

## Modern Portfolio Theory

Modern Portfolio Theory is the philosophical opposite of traditional stock picking. Harry Markowitz first established this investment approach, which attempts to construct a portfolio offering maximum expected return for a given level of risk tolerance. Prior to this, the investment community had discussed risk, but had no specific tools to quantify it. This breakthrough allowed economists and investment professionals to understand the market as a whole and analyze what makes each investment opportunity unique. Investments are described statistically, in terms of their expected long-term return rate and their expected short-term volatility. The volatility is equated with "risk", measuring how much worse than average an investment's bad years are likely to be.

In today's markets, MPT is typically used by research analysts and portfolio managers as a tool that monitors risk and return characteristics of a portfolio versus a benchmark.



**Modern Portfolio Theory (MPT)** refers to an investment strategy that seeks to construct an optimal portfolio by considering the relationship between risk and return. MPT suggests that the risk of a particular stock or portfolio should not be looked at in a vacuum (but rather how its performance varied in relation to the overall market.) In using MPT a consultant's goal is to identify a client's acceptable level of risk tolerance and then construct a portfolio with the maximum expected return for that level of risk. The next few pages outlined some of the modern portfolio tools that consultants use.

### **Modern Portfolio Theory Tools**

#### **Alpha**

Alpha measures the relative value-added provided by an asset manager compared to a market index, given a portfolio's market risk. A positive alpha is the extra return received by an investor for taking a risk, instead of accepting the market return. For example, an alpha of 1.0 means a portfolio produced a return 1% higher than its beta would predict. An alpha of -1.0 means a portfolio produced a return 1% lower than would be expected.

Alpha does not take into account total volatility risk and it assumes the manager holds a diversified portfolio. Diversification can be measured by R-squared. An R-squared of less than 50 makes a manager's alpha rating virtually meaningless. Alpha can change dramatically from quarter-to-quarter.

#### **Beta**

Beta measures the performance of a portfolio's historical returns versus a chosen benchmark. For stocks, the benchmark is usually the S&P 500 Index. The beta of the benchmark is always 1.00. Therefore, if a portfolio has a beta of 1.00 its volatility is generally the same as the benchmark. For a fully diversified stock portfolio, a beta of 1.25 would mean that it has generally produced a 25% higher return than the S&P 500. A portfolio with a beta of 0.80 would be expected to produce a 20% lower return than the market over time and not go up as much in an up market.

Beta assumes the manager holds a totally diversified portfolio. Diversification can be measured by R-squared. An R-squared of less than 50 makes a manager's beta rating meaningless. Beta is typically measured taking into account three to five years of historical performance.

#### **R-Squared**

R-squared measures how well a portfolio is diversified versus a market index (such as the S&P 500 Index). The R-squared number ranges from zero to 100. A score of 100 signifies a perfect correlation with the benchmark. For a portfolio with an R-squared 0.85, 85% of the portfolio's risk can be attributed to being in the market, while 15% is due to other factors (i.e. security or sector selection).

#### **Correlation**

Correlation measures the degree of a portfolio's return in relation to the return of an index or other portfolios. Correlation can range from -1.00 to 1.00. A portfolio with a correlation of 1.00 means that its returns move in the same direction as the index, whereas a correlation of -1.00 means that it moves in totally the opposite direction of the index. To maintain a diversified portfolio, an investor may want to select portfolios that have varying degrees of correlation among themselves.

**Sharpe Ratio**

Sharpe ratio determines how much risk a manager assumed to achieve a portfolio's historical return. It is calculated by taking the difference between a portfolio's return and a risk-free return (measured by a Treasury bill) and dividing it by the portfolio's standard deviation. For example, if a portfolio had a Sharpe ratio of 1.30 and the benchmark has a Sharpe ratio of 1.00, then the portfolio produced a 30% better return than the index versus the risk-free rate. Sharpe ratio can be an effective way to compare individual portfolios to determine the value added by an asset manager.

**Standard Deviation**

Standard deviation is a measurement of a portfolio's total volatility (risk). It is calculated by measuring the disparity of a portfolio's quarterly returns versus its total average return over the same time period. The more volatile a portfolio's returns the greater the standard deviation. Standard deviation does not predict a portfolio's future volatility.

**Up/Down Capture Ratio**

This tool shows what percentage of the market's performance—such as the S&P 500 Index—a portfolio manager captured. These ratios are calculated by dividing a manager's performance returns by the market index's return.

$$\text{Up/down capture ratio} = \frac{\text{Manager's return}}{\text{Market index return}}$$

The up capture ratio is calculated over quarterly periods when the market index generated a positive return. The down capture ratio is for quarters when the market posts negative returns. For example, a portfolio manager with a 120% up capture ratio captured 120% of the index's return when it appreciated (a 20% higher return than the index). A portfolio manager with a 120% down capture ratio captured 120% more than the index's return when it declined (20% worse than the index).

Using an up/down capture ratio is just one of the tools to use to evaluate the performance of a portfolio manager. However, used in conjunction with other tools can be a useful way to determine if a particular manager and his or her portfolio are appropriate based on your risk/reward profile.

**Information Ratio**

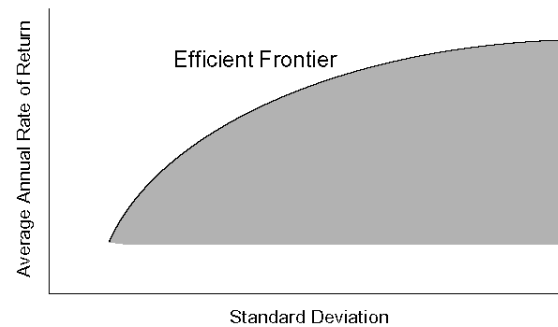
Information ratio measures the value added by a portfolio manager. The ratio shows the annualized return of a portfolio above its benchmark to annualized tracking error.

**Tracking Error**

Tracking error measures how closely an asset manager's portfolio performance is versus the market. Tracking error is calculated by taking the standard deviation of the differences in the portfolio's returns and the market's quarterly returns. If the portfolio tracks its benchmark closely it will have a small tracking error.

## Efficient Frontier

An efficient frontier is a graph representing a set of portfolios that compare returns at each level of portfolio risk (or return volatility). According to Modern Portfolio Theory, for any portfolio of assets there exists an efficient frontier, which represents variously weighted combinations of the portfolio's assets that yield the maximum possible expected return at any given level of portfolio risk.



## Scattergrams

A Scattergram is a graphical representation of an asset manager's risk/return profile within a peer group or related benchmark, typically over a 5- or 10-year time period. These graphs show the annualized rates of return of the manager's portfolio relative to risk, represented by standard deviation. Scattergrams can help investors judge an asset manager's performance based on the amount of risk taken, versus the overall risk/return of the market or other portfolios.

## Modern Portfolio Theory: A Rear View Mirror Look at Risk/Return

Modern Portfolio Theory is but one way to judge the success of an asset manager. An analysis of the manager's commitment to ongoing success, overall firms' strengths, and individual investment manager talent can also provide critical insight. It's also important to remember that these tools measure historical risk and return and are not indicative of future results.

MacKay Shields was founded in 1938, and has provided strong historical risk-adjusted returns across the capital markets by consistently applying a disciplined investment process to every client portfolio. With its sound investment process, highly experienced managers, and entrepreneurial culture, MacKay Shields is built on a solid foundation for generating strong results.

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