

How Do Statistical Risk Measures Influence Investment Decisions of a Fund Manager in the Mutual Funds Industry?

A Case Study on Reliance Mutual Funds

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ABSTRACT

The paper aims to examine the impact of statistical risk measures on the investment decisions of a fund manager responsible for managing investments in mutual funds schemes. This has been done using a case-study approach wherein performance and fundamentals of select mutual fund schemes run by Nippon India Mutual Fund (Reliance Mutual Funds) were analysed to find the linkage. To facilitate the study, the paper uses intra-firm comparison wherein it compares different fund schemes each catering to a different purpose and a different class of investors. Further to support inferences, the paper uses past data and factors in past decisions of fund managers of various schemes run by Reliance Mutual Funds.

Keywords: Mutual Funds, Investment Decision-Making, Statistical Risk Measures, Fund Manager, Case Study.

1. INTRODUCTION

Through this paper, it is attempted to understand the following statistical measures: Beta, Alpha, Standard Deviation and Sharpe Ratio, their significance in predicting portfolio return and portfolio risk and the impact of these risk measures on a mutual fund manager's investment decisions. The scope of the study is defined as follows:

Mutual Fund Schemes Under Study: Schemes stated below are major equity schemes run by Reliance Mutual Funds and constitute the scope of the study.

Reliance Large Cap Fund, Reliance Vision Fund, Reliance Quant Fund, Reliance Balanced Advantage Fund, Reliance Index Fund – NIFTY Plan, Reliance Growth Fund, Reliance Small Cap Fund, Reliance Value Fund, Reliance Multi Cap Fund, Reliance Equity Hybrid Fund and Reliance Equity Savings Fund.

Time Period of Data Taken: April 2019 and earlier (This is done to adjust for disruptions that COVID-19 might have caused in the investment decisions of mutual fund managers)

2. STATISTICAL RISK MEASURES AND INVESTMENT DECISION-MAKING BY MUTUAL FUND MANAGERS

1. BETA (β)

Definition

Beta measures the systematic risk of a security or a portfolio compared to the market. It indicates how closely the fund is related to the index it follows. The market has a beta of 1.0. Value of beta helps in selecting stocks that reduce the overall volatility and create a more diversified portfolio.

Beta value represents the tendency of a portfolio's return to respond to movements in the market. It can be calculated as:

Beta coefficient (β) = Covariance (R_e, R_m) / Variance (R_m) where: R_e = the return on a security/portfolio

R_m = the return on the overall market

Variance refers to the spread of a data set around its mean value, while covariance refers to the measure of the directional relationship between two random variables.

The value of beta helps in predicting the performance of the portfolio in correlation with an index. However, the stock and the index/benchmark used in the calculation should be related. To ensure this, the portfolio should have a high R-squared value in relation to the benchmark.

Situations

- In a situation where the value of beta is less than one, it indicates that the portfolio's return will be less volatile than the market. For instance, a beta value of 0.70 implies that the volatility of the portfolio is lower than that of the market.
- Value of beta equals one indicates that the portfolio moves in the same direction as that of the market. It refers to a situation where price activity is strongly correlated to that of the market.
- Value of beta more than one indicates that the portfolio's return will be more volatile than the market. For example, if a fund portfolio's beta is 1.3, it is 30% more volatile than the market.
- Negative beta value (beta of -1.0) means that the stock is inversely correlated to the market. It means that the price movements work in the opposite direction than that of market trends.

Analysing Reliance Mutual Fund Schemes

In order to understand the significance of beta in influencing fund manager's investment decisions, the paper examines mutual fund equity schemes and attempts to give explanation for fund manager's investment decisions on allocation of funds using the beta of the respective portfolio. Also, it attempts to justify the value of beta by comparing it with the nature of a particular mutual fund scheme.

Source of Data: Fundamentals by Reliance Mutual Funds (April 2019). Values for beta are taken from the financials which have been calculated using monthly rolling returns for 36 months period with 6.20% risk free return (FBIL Overnight MIBOR as on 30/04/2019)

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Table 1: Analysis of β values of different schemes

$\beta > 1$	Reliance Equity Hybrid Fund	<ul style="list-style-type: none"> Reliance Equity Hybrid Fund capitalizes on equity growth potential by maintaining a large cap-oriented portfolio hence the fund manager allocates funds in stocks which have greater return potential and price sensitivity; therefore, the value of beta is more than one.
$\beta \approx 1$	Reliance Balanced Advantage Fund Reliance Index Fund NIFTY Plan Reliance Multi-Cap Fund	<ul style="list-style-type: none"> Reliance Balanced Advantage Fund aims to capitalize on the potential upside in equity markets while also attempting to limit the downside by dynamically

$\beta \approx 1$		<ul style="list-style-type: none"> Managing the portfolio through active use of debt hence the fund manager allocates funds on stocks and instruments that balance out the upside and downside. Reliance Index Fund – NIFTY Plan is designed to move in tandem with NIFTY Index. Hence the fund manager invests in stocks constituting the NIFTY 50 Index in the same proportion as in the Index. Reliance Multi Cap fund invests in all of three capitalization categories: Large, Mid and Small. Due to the diversified portfolio, the overall value of beta of the portfolio gets balanced out (approximately equal to one)
$\beta < 1$	Reliance Large Cap Fund	<ul style="list-style-type: none"> Such schemes aim at ensuring return even when the markets are down, hence fund managers choose stocks that are less volatile than the market. Stocks with lower beta values provide stability to the portfolio whilst also providing better risk adjusted return in the long term.
	Reliance Vision Fund	
	Reliance Quant Fund	
	Reliance Growth Fund	
	Reliance Small Cap Fund	
	Reliance Value Fund	
	Reliance Equity Savings Fund.	

2. Alpha

Definition

Alpha is the difference between the return of a portfolio, given the value of beta, and the return expected. It is calculated using CAPM and measures the excess return that a fund generates over its expected return. It may be positive or negative depending on the performance of the fund. A positive alpha implies that the fund has outperformed its benchmark index. A negative alpha indicates underperformance.

$$\text{Alpha} = \text{PR} - \text{CAPM}$$

where: PR = portfolio return

CAPM = risk-free rate + β (return of market risk-free rate of return)

Alpha can therefore be defined as the value that the fund manager adds to or subtracts from the fund. Prudent fund managers aim at generating the alpha in diversified portfolios, with diversification intended to eliminate the unsystematic risk. Lower values of alpha prompt fund managers to change their investment strategies and diversify the portfolio in order to aim higher alpha.

Analysis of Reliance Mutual Fund Schemes

To understand the impact of alpha on the investment decisions of a fund manager, certain ratios that track the performance of the fund and the fund manager have been identified and studied in relation to alpha.

Relationship with Other Ratios

A. Total Expense Ratio

Total expense ratio (TER) is a computation of the total costs associated with managing and operating a mutual fund. This consists primarily of management fees and additional expenses including trading fees, legal fees, auditor fees, and other operational expenses.

Since fund managers charge fees from investors for managing funds, the total expense ratio represents loss to investors when the fund underperforms from the predicted return (negative alpha).

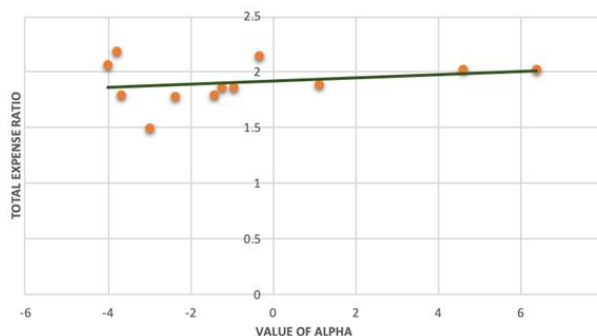
In certain circumstances, index benchmarks manage to beat the performance of the fund manager. The fee therefore acts as net loss to the investor. This difference is precisely known as alpha. Therefore, the total expense ratio should be in alignment with performance returns and alpha.

To further prove the relation between the value of alpha and TER (total expense ratio), the paper analysed schemes under the study. Correlational Analysis showed a positive correlation between value of alpha and change in TER. The correlation is positive but weak with $r=0.25$ (Pearson correlation coefficient).

Source of Data: Fundamentals, April 2019 (issued by Reliance Mutual Funds)

Schemes under Study: Equity Mutual Fund Schemes run by Reliance Mutual Funds. For the list, refer to the introduction.

Figure 1: Alpha and Total Expense Ratio



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B. Portfolio Turnover Ratio

The portfolio turnover ratio is calculated by considering the fund's acquisitions or dispositions, whichever number is greater, and dividing it by the average monthly assets of the fund for the year. It can also be gauged as the number of times the fund manager changes the allocation of funds.

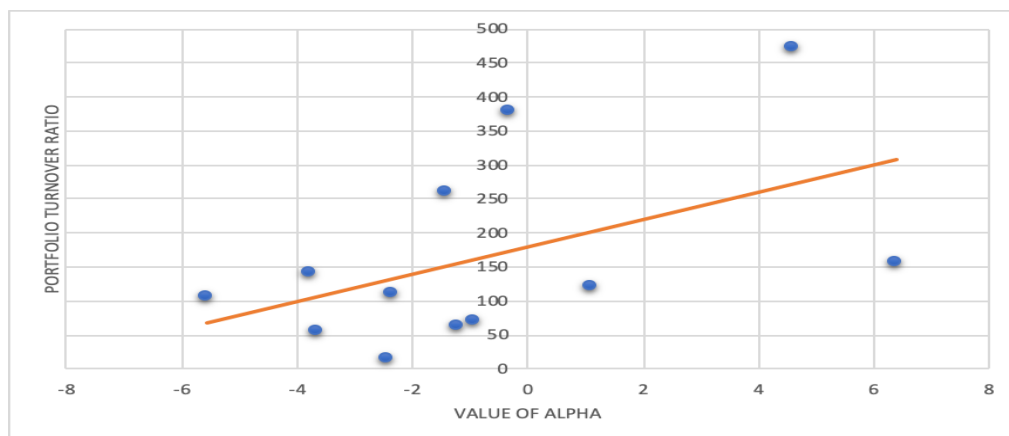
Although not directly related to diversification, portfolio turnover ratio helps in finding how quickly investments in stocks change.

After analysing the factsheets of Reliance Mutual Fund schemes, it was observed that alpha and portfolio turnover ratio were positively correlated with $r=0.5$.

Source of Data: Fundamentals, April 2019 (issued by Reliance Mutual Funds)

Schemes Under Study: Equity Schemes run by Reliance Mutual Funds. For the list, refer to the introduction.

Figure 2: Alpha and Portfolio Turnover Ratio



Standard Deviation

Definition

Standard deviation measures the volatility of a fund by showing how much the return on a fund is deviating from the mean based on its historical performance. Higher SD also implies that Net Asset Value of the fund is more volatile as compared to a fund with lower SD, hence the former is riskier.

Major drawback of using standard deviation as a risk measurement instrument is the fact that it assumes normal distribution calculating all uncertainty as risk thereby not accounting for favorable circumstances such as above average returns.

Relevance of Standard Deviation for Fund Managers

The value of standard deviation is usually in accordance with the nature of the scheme for instance, growth funds have higher SD due to expectation of higher than average returns whereas index funds have lower SD as the fund's goal is to replicate the index. Schemes are designed in accordance with investor needs and therefore allocation of funds is done based on the goal of the fund. Aggressive

investing would demand higher risk and hence higher standard deviation.

Based on returns and the type of investor the schemes cater to, the fund manager allocates funds in different stocks and maintains standard deviation specific to the nature of the scheme.

Analysis of Reliance Mutual Fund Schemes

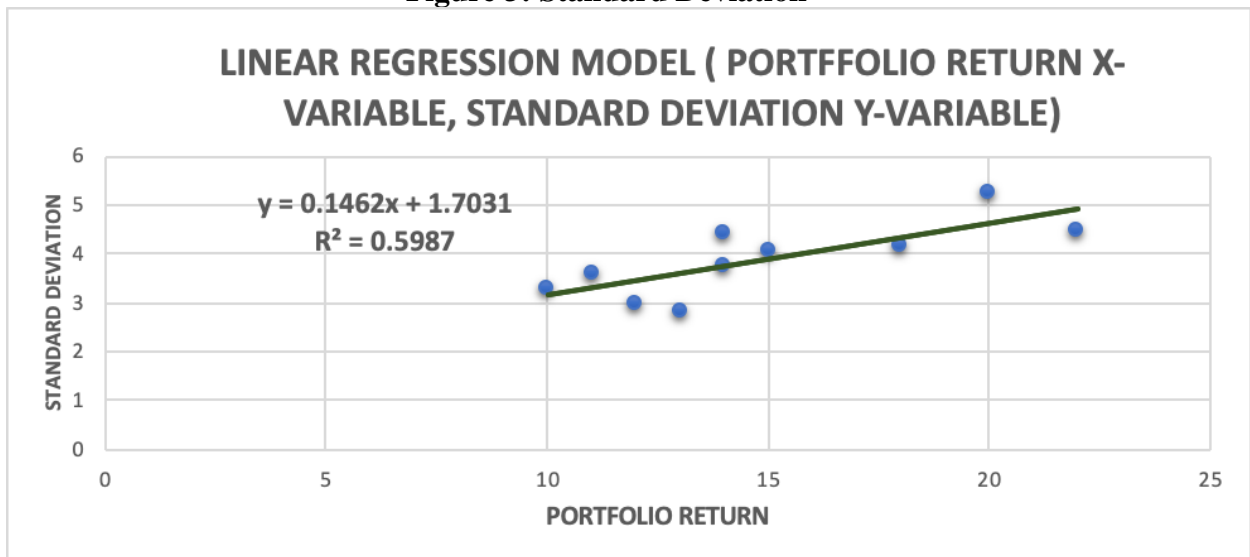
After analysing the Reliance Mutual Fund Equity Schemes, it was observed that schemes with higher returns (past – since inception) tend to have higher standard deviation.

Running a simple linear regression model with Returns as X variable (independent variable) and Standard Deviation as Y variable produces the following result.

Source of Data: Fundamentals, April 2019 (issued by Reliance Mutual Funds)

Schemes Under Study: Equity Schemes run by Reliance Mutual Funds. For the list, refer to the introduction.

Figure 3: Standard Deviation



The behavior demonstrated in the model can be explained by the fact that fund managers take riskier approach for mutual fund schemes which are high growth in nature – this risk leads to higher volatility in returns which explains the higher SD. Similarly, for mutual fund schemes which are low growth in nature, fund managers take an approach that enables stabilized returns for a long period of time – this leads to low volatility and consequently to low SD.

3. SHARPE RATIO

Sharpe ratio is an estimate of excess portfolio return over the risk-free rate relative to its standard deviation. Ex-post Sharpe ratio is calculated using realized historical return while ex-ante Sharpe ratio uses expected return. This paper focuses on ex-post Sharpe Ratio.

$$\text{Sharpe Ratio} = \frac{R_p - R_f}{\sigma_p}$$

where, R_p = return of the portfolio R_f = risk-free rate

σ_p = standard deviation of the excess return of the portfolio

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Relevance of Sharpe Ratio for Fund Managers

1. **Investor Attraction:** Sharpe Ratio is a measure of risk adjusted performance. Investors use this measure to decide whether to compare different mutual funds at a given level of risk.
2. **Assists in Portfolio Diversification:** Portfolio diversification with assets having low to negative correlation helps in reducing the overall portfolio risk and consequently increases the Sharpe ratio. To conclude, adding diversification increases the Sharpe ratio compared to similar portfolios with a lower level of diversification.

Analysis of Reliance Mutual Fund Schemes

1. **Growth-risk and Sharpe Ratio:** High Growth funds with high-risk potential tend to have higher Sharpe ratio than low growth funds with low-risk potential. A similar trend was observed in Reliance Mutual Fund Equity Schemes as well.
2. **Beta and Sharpe Ratio:** Reliance Mutual Fund Equity Schemes with beta more than one had a higher value of Sharpe ratio when compared to schemes with beta value equal to/less than one.

Source of Data: Fundamentals, April 2019 (issued by Reliance Mutual Funds)

3. **Findings:** The paper found linkages between statistical risk measures and investment decision-making by mutual fund managers. Findings of the paper are summarized as follows:
 1. **Beta:** After analysing the financial data of Reliance Mutual Fund Equity Schemes, it was found that the fund manager maintained the beta value as per the nature of the mutual fund scheme. Hence for high growth schemes such as Reliance Equity Hybrid Fund, beta was consistently maintained at a value more than 1. Further, stocks constituting the fund were more volatile than the market due to the high-growth nature of the mutual fund scheme. Similarly for schemes aiming to ensure returns even when the markets are down, fund managers chose stocks that are less volatile than the market (beta less than one) because stocks with lower beta value provide stability to the portfolio whilst also better risk adjusted return in the long term. Examples of such schemes are Reliance Large Cap Fund, Reliance Vision Fund and Reliance Quant Fund.
 2. **Alpha:** This paper tried to explore the possible relationship between Alpha and Total Expense Ratio AND Alpha and Portfolio Turnover Ratio since all these ratios were influential in determining the success of a mutual fund manager. After analysing Reliance Mutual Fund Equity Schemes, the following results were obtained: Alpha and Total Expense Ratio were positively related but had weak correlation. Alpha and Portfolio Turnover Ratio were positively related and had strong correlation. The later correlational relationship meant that a higher alpha and the number of times the fund manager changed the allocation of funds were linked.
 3. **Standard Deviation:** The value of standard deviation is usually in accordance with the nature of the scheme for instance, growth funds have higher SD due to expectation of higher than average returns whereas index funds have lower SD as the fund's goal is to replicate the index. Schemes are designed in accordance with investor needs and therefore allocation of funds is done based on

the goal of the fund. Aggressive investing would demand higher risk and hence higher standard deviation. After analysing the Reliance Mutual Fund Equity Schemes, it was observed that schemes with higher returns (past – since inception) tend to have higher standard deviation.

- 4. Sharpe Ratio:** Analysis of Reliance Mutual Fund Equity Schemes showed that funds with beta higher than one had a higher value of Sharpe ratio when compared to funds with beta equal to/less than one. This is justified because high Growth funds with high-risk potential (beta more than one as found out by our analysis) tend to have higher Sharpe ratio than low growth funds with low-risk potential (beta less than one).

5. CONCLUSION

The paper aimed at establishing a link between statistical risk measures and the investment decisions of a fund manager using a case study approach. From our findings, it can be clearly seen that statistical risk measures play a huge role in influencing the decision-making of mutual fund managers. This phenomenon is cyclical: good decisions lead to sound values of statistical risk measures and sound statistical risk measures lead to better decision making. While this phenomenon exists in theory, this paper aimed to provide empirical evidence for the same. Further to eliminate firm heterogeneity (in operations of fund managers), intra-firm comparison was adopted to better understand the above relationship. While the paper provided empirical evidence, the authors acknowledge that the relationships so explored have external and uncontrollable determinants as well. Hence, no risk measures should be taken into isolation for understanding the effect on investment decision-making by fund managers. A multitude of risk measuring ratios and external uncontrollable determinants together influence the investment decisions of a mutual fund manager.

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