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# THE SHARPE-LESS-NESS WHEN THE LIGHTHOUSE MISGUIDES

Sharpe ratio is one of the most widely accepted risk adjusted performance measures. As a ratio of return to risk, it is used universally to compare funds and indices. This paper discusses the shortcomings in using the Sharpe ratio and showcases scenarios when the ratio leads to incorrect inferences. Adjustment to Sharpe ratio in order to avoid such incorrect inferences is also discussed.

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# SHARPE RATIO

Sharpe Ratio, developed by Nobel laureate William F. Sharpe, is one of the most widely used statistics to measure fund performance and compare funds.

Sharpe ratio is one of the most widely known measures across the fund management community. It represents the ratio of excess return generated per unit of risk taken and is interpreted as a risk adjusted measure to gauge a fund manager's ability.

Sharpe ratio =  $(r_p - r_f) / \sigma_p$  where  $r_p$  = portfolio return,  $r_f$  = risk free rate and  $\sigma_p$  = portfolio volatility.

It's evident that in this particular risk adjusted measure, volatility is the measure of risk. There are other risk adjusted performance measures (RAPM<sup>1</sup>) like Treynor ratio, Jensen's

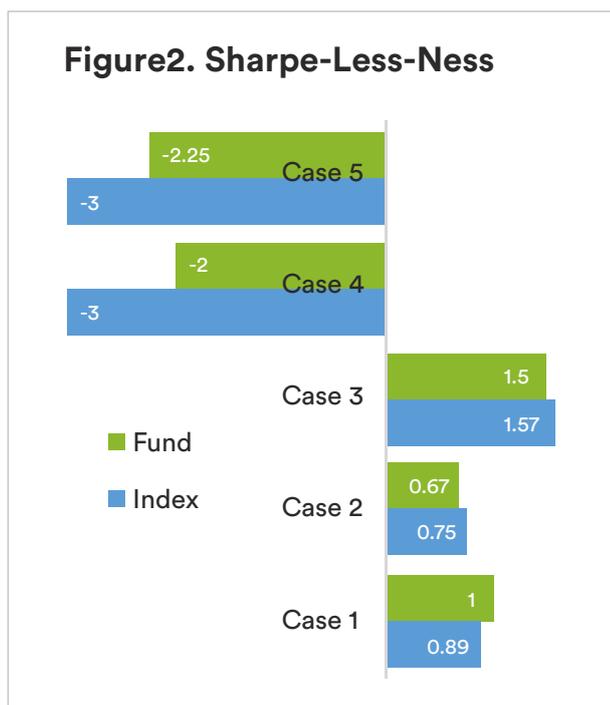


Figure 1 shows a plot of Sharpe Ratios of a Fund and an Index in five different scenarios. The risk and return statistics for the cases in the graph are provided in Appendix 1.

The significance of Sharpe and other ratios is in their ability to depict a complete view of portfolio performance with respect to a benchmarked index or peers. Since different fund managers would assume different risk, comparing them on the basis of absolute return would be myopic.

The same is illustrated in Table1, which is an illustration of Case1. Fund seems to have underperformed when one looks at the absolute returns, but Sharpe Ratio of Fund is higher than Index and hence from a holistic perspective, Fund has performed better than the index.

**Table1:** Case1- Comparison using Sharpe ratio (6% risk free rate assumed)

Funds	Return	Volatility	Sharpe Ratio
Fund	12%	6%	1.00
Index	14%	9%	0.89

## A FEW POINTS REGARDING SHARPE RATIO

At this juncture it is important to understand a few points regarding Sharpe ratio (and some other RAPMs in general):



**Standalone Sharpe ratio doesn't provide significant information:** Sharpe ratio should be looked at, in comparison to other funds or benchmarked indices. It is a measure to bring multiple funds on the same platform of risk and subsequently compare them. In that sense, a fund that generates more return per unit of risk is better. This allows the comparison of funds belonging to different styles, since the risk inherent in styles is accounted for in the statistic.



**Comparison should be done across the same time period:** Funds should be compared for the same time period for the inference to be valid.

1. A detail discussion on Risk Adjusted Performance Measures (RAPM) is beyond the scope of this paper.
2. Performance should be evaluated using risk, return and multiple RAPM statistics. In this paper, the comparison is done using Sharpe ratio only to demonstrate the cases where such ratios give incorrect inference. Higher the Sharpe, better the fund.

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## AT TIMES, SHARPE MISGUIDES

When the excess return of the portfolio is negative, the Sharpe Ratio might present an incorrect picture for comparison. Analysts must be careful while basing analysis on Sharpe Ratio during falling market cycles.

As mentioned earlier, Sharpe Ratio provides a good way to compare funds; however the same is limited to cases when the excess returns are positive.

A fund manager who assumes lesser risk is preferred. In the Sharpe ratio formula, the lower the denominator (lesser risk), the better the fund for the same return (numerator). However, this gives counter-intuitive inference when the return (numerator) is negative.

For the same negative excess return, a fund manager with lesser volatility (denominator) would have more negative Sharpe i.e. lesser Sharpe and hence signifying relatively bad performance.

**Figure2. Sharpe-Less-Ness**

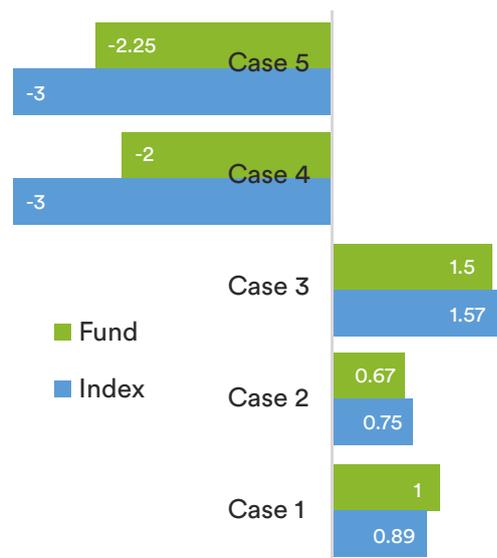


Figure2 highlights the two cases where the excess returns are negative and conventional Sharpe ratio might lead to an incorrect inference.

Table2 demonstrates this point clearly through Case 5. Both, the fund and index have a return of -12% but the index is less risky as compared to the Fund and hence the fund has underperformed. However, the Sharpe ratio of Index is lower than Fund leading to a counter-intuitive inference. This is because of the negative numerator and lower denominator issue mentioned above.

**Table2: Case5 - Sharpe ratio in negative returns (6% risk free rate assumed)**

Funds	Return	Volatility	Sharpe Ratio	Adjusted Sharpe <sup>3</sup>
Fund	-12%	8%	-2.25	-1.44
Index	-12%	6%	-3.00	-1.08

The case depicted in Table2 is clear from the naked eye. With the same returns, since the fund has taken higher risk, it is an underperformer. However, there can be situations when this analysis might not be that simple. Table3 demonstrated this points using Case4.

**Table3: Case4 - Sharpe ratio in negative returns (6% risk free rate assumed)**

Funds	Return	Volatility	Sharpe Ratio	Adjusted Sharpe
Fund	-10%	8%	-2.00	-1.28
Index	-12%	6%	-3.00	-1.08

3. A simple way of creating an adjusted ratio is presented here. better the fund.

In Table3: Case4, the return and risk of the Fund is higher than Index. We would need an adjustment to Sharpe Ratio to consistently figure out the better performers in different market scenarios.

The incorrectness of Sharpe in negative excess return scenario is often neglected while doing portfolio comparisons and leads to incorrect analysis, which most of the times might go unnoticed. Nevertheless, the incorrect analysis leads to incorrect decisions for investors.

## FIXING SHARPE-LESS-NESS

To ensure correct inferences, adjustment to Sharpe Ratio is required when the excess return of the portfolio is negative.

Valuefy uses a divisor calculated using market factors to adjust the Sharpe Ratio, so that the statistics is comparable across indices and funds. Similarly other RAPMs are also adjusted for any fallacy.

One way to counter such an issue is to adjust the ratio during negative excess return scenarios. In such cases, the portfolio excess return can be multiplied by volatility to calculate the Adjusted Sharpe and then used for portfolio comparisons. This would provide a correct picture of relative fund performance as shown in Table2 & Table3.

The scale of Sharpe and Adjusted Sharpe might be different because the Sharpe is dimensionless, whereas the Adjusted Sharpe is a product of two percentage numeric variables. To bring it to rather comparable scale the Adjusted Sharpe can include a constant multiplier.

In the examples discussed in this paper, the constant is 100. Analysts might wish to create a constant for relevant benchmark indices using appropriate historical data and use the same for calculations.

The use of adjustment in Sharpe would alleviate the aforementioned issue. It should be noted that the comparisons using Sharpe and Adjusted Sharpe should be done for comparisons only, rather than using the absolute quantitative value for further use.

Other Risk Adjusted Performance Measures (RAPM) like Treynor Ratio, Jensen Alpha etc. also suffer from the same shortcoming. As an exercise, the readers can analyze and create similar adjustments to those.

## APPENDIX 1

### Risk & return statistics of the cases depicted in graph

		Fund			Index	
Cases	Return	Volatility	Sharpe	Return	Volatility	Sharpe
Case 1	12%	6%	1.00	14%	9%	0.89
Case 2	10%	6%	0.67	9%	4%	0.75
Case 3	15%	6%	1.50	17%	7%	1.57
Case 4	-10%	8%	-2.00	-12%	6%	-3.00
Case 5	-12%	8%	-2.25	-12%	6%	-3.00

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