

Comparative Analysis of Sharpe and Sortino Ratio with reference to Top Ten Banking and Finance Sector Mutual Funds

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ABSTRACT

Mutual fund represents a way of investing money into a professionally managed and diversified pool of securities that hopefully will provide a good return on unit holder's money for the purpose of making an investment in mutual fund, fund manager prepare a professionally managed set of portfolios. A portfolio is defined as a collection of investments. As it is not desirable for any investor to invest all its funds in one individual security. Hence the performance of mutual funds takes very important role. There are various ratios to analyse the performance of mutual fund. Here with my analysis i want give an understanding of Sharpe ratio and Sortino ratio. As we know within the last few year considerable progresses has been made in three closely related areas-the theory of portfolio selection, the theory of the pricing of capital asset under the condition of risk, and the general behaviour of stock market prices. Result obtained in all three areas is relevant for evaluating mutual fund performance. However with this reference, i want to analyse the performance of mutual fund with the help of Sharpe ratio and Sortino ratio which are used for the portfolio evaluation and also want to give comparative analysis of Sortino ratio and Sharpe ratio.

Keywords: Sharpe ratio, Sortino ratio, Standard Deviation, Risk premium, Fund Performance, Downside Deviation.

INTRODUCTION:

One of the benefits of the mutual fund for the individual investor is the ability to delegate management of the portfolio to investment professionals. The investor retains control over the broad features of the overall portfolio though the asset allocation decision: each individual chooses the percentage of the portfolio to invest in bond versus equity funds versus money market funds. one of the main advantage of mutual funds is that they give small investor access to professionally managed diversified portfolio of equities, bond and other securities which would be quite different to create.

Diversification helps in reducing the risk of investing.. "Never put all your eggs in one basket" is what is meant by diversification. Instead of investing all fund in one asset, the funds be invested in a group of assets.

Total risk of one investment is the sum of the impact of all the factors that might affect return from that investment .However, investors need not suffer risk inherent with individual investment as it could be reduced by holding a diversity of investment. A common person who are not aware of mutual fund , go for investing in mutual fund through AMC as they have fund managers for taking investment decision .For the purpose of analysing mutual fund performance fund manager use various ratios like Sharpe , Sortino, Jensen, Treynor etc. Sharpe ratio is very commonly used to analyse the performance of mutual fund. Higher Sharpe ratio indicate better performance of the fund.. sometimes Sharpe ratio does not give better measure for analysing fund performance then we take into consideration the other measure /ratios to analyse the funds performance.

REVIEW OF LITERATURE:

(Markowitz 1952) have done a pioneer work for the development of portfolio theory. He has provided a conceptual framework and analytical tool for selection of an optimal portfolio. He shows as to how an investor can construct portfolio of investment (Treyner

(Sharpe 1963) introduced SINGLE INDEX MODEL .the basic preposition of the single index model is that the return on the security could be regarded as a single index of the market. The idea is that the portfolio is affected by the movement in stock market.

(Sharpe et al 1964) developed capital assets pricing model to how risky assets should be priced. CAPM tries to establish a relationship between risk of an asset and its expected return. The expected return can be used to find out whether is earning more or less than its fair return. CAPM helps identifying the assets which are under-priced or over-priced

(Sharpe 1966) develop the sharpe index of historical return in terms of risk free rate to the standard deviation of the portfolio returns.the study concluded that mutual fund underperform the market and manager choose funds as good as market.

(Treyner 1965) concluded that standard deviation measures systematic risk and unsystematic risk while in case of mutual fund by creating portfolio ,unsystematic risk is diversified and only systematic risk is left , so beta should be used instead of standard deviation.

(Jensen 1968) has developed another model for evaluation of performance of a portfolio. This measure is based on differential returns and is known as Jensen's ratio or Jensen's Index. Jensen's ratio measures the difference between the actual return of a portfolio and expected return of a portfolio in view of the risk of the portfolio.

(Fama 1972) attempts to measure the performance in terms of the components of risk of the portfolio .In this model the risk premium is consisting of reward for risk bearing and reward for stock selection. The reward for stock selection is for the better selection of stock for the portfolio. It is the return earned on a portfolio over and above the return in view of the risk of the portfolio.

(Sharpe 1996) explains the theory of portfolio selection, the theory of pricing of capital assets under conditions of risk, and the general behaviour of stock market prices. Results obtained in all three areas are relevant for evaluating mutual fund performance. However one paper pointing the direction for future studies of mutual fund performance has appeared. He concluded and represents an attempt to bring to bear on the measurement and prediction on mutual fund performance , some of the result of recent work in capital theory and the behaviour of stock –market prices.

(Modigliani and Modigliani 1997) given a measure which describes that a portfolio is adjusted by mixing a sufficient quantum of risk –free securities so that the risk of portfolio is equal to the risk of the market index. Then , the return of the Adjusted portfolio is compared with the return on the market index to find out the performance of the portfolio.

(Chang et al 2008) investigate the performance of 30 Taiwan open-ended equity mutual fund and the sample period was divided into sub periods ,the bull market period(Nov 2006 to OCT (2007) and the bear market (Nov 2007 to oct 2008) and the analysis of the performance evaluation used six indicators to track the equity mutual fund with positive (negative) performance in the bull(bear) market. Moreover, most of the mutual fund performance ranking are inconsistence for both bull and bear market period.

RESEARCH MEHEDOLOGY:

The concept of research methodology is extensive. It can be classified as a tool for problem solving or a way to conduct and gather new knowledge. Everything that can contribute to this is research methodology. Research methodology refers to the procedural framework within which research is conducted (Remenyi, Williams, Money, & Swartz, 1998).

Sample Selection:

Analysis includes observation of top ten banking and finance sector open ended mutual funds.

Secondary Data Sources:

Secondary contains relevant data that has been collected with a different purpose, but from which conclusions is valuable for the purpose. In this research work, secondary data is used from the different websites.

As my study consist of top ten banking and finance sector fund. I have taken top ten banking sector fund from (www.nseindia.com, www.bseindia.com). Details of standard deviation, Sharpe ratio, Sortino ratio and Standard Deviations have been taken from (www.nseindia.com, www.bseindia.com, www.indiatimeseconomictimes.com)

OBJECTIVE OF THE STUDY:

- To give an understanding of Sharpe and Sortino ratio for analysing the mutual fund performance.
- To make a difference between Sharpe ratio and Sortino ratio.
- To discuss the situation when Sortino ratio give better analysis of mutual fund performance than Sharpe ratio.
- To give overall understanding of Sharpe ratio and Sortino ratio in comparative way.

METHODOLOGY:

Following methodology should be taken into consideration while comparing the Sharpe and Sortino ratio. Systematic risk and β factor: William Sharpe has suggested that the systematic risk can be measured by β , the beta factor. The beta will be viewed as an index of the degree of responsiveness of the securities return with the market return. The beta coefficient is the relative measure of sensitivity of an asset's return to change in the return of the market portfolio. The beta coefficient is calculated by relating the returns of sensitivity with the returns for the market. Mathematically, the beta of security is the security's covariance with the market portfolio divided by the variance of the market portfolio and can be calculated as following:

$$\beta = \frac{\text{cov}(S, M)}{\sigma^2}$$

Sharpe Ratio; The Sharpe ratio developed by William F. Sharpe is the ratio of portfolio total return minus risk free rate divided by standard deviation of the portfolio which is a measure of its risk. The Sharpe ratio is simply the risk premium per unit of risk, which is quantified by the standard deviation of the portfolio.

$$\text{sharpe ratio} = \frac{\text{risk premium} - \text{risk free rate of interest}}{\text{standard deviation of the portfolio}}$$

hence the Sharpe ratio measures the performance of the portfolio compared to the risk taken, the better the performance and greater the profit for taking on additional risk.

The higher the Sharpe ratio the better the funds historical risk adjusted performance. The Sharpe ratio is the single number, which represent both the risk, and the return inherent in a fund. The Sharpe ratio represents this trade-off between risk and returns. At the same time it also factors in the desire to generate returns, which are higher than those from risk free returns.

Mathematically the Sharpe ratio is the return generated over the risk free rate, per unit of risk. Portfolio diversification with assets having low to negative correlation tends to reduce the overall portfolio risk and consequently increases the Sharpe ratio. For instance, let's take a portfolio that comprises 50 per cent equity and 50 per cent bonds with a portfolio return of 20 per cent and a standard deviation of 10 per cent. Let's take the risk-free rate to be 5 per cent. In this case, the Sharpe ratio will be 1.5 [(20% - 5%)/10%]. Let's add another asset class to the portfolio, namely a hedge fund, and tweak the portfolio allocation to 50 per cent in equity, 40 per cent in bonds and 10 per cent in the hedge fund. After the addition, the portfolio return becomes 25 per cent and standard deviation remains at 10 per cent. If the risk-free rate is taken as 5 per cent, the new Sharpe ratio will be 2 [(25% - 5%)/10%].

This shows that the addition of a new asset can give a fillip to the overall portfolio return without adding any undue risk. This has the effect of augmenting the Sharpe ratio.

Standard Deviation: a reliable and convenient way to quantify the risk is to measure the degree of spread of possible returns around the expected returns. This is known as the standard deviation " σ " of possible returns. An investor may have a different possible returns each with a corresponding probability. These possible returns and the respective probabilities can be used to find out the expected return as per the following equation:

$$\sigma = \sqrt{\sum_{i=1}^n P_i (x_i - \bar{r})^2}$$

Here x_i =expected returns

P_i =probabilities of the returns

\bar{r} = average returns

Risk Premium: Different types of investment /securities have varying degree of risk attached with their returns. Investors want a commensurate return from the investment in the view of degree of risk attached there with. Risk premium is the additional amount that the investor expects from an investment for assuming the extra risk of that investment. The government treasury bills are considered as risk free and the return expected from such investments are taken as risk free return. This return is considered as the benchmark. Higher the degree of risk

of a particular investment compared with the risk free investment, greater is the additional amount to the risk premium expected by the investor.

Sortino Ratio: Sortino ratio is a modification of the Sharpe ratio but uses downside deviation rather than standard deviation as a measure of risk i.e. only those returns falling below a user specific target, or required rate of return are considered risky.

It is interesting to note that even NOBEL LAUREATE Harry Markowitz, when he developed modern portfolio theory in 1959, recognized that the downside deviation is relevant to the investors, using downside deviation to measure risk would be more appropriate than using standard deviation.

In the early 1980s, Dr. Frank Sortino, had undertaken research to come up with an improved measure to risk adjusted return. According to Sortino, Brian Rom's idea at investment termologies to call new measure the Sortino ratio, the first reference to the ratio was in financial executive magazine(August 1980) and the first calculation was published in a series of articles in the journal of risk management(September 1981)

The Sortino ratio "S" defined as

$$S = (R - T) / TDD$$

Where,

R=the average period return

T=the target or required rate of return for the investment strategy under consideration

TDD= the target downside deviation

Target Downside Deviation: (TDD) TDD is defined as the root mean square of the deviations of the realized return's underperformance of 0.

$$TDD = \sqrt{\sum_{i=1}^n p_{i(0, x_i - T)}^2}$$

T = target return

The equation for TDD is very similar to the definition of standard deviation.

A Sharpe ratio of 1 or higher is commonly considered to be a good risk-adjusted return rate. the Sortino ratio variation of the Sharpe ratio only factors in downside or negative volatility, rather than the total volatility used in calculating the Sharpe ratio.

The Sharpe ratio and Sortino are both risk adjusted evaluations of return on investment. the Sortino ratio is a variation of the Sharpe ratio that only factors the downside risk

The Sortino ratio variation of the Sharpe ratio only factors is downside, or negative volatility rather than the total volatility used in calculating the Sharpe ratio. The theory behind the Sortino variation is that upside volatility is plus for the investment, and it therefore should not be included in the risk calculation.

Therefore, the Sortino ratio takes upside volatility out of the equation and uses only the downside standard deviation in its calculation instead of the total standard deviation that is used in calculating the Sharpe ratio.

Analysts commonly prefer to use the Sharpe ratio to evaluate low volatility investment portfolios and the Sortino variation to evaluate high volatility portfolio.

DATA ANALYSIS:

Study of top ten banking and financial sector open ended fund has been done to analyse the performance of mutual fund on the basis of Sharpe ratio and Sortino ratio.

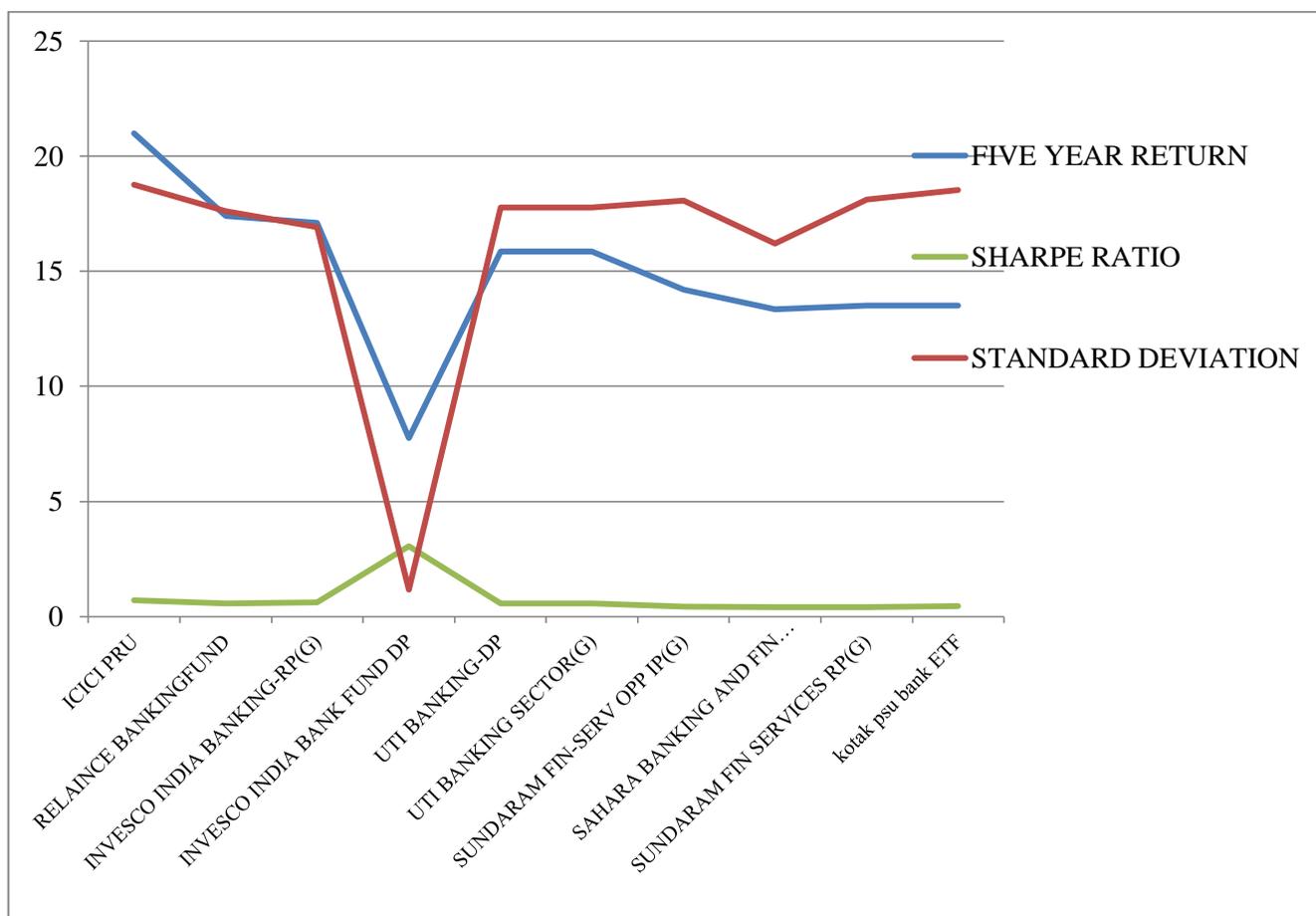
Analysis of Top Ten Indian Banking and Financial Sector Mutual Fund:

Fund	Category	Last NAV rs/unit	Five Year Return	S.d.	Sharpe Ratio	Sortino Ratio
ICICI PRU banking and fin-SERV-RP(G)	Banking and finance	56.0600	20.99%	18.76%	0.71	1.18
Reliance banking fund (G)	Banking and finance	250.2143	17.39%	17.60%	0.57	0.88
Invesco india banking-RP(G)	Banking and finance	49.4900	17.10%	16.91%	0.62	0.88
Invesco India bank fund-DP	Banking and finance	1011.9023	7.75%	1.18%	3.05	4.95

Fund	Category	Last NAV rs/unit	Five Year Return	S.d.	Sharpe Ratio	Sortino Ratio
UTI banking sector-DP	Banking and finance	37.5056	15.85%	17.78%	0.58	0.88
UTI banking sector (G)	Banking and finance	95.8365	15.85%	17.78%	0.58	0.88
Sundaram fin-serv opp.IP(G)	Banking and finance	39.3295	14.21%	18.08%	0.44	0.69
Sahara Banking and fin. Services(G)	Banking and finance	59.4148	13.36%	16.21%	0.42	0.68
Sundaram fin-services Opp.RP(G)	Banking and finance	37.0204	13.5%	18.12%	0.40	0.63
Kotak PSU bank – ETF	Banking and finance	246.1384	13.5	18.54	0.46	0.69

Source: <https://economictimes.indiatimes.com>, <https://www.bseindia.com>, <https://www.nseindia.com>

Chart 1: Following Figure Show a Line Chart among Five Year Return, Standard Deviation and Sharpe Ratio

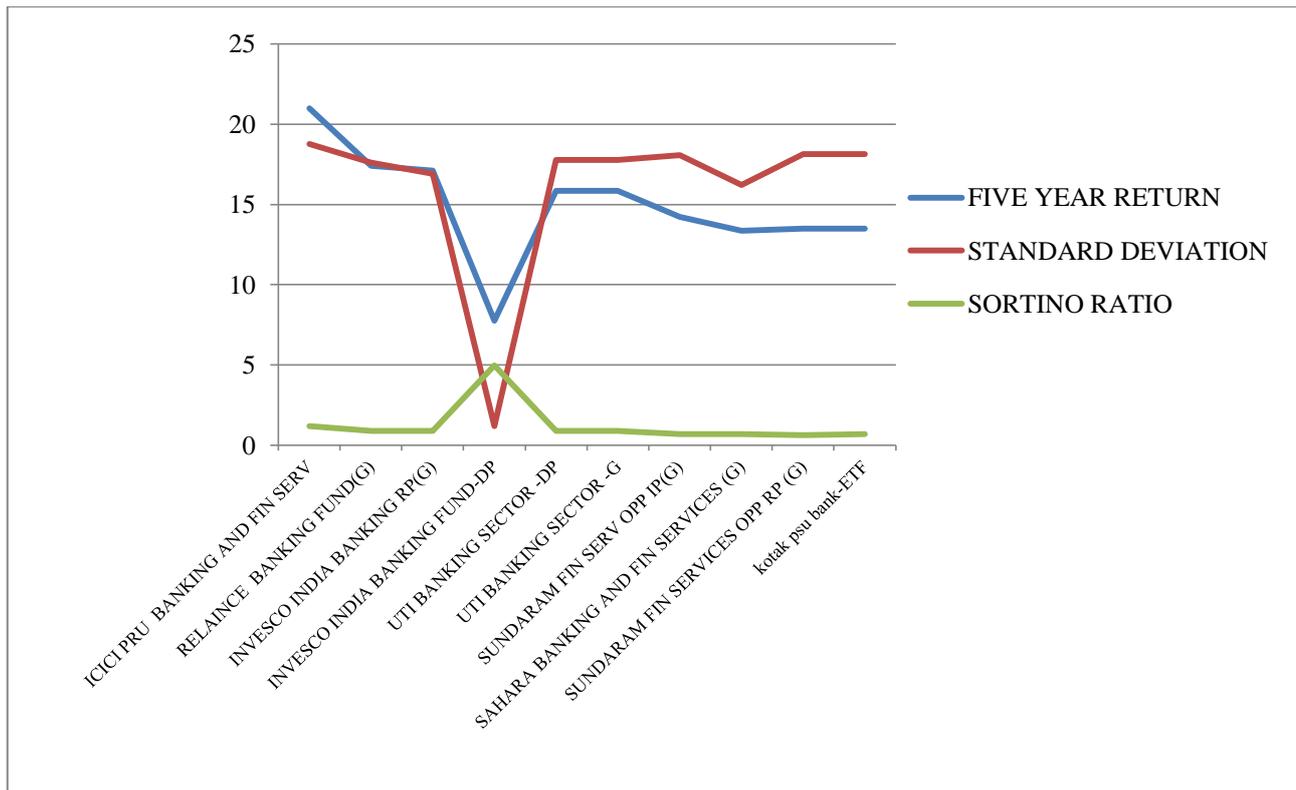


*The values of five year return and standard deviation are in percentage term.

*value of Sharpe ratio is in absolute term

From the above chart it is clear that the funds having the higher Sharpe ratio are having the higher returns but in case of “Invesco India bank fund-DP” Sharpe ratio is high but it shows the low return of 7.75%. Hence it is clear sometimes Sharpe ratio does not give a perfect measure to analyse the funds’ performance.

Chart 2: The Following Figure Show the Line Chart among Five Year Return, Standard Deviation and Sortino Ratio



*The values of five year return and standard deviation are in percentage term.
 *value of sorting ratio is in absolute term

Funds having the higher sorting ratio have the lower returns due to negative downside deviation because we know that Sortino ratio do not consider positive deviation while calculating the return. Hence higher the Sortino ratios lower the return.

From the above chart it is clear that INVESCO INDIA BANKING FUND –DP is highest Sortino ratio and lowest five year return indicating lowest negative downside deviation.

ANALYSIS AND FINDINGS:

In the above table we analysed that INVESCO INDIA BANK FUND-DP has higher Sharpe ratio i.e.3.05 and lower standard deviation (1.18%) and also higher Sortino ratio (4.95). with this we can interpretate that due to higher Sortino ratio of 4.95 fund has maximum downside deviation because of this, in spite having higher Sharpe ratio the fund is having lowest percentage of five year return i.e. 7.75%.

And also ICICI PRU BANKING ANF FIN SER-RP(G) FUND having the height five year return which 20.99% in spite of having lower Sharpe ratio of 0.71% and high standard deviation of 18.79%. fund is showing the height five year return because of positive standard deviation because due to low Sortino ratio which is 1.18 which indicate lower downside deviation.

In the above table we see that the top ten banking and finance sector open ended fund .the fund having the higher five year annual return is having the higher Sharpe ratio and lower standard deviation. (1)Exception to this rule is that Sahara banking and fin services (G) share is having higher return but lower Sharpe ration as compared to Sundaram fin-services opp.RP(G).and with this exception we can better understand the above scenario with the help of above example.

Sometimes Sharpe ratio is volatile in their results as some funds artificially increase their “Sharpe” by selling out of the money options. They get an apparent boost in returns, but with the often uncaptured, but very real, risk of stock gapping. Also Sharpe does not tell you anything about how the returns are distributed. If two funds offer similar returns, the one with higher standard deviation will have a lower Sharpe ratio. In order to compensate for the higher standard deviation, the fund needs to generate a higher return to maintain a higher Sharpe ratio. In simple terms, it shows how much additional return an investor earns by taking additional risk.

Intuitively, it can be inferred that the Sharpe ratio of a risk free asset is zero.

The Sharpe ratio, however, is a relative measure of risk-adjusted return. If considered in isolation, it does not provide much information about the fund's performance. Moreover, the measure considers standard deviation, which assumes a symmetrical distribution of returns. For asymmetrical return distribution with a Skewness greater or lesser than zero and Kurtosis greater or lesser than 3, the Sharpe ratio may not be a good measure of performance. Considering standard deviation as a proxy for risk has its pitfalls. Standard deviation takes into account both the positive as well as the negative deviation in returns from the mean; hence it doesn't accurately measure the downside risk. Measures like Sortino, which only considers negative deviation from the mean return, can remove the limitation of Sharpe ratio to some extent.

CONCLUSION AND SUGGESTION :

- Hence with the help of above analysis we can conclude that Sortino ratio give the better understanding for analysing the fund performance
- The Sortino ratio variation of the Sharpe ratio only factors is downside, or negative volatility rather than the total volatility used in calculating the Sharpe ratio. The theory behind the Sortino variation is that upside volatility is plus for the investment, and it therefore should not be included in the risk calculation.
- Therefore, the Sortino ratio takes upside volatility out of the equation and uses only the downside standard deviation in its calculation instead of the total standard deviation that is used in calculating the Sharpe ratio.
- Also the Sharpe ratio is an effective measure for long-term as well as short-term analysis of the portfolio performance.
- Measures such as Sharpe provide an unbiased look into funds' performance. This is because they are based on quantitative measures. However, these do not account for nay risks inherent in a fund's portfolio. However, while looking at Sharpe ratio a few points have to be kept in mind to obtain an accurate reading of the fund's performance. Firstly, being a ratio, the Sharpe measure is pure number .in isolation it has no meaning. It can only be used as a comparative tool. Thus the Sharpe ratio should be used to compare the performance of a number of funds.
- Alternatively one can compare the Sharpe ratio of a fund with that of its benchmark index .likewise in this analysis BSE Bankex is a benchmark index.
- The Sharpe ratio uses standard deviation as its risk components. A fund with a low returns but relatively mild standard deviation can end up with the high Sharpe ratio.
- For an investor who puts all his/her money in a single fund, Sharpe ratio is a useful measure of risk adjusted return.
- Analysts commonly prefer to use the Sharpe ratio to evaluate low volatility investment Portfolios and the Sortino variation to evaluate high volatility portfolio.

Hence we can conclude that Sortino is a sharper ratio than Sharpe

LIMITATIONS:

- It is clear that Sharpe ratio can be one of the risk return measurement .it certainly will work better for the investment that is liquid and has normally distributed return.
- However when it comes to hedge funds you need more than one measure for e.g. skewness, kurtosis, Sortino ratio, negative month , positive months, worst month and maximum drawdown. With this kind of information an investor can get a better picture of investment and to expect for the future.
- Standard deviation takes into account both the positive as well as the negative deviation in returns from the mean; hence it doesn't accurately measure the downside risk. Measures like Sortino, which only considers negative deviation from the mean return, can remove the limitation of Sharpe ratio to some extent.

REFERENCES:

- Fama E.(1972). Components of investment performance. *Journal of Finance*, 27(3):551-567
- Jensen, M.C. (1968). The performance of mutual fund in the period 1945-1964, *Journal of finance*, 23 389-416
- Ling-chang HSU, shang ling OU, chia-chan yang(2012). How to choose mutual fund that perform well? Evidence from Taiwan. *International journal of economic and finance*, volume 4,No 1
- Markowitz H.M. (1952). Portfolio selection. *Journal of finance*, 7(1); 77-91
- Modigliani F.(1997). Risk adjusted performance. *Journal of portfolio management* 45-54

- Modigliani L.(1997). Yes- you can eat risk-adjusted returns. *Morgan Stanley U.S. investment research*, 1-4
- Rustagi R.P. (2007). *Investment analysis and portfolio management*, (fourth ed.), p. 410-412,New Delhi ,Sultan chand and sons educational publishers.
- Sharpe W.F., (1992). Asset allocation management style and performance measurement, *Journal of portfolio management*.
- Treynor, J.L.(1965). How to rate management of investment funds?, *Howard business review*, 43(1): 131-136
- William F. Sharpe (1966). Mutual fund performance, *The Journal of Business*, Vol 39 No 1, part 2
