

# Performance Metrics



# Sharpe Ratio

Measures amount of return you get while assessing risk taken on (ideal ratio of 2)

It compares a fund's historical or projected returns relative to an investment benchmark with the historical or expected variability of such returns.

Uses standard deviation to assess volatility based on variance from the mean

## Sharpe Ratio Formula

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

$R_p$  = return of portfolio

$R_f$  = risk-free rate

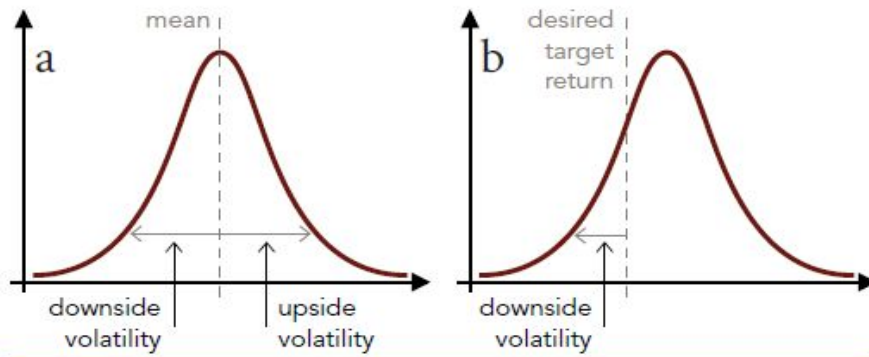
$\sigma_p$  = standard deviation of the portfolio's excess return

# Sortino Ratio

Very similar to Sharpe Ratio but only analyzes negative returns

Differentiates harmful volatility from total overall volatility by using the asset's standard deviation of negative portfolio returns

Addresses the problem of using total risk, or standard deviation, which is important because upside volatility is beneficial to investors and isn't a factor most investors worry about



$$\text{Sortino Ratio} = \frac{r_p - r_f}{\sigma_d}$$

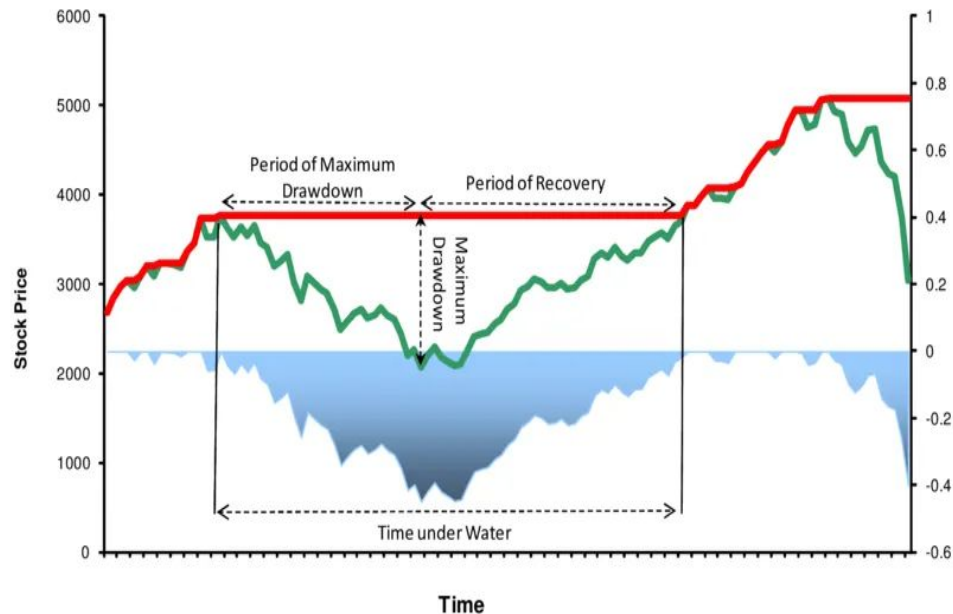
- $r_p$  → Portfolio Return
- $r_f$  → Risk-Free Rate
- $\sigma_d$  → Standard Deviation of Negative Returns (Downside)

# Maximum Drawdown

The largest drop between a peak and a trough. It shows the largest swing you're expected to have during a trade or strategy

How long our model is going to "lose money for", or just simply what the biggest loss our strategy incurred over a period of time

Drawdowns are always negative so we want as close to 0

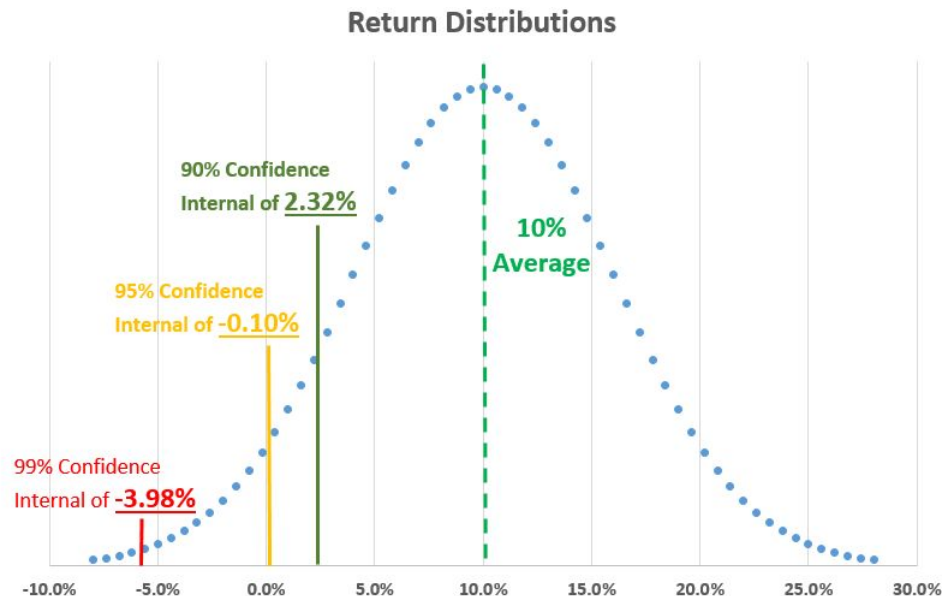


# Value-at-Risk (VaR)

Maximum capital risked at a given point of time in the portfolio

Essentially identifies the maximum potential loss a portfolio investment could face under normal market conditions and specified level of confidence, at a given point of time

Thought of as a sample of means, and is estimated using a confidence interval on a normal distribution of returns



# Beta

Analyzes the volatility (a.k.a systematic risk)

Compares the returns of personal portfolio to the returns of the benchmark (market)

Higher beta = higher **relative** volatility; values close to 1 signify alignment with market, and values less than 1 signify less volatility

Lets us analyze whether our model is beating the benchmark asset at a lower risk level (less volatile)

