio } (T) = \frac{R_p - R_f}{\beta_p}$$

Where, R_p is the return of the portfolio, R_f - the risk free return and β_p is the systematic risk of the portfolio.

Whenever R_p is greater than R_f and β_p is positive, a larger T value indicates a better portfolio for all investors. The following two cases would reflect a negative T value: when R_p is less than R_f implying a poor portfolio performance or when β_p is negative implying that the portfolio and the market are inversely proportional.

Sharpe Ratio

[7] William Sharpe developed the Sharpe ratio for calculating risk adjusted returns and takes into consideration the excess returns of the portfolio and the total risk of the portfolio. It helps to identify if a portfolio's excess returns are due to a better investment decision or due to a component of additional risk. The Sharpe ratio can be as

$$\text{Sharpe ratio} = \frac{R_p - R_f}{\sigma}$$

Where, R_p is the return of the portfolio, R_f - the risk free return and σ is the standard deviation of portfolio returns. In the study, it is calculated dividing a fund's annualized excess returns over the risk-free rate by its annualized standard deviation.

The ratio helps to directly analyse how much risk each fund had to bear to earn an excess return over the risk free interest rate.

Upside Capture Ratio

The ratio evaluates on how mutual fund performed relative to the index when the index had risen. It indicates the investment manager's overall performance in the up-markets. It is calculated as

$$\text{Upside Capture ratio} = \frac{\text{Manager's Returns}}{\text{Index Returns}} \times 100$$

If the value of the upmarket ratio is more than 100, the investment manager has outperformed the index during an up market. In the study, the ratio is calculated by taking the fund's monthly return during the periods of positive benchmark return divided by the benchmark return of the same month and then calculating the geometric average for the fund and index return during the up months for a period of three years.

Downside Capture Ratio

The ratio evaluates on how mutual fund performed relative to the index when the index had fallen. It indicates the investment manager's overall performance in the down-markets. It is calculated as

$$\text{Downside Capture ratio} = \frac{\text{Manager's Returns}}{\text{Index Returns}} \times 100$$

If the value of the downside capture ratio is less than 100, the investment manager has

outperformed or loss less than the index during a down market. If the ratio is negative, it reflects that the fund has generated positive returns when the benchmark declined. In the study, the ratio is calculated by taking the fund's monthly return during the periods of negative benchmark return divided by the benchmark return of the same month and then calculating the geometric average for the fund and index return during the down months for a period of three years.

On calculating the above ratios, the funds are categorised as top performing, moderately performing and least performing funds based on percentile. The top 30 percentile of funds are classified as top performing, the next 30 percentile of funds to be moderately performing and the last 40 percentile to be least performing and are colour coded to give a visual view of the funds' performance.

Results and Discussion

The top ten technology funds were selected to study the composite information reflected by performance ratios. The alpha which is a measure of the difference between a fund's actual returns and its expected performance, given its level of risk as measured by beta and standard deviation were calculated for the respective schemes to gather an idea of their actual earnings, risk and volatility respectively. Further the Sharpe ratio, Treynor Ratio, Upside and down side capture ratios were calculated to compare the performance of the funds.

Fund	Total return (%)	Alpha	Beta	Standard Deviation	Sharpe Ratio	Treynor's Ratio	Upside ratio	Downside ratio
A	16.88	4.44	0.91	16.8	0.81	14.953846	92	68
B	14.88	2.71	0.91	16.76	0.71	13.076484	89	73
C	15.72	5.17	0.69	13.46	0.9	17.556522	76	47
D	14.71	4.31	0.69	13.43	0.84	16.349565	75	49
E	14.24	3.87	0.68	12.97	0.83	15.831029	76	53
F	13.27	3.03	0.68	12.93	0.77	14.641324	74	55
G	14.31	3.63	0.72	13.15	0.83	15.159028	76	53
H	13.21	2.67	0.71	13.13	0.75	13.869718	74	56
I	14.57	4.87	0.59	11.05	0.98	18.354237	68	39
J	13.88	4.27	0.59	11.04	0.93	17.402034	67	40

Table 1. Consolidated values for the period 2016-2019

Inference: In table 1, it is seen that fund A has a total return of 16.88% and alpha is 4.44 implies that fund produced 4.44% more than what the beta would predict. The beta of the fund is 0.91 which is very close to the market. The standard deviation of the fund is 16.8% reflecting that 68 percentage of time the funds mean returns varied with tolerance of $\pm 16.8\%$ from the mean returns. The Sharpe ratio for fund A is 0.81 shows the risk adjusted performance of the fund. The higher the Sharpe ratio, the better the risk adjusted performance. The Treynor ratio of 14.95 implies how well the investment has compensated the investor for the given level of risk. The higher the Treynor ratio, the better the compensation to the investor. An upside capture ratio of 92 implies the fund has not generally beat the market while there was an upmarket while a downside capture ratio of 68 implies the fund had lost less compared to benchmark in a downside market. A higher upside ratio and a low downside capture ratio is advantageous to the investor.

The above measures were analysed and the selected funds were classified on the basis on each measure as best performing, moderately performing and least performing.

Fund	Sharpe Ratio	Treynor's Ratio	Upside ratio	Downside ratio	Rank
C	0.900	17.557	76	47	1
I	0.980	18.354	68	39	2
J	0.930	17.402	67	40	2
E	0.830	15.831	76	53	3
G	0.830	15.159	76	53	3
D	0.840	16.350	75	49	4
A	0.810	14.954	92	68	5
B	0.710	13.076	89	73	5
F	0.770	14.641	74	55	6
H	0.750	13.870	74	56	6

Table 2. Classification of Funds based on performance

In table 2, the funds that have performed the best have been coded green, the moderately performing

funds have been coded yellow and the least performing have been coded red. Here, the top 30 percentile of funds are classified as top performing, the next 30 percentile of funds to be moderately performing and the last 40 percentile to be least performing. This colour coded classification would yield information on the best performing funds as per information provided by each ratio. A checkered pattern would help to unearth additional information on riskiness or opportunity for returns underlying the fund categories. Now the funds are ranked by providing equal weightage to performance measures considered in the study.

From the table, it can be noted that as per Sharpe's ratio and Treynor's ratio, the best performing are funds C, I and J. But, while considering the upside capture ratios, funds I, J seem to be performing the least compared to the funds selected. These funds have performed less attractively during the up markets but have been seen as the best performing during the down markets. It is seen that fund C has fallen in the top 30 percentile considering all factors chosen in the study and hence ranked '1'. But the choice of fund C may not be termed as best as the choice may vary for investors who have different risk appetite. Hence, on integrating all the measures and classifying the measures, an investor could make a more informed decision and get a more vivid outlook on what to expect from his investment decision

The strength of measures like upside and downside capture ratios relies on the returns of the benchmark index stressing on the importance of wisely choosing a benchmark. The benchmark chosen should reflect the investor's perception of the market and expected returns, else the analysis of the ratios would not yield necessary insights for an investor.

Conclusion

This paper studies the relative information reflected by major ratios used in the analysis of performance of mutual funds. It is seen that when the funds were analysed using Sharpe ratio, Treynor's ratio, upside and downside capture ratios. The investors can make more informed choices by gaining a composite view of all the measures enabling him reduce the ambiguity in the expected returns. All the ratios should be analysed with an integrated perspective to derive any underlying information that plays a prominent role in the assessment of mutual fund performance.

From the analysis, it may also be concluded that the choice of the bench mark return plays a prominent role in the assessment of mutual fund performance. A wrong benchmark would lend a false view of the comparative risk and returns on the performance of the fund and hence the choice of the benchmark is crucial.

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