

Measuring Investment Risk

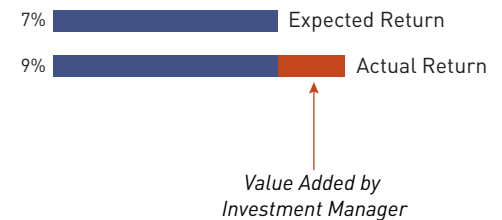
Risk measurement is a key component of portfolio construction and ongoing performance assessment. Risk can be assessed in many ways within a portfolio. The five most common risk measurements are Alpha, Beta, Standard Deviation, Sharpe Ratio and R-Squared. These statistical measures have historically been used to help assess investment risk/volatility.

ALPHA – REPRESENTS VALUE OF INVESTMENT MANAGEMENT

Alpha measures a portfolio's return in excess of the market return, after both have been adjusted for risk. It is commonly considered the value added or subtracted by the performance of the investment manager. A fund that produced the expected return for the level of risk assumed has an Alpha of zero. A positive Alpha shows that the manager produced a return greater than expected for the risk taken. A negative Alpha indicates that the manager has produced a return smaller than expected relative to the risk taken.

If a fund outperforms its benchmark by 2%, its alpha would be 2. If the fund underperforms its benchmark by 1%, its alpha would be -1.

Larger Alpha Is Better



BETA – COMPARES TO BENCHMARK INDEX

Beta measures an investment's volatility in comparison to a benchmark index that represents the market as a whole. The market is assigned a Beta of 1. A Beta larger than 1 indicates more volatility than the benchmark, either up or down. An investment with a Beta lower than 1 means less volatility, either up or down. Investors willing to take on more risk for higher returns look for higher Beta. Conservative investors looking to preserve capital look for lower Beta.

Fund A with a Beta of 1.1 should move 10% more than the market in general. If the market goes up 5%, the fund should go up 5.5%. Fund Z with a Beta of .9 would move less than the market as a whole and would go up 4.5% if the market rose by 5%. In a down market, the correlations would be similar.

BETA

Fund is 10% higher than market return with Beta at 1.1%



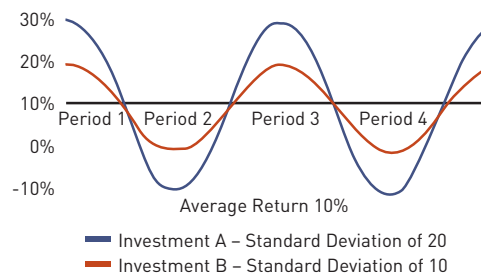
Fund is 10% lower than market return with Beta at 0.9%



STANDARD DEVIATION – METHOD OF ASSESSING HOW VARIABLE OR VOLATILE A PRICE IS LIKELY TO BE

Standard deviation is applied to an investment's annual rate of return to measure its risk (volatility). The bigger the standard deviation, the more widespread the price movements are and the more volatile the performance, either up or down. Investors comparing investments with the same rate of return may choose the one with the lower standard deviation number, which indicates less variance over time.

Fund A had an average rate of return of 10% and a standard deviation of 20 (range of return for the time period was between -10% and 30%). Fund B performed at the same rate, but had a standard deviation of 10 (range of return for the time period was between 0% and 20%). Fund B was less volatile in this time period.



**SHARPE RATIO –
MEASURES RISK-ADJUSTED PERFORMANCE**

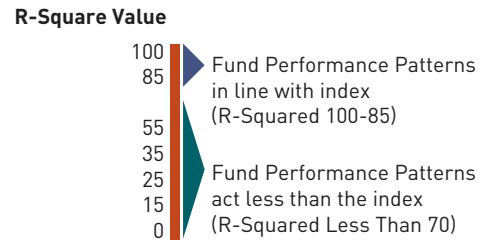
The Sharpe ratio is a representation of the risk-adjusted return of a fund. It measures how much return is being obtained for each theoretical unit of risk. To calculate a Sharpe ratio, an asset's excess return versus a risk-free asset (such as a Treasury Bill) is divided by the standard deviation of the asset's return. For similar investments, investors may choose one with a higher Sharpe ratio, indicating better historical risk-adjusted performance.

$$\frac{\text{Fund Average Return} - \text{Risk Free Return}}{\text{Standard Deviation}} = \text{Sharpe Ratio}$$

If a Treasury Bill returned 3% and an investment returned 13% and its standard deviation is 5%, the Sharpe Ratio would be 2.

**R-SQUARED –
MEASURES MOVEMENT AGAINST BENCHMARK**

R-Squared is a statistic measure that represents the percentage of a fund's movements that can be explained by the movements in its benchmark index. R-Squared values range from 0 to 100. An R-Squared of 100 means that all movements of a fund are completely explained by movements in the index. Fund A with a high R-Squared (between 85 and 100) indicates the fund's performance patterns have been in line with the index. Fund Z with a low R-Squared (70 or less) is less correlated with the index. R-Squared can be used to determine the significance of a particular beta. Usually, a higher R-Squared will mean a more reliable beta.



The illustrations shown are hypothetical and should not be considered indicative of any PNC Funds investment.

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