# Modern Portfolio Theory

Everyone with money to invest faces a primary question: where do I invest the funds? There are a number of individual factors to consider, such as the dollar amount of investable funds, the investment time horizon, the individual's income tax bracket, and his or her ability to tolerate risk.

Rather than placing all funds into one asset type, many individuals will create an investment "portfolio," a collection of many different types of assets. Modern Portfolio Theory (MPT) is a methodology used to construct a diversified portfolio such that the overall risk of the portfolio is less than the risk of any one investment in the portfolio. There are two key concepts involved in MPT:

- **Correlation:** Rather than adding an investment to a portfolio on its individual merits, investments are selected according to how a particular asset changes in value in relation to the other investments in the portfolio.
- **Risk vs. return:** MPT recognizes that there is a relationship between risk and reward; the higher the risk undertaken, the higher the potential reward; the lower the risk, the lower the potential reward. MPT guides an investor in constructing a portfolio that either maximized return for a given level of risk, or minimizes risk for an expected rate of return.

## Correlation

Consider a hypothetical portfolio consisting of 60% domestic corporate stock and 40% government bonds. As a general rule, these two asset classes will respond differently to the same macroeconomic events. A rising stock market will frequently attract investors and decrease demand for "safe" investments such as US government bonds, thus driving down bond prices. On the other hand, a declining stock market frequently causes investors to seek "shelter," generally decreasing the price of stocks and increasing the price of government bonds.

Correlation is the extent to which the investment return of one investment is related to the investment return of a different investment. In the hypothetical example above, US government bonds and domestic corporate stock are considered to be *negatively* correlated. Typically, when one goes up the other goes down and vice versa.

MPT argues that constructing a portfolio from assets that exhibit little correlation to each other is best. Given a long enough time frame, a worthwhile investment will generally appreciate and/or generate income. In the short run, however, the investment will usually experience ups and downs. A portfolio with a wide variety of investments, exhibiting low correlation to each other, can provide consistent portfolio growth, even in the event that a portion of the portfolio declines in value.

Taking the correlation concept one step further, MPT suggests that adding a risky asset to a portfolio can lower total portfolio risk. This risk reduction occurs when this new, "risky" asset has no correlation to the other assets in the portfolio. Continuing with our earlier theoretical example, let's add international stocks:

International stock markets have historically been more volatile (risky) than domestic, US markets. Yet the inclusion of this third class – although by itself risky – lowers the total portfolio risk. This is because each asset in the portfolio shows a low correlation of returns to the other assets in the portfolio.

## Risk vs. Return – The Efficient Frontier

MPT assumes that investors are rational and that they seek to maximize investment return with the least possible risk. Using the correlation principles of MPT, it is possible to design a portfolio that, for a given level of risk, maximizes the potential return. Such portfolios are deemed "efficient" as no further diversification will lower and individual portfolio's overall risk.

Such an efficient frontier assumes that all investments included in the various portfolios carry some degree of risk. According to some, it is theoretically possible to include a "risk-free" asset, such as US government bonds, that could increase the potential return *beyond* a particular efficient frontier. However, not all observers agree that a truly risk-free asset, even US government bonds, actually exists.

## Unsystematic vs. Systematic Risk

The diversification and correlation principles that underlie MPT can offset what is known as *unsystematic* risk, i.e. the risk inherent in holding individual stocks and bonds. An individual company or industry could experience significant problems, leading to a decline in the market value of related securities. Under MPT, diversifying the overall portfolio, with assets that are

poorly correlated, should result in portfolio growth, even if a portion of the portfolio declines in value.

*Systematic* risk, on the other hand, affects an entire market or economy, not just individual companies or industries. War, rampant inflation, and major economic crises are examples of systemic risk. During such traumatic events, all asset classes tend to move together (usually downward) and to be much more highly correlated than they might be during "normal" times. MPT makes no claim to provide any protection against such systematic risk.

## Criticism of Modern Portfolio Theory

It should be noted that not all observers agree that MPT is the perfect answer to the question of how to construct an investment portfolio. A number of the key assumptions underlying MPT (for example using historical rates of return as a measure of future risk or that the correlations between assets are unchanging) have been challenged by observers as not matching what happens in the real world. All investors should be aware of these controversies and understand the assumptions underlying any recommendations made by a portfolio manager.