**Week 1 Assignment: Toolkit Definitions**

**Submitted By:**

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**True or False: Correlation and Covariance are statistical attributes that describe the relationship between two assets, while Variance and Volatility are statistical attributes of a single asset.**

True

**How are Variance and Volatility related?**

In finance, volatility is usually measured as the standard deviation of a security’s price over time. Variance is the standard deviation squared. Variance and standard deviation are related in that they are both measures of the dispersion of a security’s price from its mean over a given period. Variance can also be an indicator of a security’s volatility.

**How are Variance and Covariance related?**

In Finance, variance and covariance are related in that they both can be used to analyze asset price movements. Variance describes the spread of a single security’s share price around its mean price over time. Covariance describes the directional relationship between two asset prices.

**How are Correlation and Covariance related?**

Correlation and covariance both describe the directional relationship between two variables. Covariance can predict how two stocks might perform relative to each other in the future. Correlation shows the directional relationship between two asset prices as well as the strength of that relationship.

**How are Beta and Correlation related? Does a higher Correlation increase or decrease Beta?**

Beta and correlation are related in that beta measures a stock’s *correlated* volatility to an index of securities. If a stock has a beta of one, then it is perfectly correlated to its index. A stock’s beta will increase as it increases in correlation to its index until a beta of one is reached. A beta greater than one indicates that the security is more volatile than the index.

**How are Beta and Volatility related? Does a higher Volatility increase or decrease Beta?**

Beta measures a stock’s correlated volatility to systematic risk. Volatility is a measure of a stock’s total risk. They are related in that they both measure risk. Higher volatility will increase a stock’s beta.

**How are Sharpe Ratio and Sortino Ratio similar? How are they different?**

The Sharpe and Sortino ratios are similar in that they are both risk-adjusted measures of return on investment. They are different in that the Sharpe ratio includes a security’s total volatility in its calculation, and Sortino ratio  takes upside volatility out of the equation and uses only the downside [standard deviation](https://www.investopedia.com/terms/s/standarddeviation.asp).

**What is a Drawdown and Maximum Drawdown in reference to investment risk?**

A drawdown is a peak-to-trough reduction of capital that occurs during a specific period for an investment. Drawdowns can be used to evaluate the historical risk of different investments. A maximum drawdown is a specific type of drawdown that looks for the *largest* movement from a high point to a low point in the history of a portfolio. Maximum drawdown is a capital preservation metric and can be used to compare different strategies who might otherwise have very similar metrics.