4.3. THEORIES OF PORTFOLIO MANAGEMENT

After determining where a client is and where she needs to go, the representative faces the delicate task of deciding how to get there. Like anyone on a journey, choosing the correct path between "Point A" and "Point B" can make the difference between getting there sooner than planned and not getting there at all. Likewise, choosing the right investments to move investors from the present to their future goals is both an art and a science that lies at the heart of the representative's role.

Most professionals today rely on some version of **modern portfolio theory (MPT)** to guide their customers' investment decisions. Under modern portfolio theory, investment professionals try to find a superior portfolio by systematically choosing a diversified set of investments *in relationship to one another* that maximizes returns and minimizes risks.

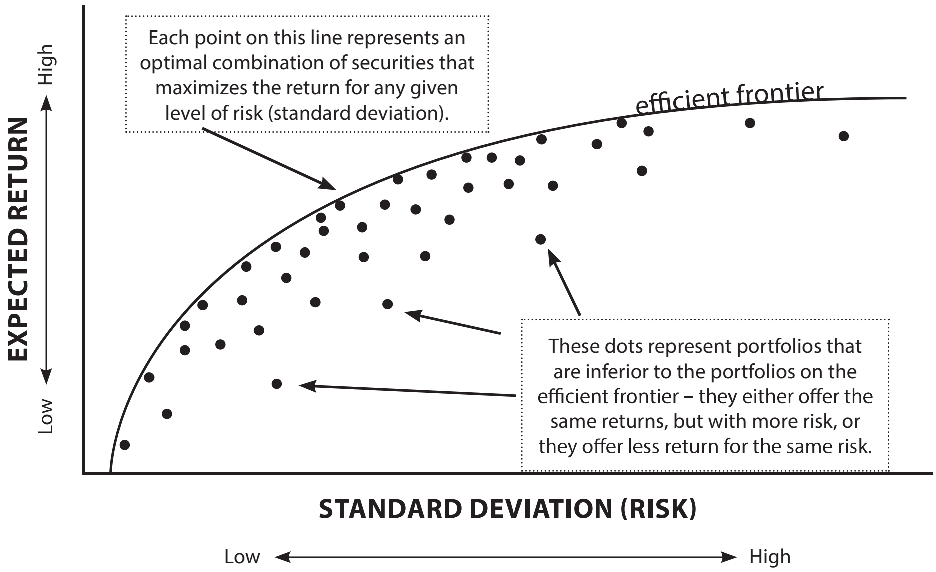
Prior to the development of modern portfolio theory, portfolio diversity was achieved somewhat haphazardly. Investors looked at the risks and rewards of particular stocks and picked securities that tended to move in different directions or at different rates in response to market risks.

Modern portfolio theory applies statistical theory and computer technology to find an optimal set of securities that maximizes a portfolio's return at any given level of risk. It systematizes what professional investors have habitually tried to do instinctively. Diversification and a combination of asset classes are at the heart of modern portfolio theory.

According to the theory, at each level of risk there exists a single portfolio that will achieve the highest expected level of return. Each of these optimal portfolios can be plotted on a graph, forming a curve said to be on an **efficient frontier**. The curve is plotted on a graph where the horizontal axis is units of risk (usually standard deviation), and the vertical axis is return. Investments on the efficient frontier offer the highest amount of expected return for the level of risk. Investments below the efficient frontier are not optimal, in that they offer too little return for the amount of risk: by moving directly north from the investment to the point of intersection with the efficient frontier, one finds an investment opportunity with the same amount of risk but higher expected return.

Under modern portfolio theory, an investment professional can attempt to achieve a favorable portfolio return by deliberately choosing investments in relationship to one another instead of seeing them as separate unrelated decisions. The relationship sought is a low correlation (as close to zero as possible), meaning a particular investment does not move to any great extent the same as the rest of the portfolio. Investments are chosen based on calculated mathematical probabilities. The goal is to maximize portfolio return for a given amount of risk or, correspondingly, to minimize risk for a given level of expected return. The underlying philosophy of modern portfolio theory, thus, is diversification. Modern portfolio theory assumes that investors are risk-averse and rational and markets are efficient. It proposes that if the assets in the portfolio are diverse and, thus, relatively uncorrelated, the investor can minimize risk and maximize returns. While many advisers and clients embrace some form of modern portfolio theory, they may disagree on how to select the underlying individual investments and when to buy or sell them.

Below we examine some of the most common methods of building a portfolio using modern portfolio theory.



4.3.1. CAPITAL ASSET PRICING MODEL

The **capital asset pricing model (CAPM)** is a model that builds on the ideas of modern portfolio theory, allowing investors to calculate the expected return on an investment given the amount of systematic risk of the investment.

To understand CAPM, it is important to understand the distinction between systematic and unsystematic risk. Recall that **systematic** risk is risk attributable to market forces. In other words, it is the risk that the entire market will decline. **Unsystematic risk** is investment-specific. It is the risk that a particular investment will do poorly because of factors having to do with that investment alone (e.g., poor management, changes in regulation). Unsystematic risk can be diversified away by choosing the right set of uncorrelated or negatively correlated securities. Because unsystematic risk can be minimized through diversification, investors do not expect to be compensated for increased unsystematic risk. In contrast, systematic risk cannot be minimized through diversification, and for this reason, investors demand to be compensated for the amount of systematic risk. The CAPM model is a way to calculate how much return can be expected from an investment, given the amount of systematic risk of an investment.

Let's look at how the capital asset pricing model works. Basically, CAPM states that the expected return for any security is the sum of its riskless rate of return plus its risk premium. **Riskless rate of return** is the return that an investor can achieve taking virtually no risk. A typical benchmark that is used for riskless rate of return is the return on T-bills. **Risk premium** is the additional return investors expect to earn in compensation for a security's risk. In the context of CAPM, the risk premium for a given security is the difference between the overall market and the riskless rate of return, also called the riskless rate of return of return, times the security's beta. **Beta** is the measure of a security's systematic variability or risk. It measures how closely the security's returns respond to swings in the market (discussed further below).

$$\text{expected return} = \text{risk-free return} + \overbrace{\text{beta x (market return – risk-free return)}}^{\text{risk premium}}$$

In other words, if you know a security's beta, you know the return in the market, and if you know the riskless rate of return, you can calculate an expected return for your security. To illustrate, let's look in more detail at the concept of the beta coefficient.

4.3.1.1. The Beta Coefficient

Beta is essentially a measure of **correlation**, or how two items fluctuate in relation to one another. In this case, we are looking at the correlation between the performance of a single security and the performance of the market as a whole.

Looking at the above formula, suppose a security's beta = 1.0. The expected return of that security will be identical to the expected return of the market. In other words, the security can be expected to fluctuate by the same percentage the market fluctuates. A beta greater than 1.0 indicates that the price of the security will move more than the market. A beta of less than 1.0 indicates that the price of the security will move less than the market. For example, if the market rose 10%, and a particular stock has a beta of "2.0," the stock's price would be expected to increase 20%. If another stock has a beta of 0.5, it would be expected to only increase by 5%.

Note: it is important to recognize two unique situations. First, if a stock has a beta of "0," it means that there is no relationship between how its price fluctuates and the fluctuation of the market. Second, if a security has a negative beta (for example, -1.0 or -0.5), it means it moves in the opposite direction of the market in the proportion signified by the number.

Example: A $10 stock has a beta of 2.0. The expected return in the market, based on its recent performance is 7%, and the riskless rate of return as measured by the Treasury bill rate is 2%. Using CAPM, we can calculate the expected return for the security:

2% + (2.0 x (7% – 2%)) = 12%.

Example: Another $10 stock has a beta of 0.5. The expected return in the market is 7% and the riskless rate of return 2%. The expected return for the security in this case is 4.5%.

2% + (0.5 x (7% – 2%)) = 4.5%

Example: ABC Company has a beta of -0.5, the market is expected to return 8% this coming year, and investors can earn 2% risk-free in short-term U.S. Treasury bills. The CAPM would say the expected return of the ABC Company is negative.

2% + (-0.5 x (8% – 2%)) = -1%

4.3.1.2. Alpha

According to the modern portfolio theory and the capital asset pricing model, a portfolio on the efficient frontier maximizes its expected returns and eliminates unsystematic risk. But stocks do not always perform as expected. When stocks behave differently from expectations, they will have an actual return that deviates from the expected return. The difference between a security's actual return and its expected return is known as the stock's **alpha**.

alpha = actual return – expected return

When a stock's alpha is greater than zero, it means that the stock has performed better than its expected return. Thus, given the expected return calculated through CAPM, the stock performed better than expected. When a stock's alpha is less than zero, it means that it has performed worse than its expected return.

4.3.1.3. Implications of the CAPM

For active managers, beta is the most commonly used measure today of a stock's riskiness. Beta, as a measure of systematic risk, is also a convenient way to compare the riskiness of similar stocks.

Alpha can also be used to judge the success of a portfolio or mutual fund manager. To do this, a beta is calculated for an entire portfolio, and an expected return is calculated for the entire portfolio using CAPM. The alpha of the portfolio is the performance of the fund above its expected return. In fact, calculating the alpha of a portfolio is one of the most common ways to quantify an investment adviser's performance. A positive alpha shows how much better (or worse) the portfolio's actual returns were over the performance that can be explained by the market.

Example: At the beginning of the year, your client, Ms. Jones, had a portfolio with an expected return of 4% and a beta of 1.0. The T-bill rate is 2%. At the end of the year, her actual return showed a positive alpha of 2%. What was her actual return on her portfolio?

Alpha levels can be both positive and negative. Alpha = actual return – expected return (2% = actual return – 4%). Thus, her actual return was 6%.

Example: Now suppose Ms. Jones owns shares of Technix, whose positive alpha is 2%. The market is returning 4%. The beta of her stock is 0.5, and the T-bill rate is 2%. What is the actual return on Technix?

To answer this question, you first must know the expected return of the stock. We can then use CAPM to calculate the stock's actual return. First, expected return = riskless rate of return + (beta x (market return – riskless rate of return)), or 2% + (0.5 x (4% – 2%)) = 3%. So if alpha = actual return – expected return, or 2% = actual return – 3%, then the stock's actual return is 5%.

Example: A portfolio has a beta of 1.0. The S&P 500 experiences 8% growth, and the portfolio produces an actual return of 12%. The riskless rate is 2%. What is the alpha of the portfolio?

The capital asset pricing model allows us to calculate the expected return on the portfolio.

expected return = riskless rate of return + (beta x (market return – riskless rate of return))

expected return = 2% + (1 x (8% – 2%)) = 8%.

Next we must calculate alpha.

alpha = actual return – expected return

So, 12% – 8% = 4%.

Note that when the beta is equal to one, the expected return will be the same as the market return. The exam may give you a question with a beta of 1.0 and no riskless rate; in this case the expected return is simply equal to the market return.

4.3.1.4. Other Important Risk Concepts

The exam may ask about a couple of other concepts used to explain risk and volatility. While you will not be asked to calculate any of these amounts, you should know how they can be incorporated into portfolio management decisions.

Standard deviation is a commonly used measure that helps explain how much a security has historically varied from its average return over a period of time. This number can help clarify how the volatility can be different between two investments with identical average returns. For example, Securities A and B both have an average return of 10% over the last two years. Security A arrived at this 10% average return by climbing 12% the first year, then 8% the second year (20% total return divided by 2 years = 10%). However, Security B arrived at this 10% average return by climbing 30% the first year, then decreasing 10% the second year (20% total return divided by 2 years = 10%). In this example, Security B made much wider swings, or "deviations," from its average to arrive at the same point. Standard deviation is discussed further in Chapter Six.

4.3.2. EFFICIENT MARKET HYPOTHESIS

The exam will expect you to know the **efficient market hypothesis (EMH)**. This hypothesis states that the market as a whole has all the information needed to make it operate efficiently, and thus, at any moment, every security in the market is priced at what it is worth. As a result, individual investors and advisers, with their limited access to information, cannot outperform the market on a prolonged basis without incurring more risk than the market. At best, because the market is always right in the long run, they can only hope to match the market's returns, minus their costs of investing.

By extension, an **efficient portfolio** is one that offers the highest expected return for a given standard deviation. Depending on an investment adviser's belief about the efficient market hypothesis, their attempt to build an efficient portfolio may or may not include active management choices. The **random walk theory** states that, because the