Portfolio

A portfolio is the grouping of assets such as stocks, bonds, cash equivalents as well as their mutual, exchange-traded and closed-fund counterparts.

The choices the investor makes depends on risk-return characteristics of individual securities. The goal is to get the optimal portfolio, which is when you can achieve the highest return with the lowest risk. This process is known as portfolio selection.

An example of this is if you had a $1 million dollar portfolio and you had three assets X, Y, and Z. We know X has a return of 5%, Y has a return of 7%, and Z has a return of 3%. We also know we have $500,000 in X, $200,000 in Y, and $300,000 in Z.

> Portfolio expected return =(($500,000/ $1 million) x 5%) + (($200,000/ $1 million) x 7%) + (($300,000/ $1 million) x 3%) = 2.5% + 1.4% + 0.9% = 4.8%

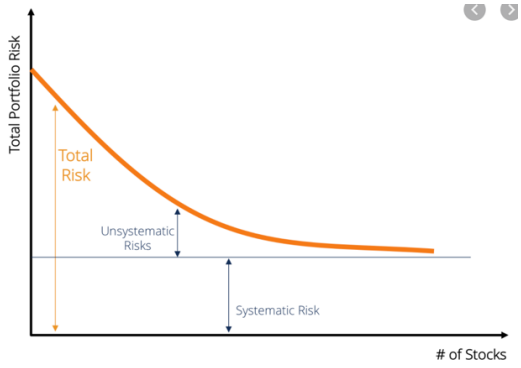
Asset

An asset is an item of economic value. These items can be cash, stocks, accrued incomes, many other items as well. In terms of predicting for a portfolio would typically stick to cash and stocks as values.

Risk

Risk is considered the chances that the actual results differ from the actual results. This risk could include losing all of your original investment. It is standard practice that if you are given two portfolio options with the same expected return, you would pick the one with the lower risk. Another standard is if two portfolios have the same risk then you would pick the portfolio with the higher expected returns.

Typically, there are two types of risk referred to mostly. These are systematic risk, and unsystematic risk. Systematic risk refers to the market as a whole, things that affect the everyone, inflation is an example of this. Unsystematic risk is unique to a specific company or industry.



Diversification

Diversification is the idea that you should not pull all of your eggs in one basket. In the terms of economics, this translates to not putting all your money in on one stock, or one type of industry, diversifying can help lower risk.

Returns

Returns are what are referred to when talking about the gain or loss of a portfolio. The example in the Portfolio section is an example of calculated return.

$$R_P = \sum_{i=1}^{n} w_i r_i \quad Where \sum_{i=1}^{n} w_i = 1$$

W in this equation represents the weights of the asset, and r represents the returns of each asset.

Markowitz Model

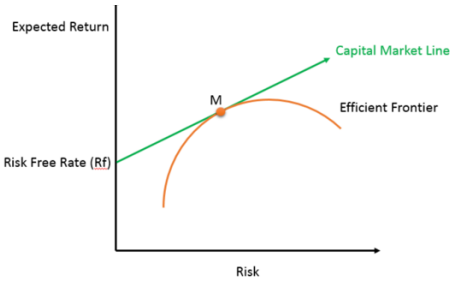
The Markowitz Model is a mathematical model that outputs the most optimal portfolio. It was theorized by Harry Markowitz in 1952 and is the driving idea behind the Modern Portfolio Theory. The theory behind this was based on two main concepts:

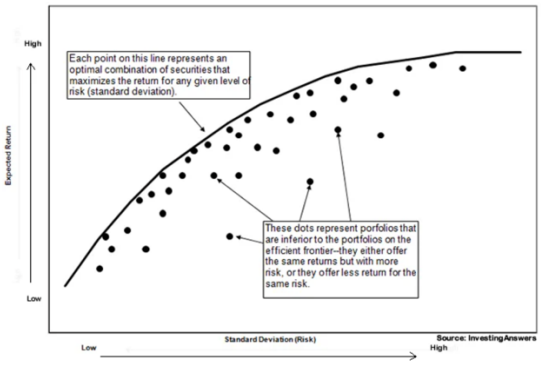
1. The investor's goal is to maximize return for any risk level
2. Risk can be reduced by diversifying

These are assumptions that are taken by the model:

- The investors are rational.
- The supply and demand equilibrium are instantly achieved.
- There are no taxes.
- Information is easily accessible.
- Everyone has the same opportunity of borrowing and lending.
- Market is liquid.

When the standard deviation and expected return is graphed against each other, the efficient frontier is formed. The efficient frontier represents well diverse portfolios, which is what the investor wants to reach.





The math goes as follows:

If we have two assets A and B the following would give us the expected return:

$$E(r_p) = w_A E(r_A) + w_B E(r_B)$$

Again, as above w represents the weight of the asset. We can calculate the variance of the portfolio with:

$$\sigma_p^2 = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2 w_A w_B \sigma_A \sigma_B \rho_{A,B}$$

This equation can help us find the correlation coefficient between the assets in the portfolio. The two graphs shown below show the difference this coefficient makes, when the coefficient is -1, the portfolio will be considered risk free, but as seen in the second graph, as the coefficient approaches 1 the portfolio will become very risky and volatile.