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A STUDY ON RISK ADJUSTED PERFORMANCE OF OPEN-ENDED EQUITY MID CAP AND MULTI – CAP MUTUAL FUND SCHEMES IN INDIA BY SHARPE RATIO : PRE COVID SCENARIO

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Abstract

Mutual funds are risky financial instruments, they are governed by the normal risks involved in investments. It is difficult to predict the performance of a mutual fund just on the basis of the return of the fund. The performance can only be evaluated in a correct manner if the risk is considered in evaluating the return. Hence a mutual fund's performance is accurate only if it is risk-adjusted performance.

In this study, 21 Open Ended Multi Cap Funds and 17 Open Ended Mid Cap funds are compared using the Sharpe Model by William F. Sharpe, who developed it in 1966. The data of 10 calendar years of pre covid is taken for the period between 1st January 2009 – 31st December, 2019. The S&P BSE SENSEX is taken as the benchmark index under this study. It was found that most of the funds had outperformed the market and given good returns.

Keywords: *Mutual Funds, Sharpe Ratio, Risk-adjusted, Performance, Standard Deviation*

INTRODUCTION

Right from the advent of investing, the capital market has been the primary avenue for the majority of investors to invest their savings. However, the capital market is volatile, and it is difficult to predict the outcome of investments. It is practically not possible to consistently beat the market and predict accurate returns. This concept is termed as an Efficient Market Hypothesis (EMH), which is one of the most accepted paradigms related to investments.

Mutual fund investments have primarily acted as a bridge to connect the void between the supply and demand of the funds in the financial markets. The Indian Capital market has come a long way by developing an efficient regulatory infrastructure towards ensuring the conduct of securities transactions efficiently and transparently. Two essential constituents of the capital market are the primary and the secondary market. The primary market helps both the corporate and the government to raise funds by issuing securities. The secondary market, through continuous trading activities, provides liquidity in the system. Mutual funds play an essential role in both the markets and also strengthens their transfer mechanism. The recent past shows a rapid change in the Indian securities market, especially in the secondary market with the establishment of SEBI and depository institutions.

LITERATURE REVIEW

Several pieces of literature were evaluated. Literature of both Indian and foreign origin and context we taken under the study. The reviews of the literature are explained and discussed as under.

Andre Santos, Joao Tusi, Newton Da Costa & Sergio Da Silva (2005)[1], evaluate the performance of 307 Brazilian stock mutual funds employing stochastic frontiers. They listed the top and the bottom ten actively managed funds for the period between April 2001–July 2003 and found that the fund's performance is based on the manager's ability. They also found that funds with low volatility are more efficient. They found no relation between fund size and performance.

Michael E. Drew, Madhu Veeraraghavan, Vanessa Wilson (2005)[2], the study provides little evidence that the Australian fund's management industry holds enough macro or micro forecasting abilities to bring positive alpha. Evidence suggests that managers did not try to significantly alter their systematic risk levels, resulting in primarily fixed coefficients over the sample period.

[1] Economics Bulletin (2005), Vol. 13, No. 2 pp. 1–6
[2] Investment Management and Financial Innovations, 2/2005 Pg: 111-127

Nalini Prava Tripathy (2006)[3], evaluated the market timing abilities of Indian fund managers of thirty-one tax planning schemes in India over the period December 1995 to January 2004 by using Jensen & Mazuy Model and Henriksson & Merton model. The study indicates that fund managers have not been successful in reaping returns above the market. Instead, they are timing the market in the wrong direction.

Vassilios Babalos, Nikolaos Philippas, Michael Doumpos, Constantin Zopounidis (2011)[4], made combined efforts to study Greek domestic equity funds for the period 2000–2009. They used risk-adjusted returns, such as Carhart's alpha, with funds' cost variables. The conclusion is that among employed variables, the complex Carhart's alpha plays a crucial role in determining fund rankings. On the other hand, fund rankings are affected only marginally by operational attributes.

R. Sivarma Prasad & B. Srinivas (2012)[5], tried to identify market timing abilities of 17 equity schemes in India for 1st April 2000 to 31st March 2010 by Treynor and Mazuy Model (1966) and Henriksson and Merton (1981). They concluded that the fund managers are successful in timing the market by getting returns over the market.

Subrata Roy & Shantanu Kumar Ghosh (2012)[6], they examined the open-ended equity-linked saving mutual fund schemes (ELSS) for the recession between 2008-2009. They used Sharpe, Treynor, Jensen and Treynor & Mazuy, models to conclude that the stock-selection and market-timing performances of the managers were statistically insignificant and also the diversification performances of the mutual fund schemes (ELSS) is undesirable. It was concluded that the overall performance of the open-ended mutual fund schemes (ELSS) was unsatisfactory.

Sadia Babar, Sania Nawaz & Sumaira Ashraf (2013)[7], studied the Pakistani mutual fund market from 2004 to 2011. Mutual funds' performance was analyzed using various evaluation techniques; Sharpe, Treynor, Jensen's alpha, Sortino, Information/Appraisal ratio, Fama overall performance, and performance attribution analysis. It was found that it is concluded that in Pakistan, overall mutual funds are not able to add value due to the slowdown in the overall economy and liquidity crisis in the market, the mutual fund industry is experiencing a declining trend in returns.

Rajib Deb (2013)[8], wanted to provide investor insight into the performances of tax saving mutual fund schemes. He used the Sharpe ratio to determine the performance of the funds and ranked them on that basis. According to the information now, available investors can evaluate which scheme is performing well.

Zabiulla (2014)[9], studied whether Indian mutual fund managers inculcate an active portfolio strategy. He also addressed how the asset size and the market capitalization are in correlation with the fund manager's ability to create value to the fund. It is evident from the research that fund managers lack superior stock-selection skills and fail to portray any distinguishable expertise in timing. It is fair to say that managers are unsuccessful in determining the timing of entering or exiting the market.

Sowmiya.G (2014)[10], wanted to know the basic concepts and terminologies of the mutual funds in public limited companies and private limited companies, to analyze performance and growth of selected mutual funds schemes with their NAV and their returns, to identify the return variance and to provide suggestions based on the analysis. The performance of the Birla Sun Life Equity Fund(G) scheme for the three months, namely July, August, September 2013, was reasonable compared to the other schemes. The beta and alpha values of all the schemes have shown that there was more risk than returned earned.

Gözde Ünal, Ömer Faruk Tan (2015)[11], empirically evaluated the selectivity skills and market timing ability of fund managers in Poland during the period from January 2009 to November 2014. After the global financial crisis of 2008. In total, 14 equity fund managers' performances are analyzed. They found that the fund returns were generally lower than the stock market, and Polish fund managers could not display an excellent performance both in selectivity skills and market timing abilities.

Shefali Gupta, S.K Shrivastava, Vinod K. Bhatnagar (2015)[12], carried out the performance evaluation of Indian mutual funds 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 the daily closing NAVs. The study period is 1st April 2008 to 31st March 2013. The findings of performance measures point that most of the mutual fund has given a positive return from 2008 to 2012.

JeelanBasha. V (2015)[13], used a sample of public-sector sponsored & private- sector sponsored funds of net assets to investigate the differences in assets held, diversification, and effects of diversification on investment performance for the period May 2002 to May 2005 Overall, all selected mutual fund companies have positive return during the study period. All selected mutual funds except HSBC has performed well as compared to the Sensex return. All of them have instability since their coefficient of Variation is in the range of 1.4947 to 1.9694. Beta is more than one to all selected mutual fund companies, which means the funds are highly

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[12] Sustainability Management and the Power of Innovation- Vol 2 (pp.17) Edition: 2015. ISBN: 978-93-84898-74-8 Pg: 68-82
[13] International Journal of Current Research Vol. 7, Issue, 04, pp.15316-15318, April, 2015

volatile than the index. HDFC stands top in all methods of performance of mutual funds. Axis Bank, SBI, and Birla mutual funds have more or less the same in their rankings. HSBC stands at the last.

Alka Solanki (2016)[14], tried to evaluate the performance of Reliance open-ended growth equity schemes. For the period from 1st April 2007 to 31st March 2016. To assess the performance of the selected mutual fund schemes, monthly returns are compared with Benchmark BSE National 100 and SENSEX returns. Results show that Out of the total schemes studied, and all schemes showed an average performance more significant than in comparison to the market return, i.e., BSE 100 and SENSEX except one, i.e., Reliance Focused Large Cap Fund.

N. Bhagyasree & B. Kishori (2016)[15], investigated the performance of open-ended, growth equity schemes from April 2011 to March 2015. The daily closing NAV of diversified schemes has been taken to evaluate the returns from the fund schemes. BSE-Sensex is used for the market portfolio. The performance of the sample schemes is assessed based on Treynor, Sharpe, and Jensen's measure, which will help investors in making better investment choices. The research revealed that 14 out of 30 mutual fund schemes had outperformed the benchmark return. The results show that few schemes which underperformed were facing a diversification problem. The positive Sharpe ratio of all funds indicated that funds were achieving returns higher than the risk-free rate. The Jensen measure showed that 19 out of 30 schemes showed positive alpha, which indicated the superior performance of the schemes.

P. Sathish & K. Sakthi Srinivasan (2016)[16], studied a sample of 20 schemes from the selected asset management companies over a study period of 5 years from January 2010 to December 2014. The performance of sample funds is evaluated by using statistical tools like average rate of return of funds, standard deviation, beta, correlation, regression analysis and risk-adjusted techniques are used by using Sharpe ratio, Treynor ratio and Jensen ratio. Benchmark index has also done for analysis.

M Ravichandran & A Jeyaraj (2017)[17], aimed at evaluating the performance of mutual funds and also to inspect the role of asset management companies about the public and private sector. The primary objective of this research is to study the financial performance of sample mutual fund schemes through statistical tools such as (beta, standard deviation, coefficient of determination, Sharpe ratio). The findings suggested mixed results as some funds were able to outperform the market and benchmark index while others underperformed.

Manoj Kumar Dash (2018)[18], examined the growth of the mutual funds and evaluated the operation of mutual fund schemes considering six mutual funds growth schemes, i.e., Reliance growth fund, SBI Magnum growth fund, ICICI growth fund, LIC growth fund, and Birla Sunlife growth fund during this period and applying Sharpe Ratio, Treynor Ratio, and Jenson Alpha to evaluate the performance of mutual funds. After analysis, the Sharpe ratio was positive for the five selected schemes out of six, which showed that funds were providing returns higher than the risk-free rate. Treynor ratio is positive for all selected schemes, which show over the performance of the schemes. Results of the Jensen measure revealed that all the chosen schemes were showed positive alpha, which indicated the superior performance of the schemes.

Literature over the years are complimenting each other, it shows that mutual funds have given positive returns over time for the amount of risk taken.

RESEARCH GAP

There has been extensive research on the performance appraisal of mutual funds. It is a much-studied and evaluated topic in the field of finance. The literature review suggests that a variety of methods and models have been used to test the performance of a portfolio. However, it is hard to ascertain the best method or model to measure the performance of a mutual fund accurately. There have been mixed results in the Indian mutual industry among the researchers. Some researches predict the funds have satisfactory performance, whereas others predict that they have unsatisfactory performance. Many researchers have assessed the funds over a short term period this can show abnormal returns.

RISK-ADJUSTED RETURN

Risk-adjusted return means an investment's return by measuring the amount of risk involved in obtaining that return, which is generally depicted as a number or rating. Risk-adjusted returns are applied to individual securities, investment funds, and portfolios. Some widely used risk measures include alpha, beta, R-squared, standard deviation, and the Sharpe ratio. When comparing two or more potential investments, an investor should always compare the same risk measures to each different investment to get a relative performance perspective.

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SHARPE MODEL

The Sharpe model or Sharpe Ratio is also known as the Sharpe measure, the Sharpe index, and the reward-to-variability ratio. It measures the performance of an investment or a portfolio compared to a risk-free asset, after adjusting for its risk. It is defined as the difference between the returns of the investment and the risk-free return, divided by the standard deviation of the investment. It is named after William F. Sharpe, who developed it in 1966.
The Sharpe ratio can be calculated to predict future outcomes and also to evaluate past performance. They are as follows:

I. Ex-post Sharpe Ratio: The Sharpe ratio can be used to evaluate a portfolio's past performance (ex-post) where actual returns are used in the formula.

II. Ex-ante Sharpe Ratio: An investor could use expected portfolio performance and the expected risk-free rate to calculate an estimated Sharpe ratio (ex-ante).

$$\frac{S = E[R_a - R_b]}{\sigma} = \frac{E[R_a - R_b]}{\sqrt{Var[R_a - R_b]}}$$

Here,

- R_a = The Asset Return
- R_b = The return on a benchmark asset, such as the risk-free rate of return or an index such as the S&P 500.
- $E[R_a - R_b]$ = the expected value of the excess of the asset return over the benchmark return.
- σ = The standard deviation of this expected excess return.

OBJECTIVE

This chapter has analyzed and studied the risk-adjusted performance of open-ended mutual fund schemes in India for 10 years ranging between 1st January, 2009 to 31st December, 2019. The objectives of this chapter are as under:

- To examine the risk-return performance of open-ended mutual fund schemes using the Sharpe ratio.
- To evaluate the performance of open-ended mutual fund schemes using the risk-adjusted model of William F Sharpe.

Benchmark Index

The Sharpe ratio requires the returns o the fund to be compared with the returns of the benchmark index. As the majority of the sample schemes have greater equity exposure, this study uses BSE SENSEX as a benchmark portfolio, which is considered an appropriate market proxy for investment performance comparison and evaluation.

Calculation of Return

The monthly returns of open-ended mutual fund schemes are calculated in the following manner :

$$R_{i_t} = \frac{NAV_{i_t} - NAV_{i_{t-1}}}{NAV_{i_{t-1}}} \times 100$$

Here,

- R_{i_t} = The return of i^{th} mutual fund scheme in period t.
- NAV_{i_t} = The net asset value of i^{th} mutual fund scheme in period t.
- $NAV_{i_{t-1}}$ = The net asset value of i^{th} mutual fund scheme in the preceding period t-1.

In the same manner, the return of the benchmark index or the market is calculated as under:

$$R_t = \frac{R_{m_t} - R_{m_{t-1}}}{R_{m_{t-1}}} \times 100$$

Here,

- R_t = Return of the market for period t.
- R_{m_t} = The closing market returns of the last trading day of the month t.
- $R_{m_{t-1}}$ = The closing market return of the last day of the previous month (t-1).

Measurement of Risk

There are many methods to gauge the risk of a portfolio. Here we are going to use Standard deviation (σ) as a measure of risk. This is the unsystematic risk of the portfolio. The unsystematic risk of the i^{th} mutual fund scheme is calculated as under:

$$\sigma_i = \sqrt{\frac{1}{n}\sum(R_i - \bar{R}_i)^2}$$

Here,

- σ_i = Unsystematic risk of the i^{th} mutual fund scheme.
- n = Size of the sample.
- R_i = Return of the i^{th} mutual fund scheme.
- $\overline{R_i}$= Average return of the i^{th} mutual fund scheme.

Test of Normality

The Kernel Density Estimation (KDE) is a way to estimate the probability density function of a random variable. Kernel density estimation is a fundamental data smoothing problem where inferences about the population are made, based on a finite data sample. In some areas like signal processing and econometrics, it is also termed the Parzen–Rosenblatt window method, after Emanuel Parzen and Murray Rosenblatt, who are credited with creating the estimation[1920]. One of the famous applications of kernel density estimation is estimating the class-conditional marginal densities of data when using a naive Bayes classifier[2122], which can improve its prediction accuracy. It is calculated as follows:

$$\hat{f}h^{(x)} = \frac{1}{n}\sum_{i=1}^{n} K_h(x - x_i) = \frac{1}{nh}\sum_{i=1}^{n} K\left(\frac{x - x_i}{h}\right)$$

Here,

- K = Kernel (a non-negative function).
- h > 0 is a smoothing parameter called the bandwidth.
- n = Size of the sample.
- x = Univariate varaiable.

Calculation of Sharpe Ratio

$$S_i = \frac{R_i - R_f}{\sigma_i}$$

Here,

- S_i= The Sharpe ratio of i^{th} scheme.
- R_i= Return of the i^{th} mutual fund scheme.
- R_f= Risk-free rate of return.
- σ_i= Standard deviation of the i^{th} scheme.

Data Analysis

Table 1.1: Risk-Adjusted Performance of Open-Ended Equity Multi-Cap Funds using Sharpe Ratio

No.	Scheme Name	$R_i - R_f$	σ_i	S_i	Rank
1	Aditya Birla Sun Life Equity	7.79	19.1	0.407700576	8
2	Baroda Multi Cap Fund	4.24	17.76	0.238557939	19
3	BNP Paribas Multi Cap Fund	8.11	16.8	0.48263244	5
4	Canara Robeco Equity Diversified	7.87	16.45	0.478131064	6

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5	DSP Equity	7.55	19.18	0.39354755	9
6	Franklin India Equity Fund	7.56	20.76	0.364294027	13
7	HDFC Equity	5.85	20.3	0.288064236	17
8	HSBC Multi Cap Equity Fund	6.66	18.53	0.359261738	14
9	ICICI Prudential Multicap Fund	7.06	18.36	0.384655937	10
10	IDFC Multi Cap Fund	8.97	17.66	0.507992525	4
11	**Invesco India Multicap Fund**	**10.86**	**19.48**	**0.557537936**	**1**
12	JM Multicap Fund	5.47	19.63	0.278725166	18
13	Kotak Standard Multicap Fund	9.35	17.45	0.535533582	2
14	LIC MF Multicap Fund	3.93	17.64	0.222522846	21
15	L&T Equity	6.48	17.29	0.374852574	12
16	Nippon India Multi Cap Fund	6.17	19.69	0.313414017	16
17	Principal Multi Cap Growth Fund	7.21	19.12	0.377133264	11
18	Quant Active Fund	7.01	20.01	0.350244378	15
19	SBI Magnum MultiCap	7.40	17.96	0.41195451	7
20	Taurus Starshare (Multi Cap) Fund	4.31	18.3	0.235613552	20
21	UTI Equity	8.82	16.84	0.52387399	3

Table 3.4 shows the Sharpe ratios of open-ended equity multi-cap funds. According to the data and outcomes the Invesco India Multicap Fund has performed the best and given its investors more than satisfactory returns against the risk. The Invesco India Multicap Fund is the top-rated fund in this category with a Sharpe ratio of 0.557537936 followed by the Kotak Standard Multicap Fund with 0.535533582 and the UTI Equity Fund with 0.52387399 respectively. It is illustrated that there is not much difference in the return to risk ratio of the top three rated funds. The overall difference in the Sharpe ratio for all the funds in this category is not vast. Hence it is safe to say that this category has given a satisfactory return to its investors as compared with the top-rated funds. The worst performing fund in the multi-cap fund category is the LIC MF Multicap Fund with a Sharpe ratio of 0.222522846.

Table 1.2: Risk-Adjusted Performance of Open-Ended Equity Mid-Cap Funds using Sharpe Ratio

No.	**Scheme Name**	$R_i - R_f$	σ_i	S_i	**Rank**
1	Aditya Birla Sun Life Mid Cap	5.73	23.21	0.246732658	17
2	BNP Paribas Midcap	10.67	19.24	0.554537006	3
3	DSP Midcap Fund	10.57	21.11	0.500811037	7
4	Edelweiss Mid Cap Fund	10.81	20.15	0.536233648	5
5	Franklin India Prima	9.96	18.32	0.543608679	4
6	HDFC Mid-Cap Opportunities	10.88	19.34	0.562795605	2
7	ICICI Prudential Midcap	6.43	20.91	0.307355858	15
8	**Invesco India Mid Cap**	**11.51**	**19.16**	**0.600585334**	**1**
9	Kotak Emerging Equity Fund	9.92	20.32	0.488412844	8
10	L&T Midcap	10.05	19.47	0.516163123	6
11	Nippon India Growth	5.98	20.09	0.297447636	16
12	Quant Mid Cap Fund	5.18	12.72	0.407081997	14
13	SBI Magnum Midcap	8.90	19.83	0.448976853	11
14	Sundaram Mid Cap Fund	8.54	20.66	0.413234076	13
15	Tata Midcap Growth	9.74	20.01	0.486655922	9
16	Taurus Discovery (Midcap) Fund	8.87	20.02	0.442822078	12
17	UTI Mid Cap	9.62	20	0.4811645	10

Table 3.5 shows the Sharpe ratio outcomes of open-ended equity mid-cap funds. Similar to the multi-cap category here also the fund from fund house Invesco is the top-performing fund. The Invesco India Mid Cap has a Sharpe ratio of 0.600585334 which beats the lowest ranking fund in this category by a margin of 0.353852676. The second-ranked fund is the HDFC Mid-Cap Opportunities Fund with a Sharpe ratio of 0.562795605. The last ranked fund is the Aditya Birla Sun Life Mid Cap Fund with the least Sharpe ratio. Notably, the Aditya Birla Sun Life Mid Cap Fund is the most volatile in this category with a standard deviation of 23.21. It can thus be said that more volatility leads to more risk which in turn bears fewer returns. Then again the Quant Mid Cap Fund has the least volatility with a standard deviation of 12.72 and yet it is in the bottom half ranked funds.

Hence, it is safe to say that for a fund to perform better there should be a balance between risk and return.

CONCLUSION

Table 1.1 shows the risk-adjusted performance of open-ended equity multi-cap funds. Both these categories are very close to each other and similar in nature. As observed they are more volatile, but they also provide more. All the funds in this category have positive Sharpe ratios.

Table 1.2 shows the risk-adjusted performance of open-ended equity mid-cap funds. The equity mid-cap funds are more volatile than the multi-cap category. The lowest standard deviation is also recorded in this category. The returns of mid-cap funds are higher than the multi-cap funds and lower than the large and mid-cap category. Concisely they have provided the investors with satisfactory returns. The highest average return belongs to this category. It indicates that they have given overall better returns than all the other categories.

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