Let's take a look at the two basic types of risk:

- **Systematic Risk** - Systematic risk influences a large number of assets. A significant political event, for example, could affect several of the assets in your portfolio. It is virtually impossible to protect yourself against this type of risk.

- **Unsystematic Risk** - Unsystematic risk is sometimes referred to as "specific risk". This kind of risk affects a very small number of assets. An example is news that affects a specific stock such as a sudden strike by employees. Diversification is the only way to protect yourself from unsystematic risk.

What is 'Systematic Risk'?

The risk inherent to the entire market or an entire market segment. Systematic risk, also known as “undiversifiable risk,” “volatility” or “market risk,” affects the overall market, not just a particular stock or industry. This type of risk is both unpredictable and impossible to completely avoid. It cannot be mitigated through diversification, only through hedging or by using the right asset allocation strategy.

For example, putting some assets in bonds and other assets in stocks can mitigate systematic risk because an interest rate shift that makes bonds less valuable will tend to make stocks more valuable, and vice versa, thus limiting the overall change in the portfolio’s value from systematic changes. Interest rate changes, inflation, recessions and wars all represent sources of systematic risk because they affect the entire market. Systematic risk underlies all other investment risks.

The Great Recession provides a prime example of systematic risk. Anyone who was invested in the market in 2008 saw the values of their investments change because of this market-wide economic event, regardless of what types of securities they held. The Great Recession affected different asset classes in different ways, however, so investors with broader asset allocations were impacted less than those who held nothing but stocks.

If you want to know how much systematic risk a particular security, fund or portfolio has, you can look at its beta, which measures how volatile that investment is compared to the overall market. A beta of greater than 1 means the investment has more systematic risk than the market, less than 1 means less systematic risk than the market, and equal to one means the same systematic risk as the market.

Whereas this type of risk affects a broad range of securities, unsystematic risk affects a very specific group of securities or an individual security. Unsystematic risk can be mitigated through diversification.

What is 'Unsystematic Risk'?

Company- or industry-specific hazard that is inherent in each investment. Unsystematic risk, also known as “nonsystematic risk,” "specific risk," "diversifiable risk" or "residual risk," can be reduced through diversification. By owning stocks in different companies and in different industries, as well as by owning other types of securities such as Treasuries and municipal securities, investors will be less affected by an event or decision that has a strong impact on one company, industry or investment type. Examples of unsystematic risk include a new competitor, a regulatory change, a management change and a product recall.

For example, the risk that airline industry employees will go on strike, and airline stock prices will suffer as a result, is considered to be unsystematic risk. This risk primarily affects the airline industry, airline companies and the companies with whom the airlines do business. It does not affect the entire market system, so it is an “unsystematic” or “nonsystematic” risk.

An investor who owned nothing but airline stocks would face a high level of unsystematic risk. By diversifying his or her portfolio with unrelated holdings, such as health-care stocks and retail stocks, the investor would face less unsystematic risk. However, even a portfolio of well-diversified assets cannot escape all risk. It will still be exposed to systematic risk, which is the uncertainty that faces the market as a whole. Even staying out of the market completely will not take an investor’s risk down to zero, because he or she would still face risks such as losing money from inflation and not having enough assets to retire.

Investors may be aware of some potential sources of unsystematic risk, but it is impossible to be aware of all of them or to know whether or when they might occur. An investor in health-care stocks may be aware that a major shift in government regulations could affect the profitability of the companies they are invested in, but they cannot know when new regulations will go into effect, how the regulations might change over time or how companies will respond.

What is the 'Capital Asset Pricing Model’ (CAPM)?

The capital asset pricing model (CAPM) is a model that describes the relationship between risk and expected return and that is used in the pricing of risky securities.

$$\bar{r_a} = r_f + \beta_a(\bar{r_m} - r_f)$$

Where:

r_f = Risk free rate

β_a = Beta of the security

$\bar{r_m}$ = Expected market return

The general idea behind CAPM is that investors need to be compensated in two ways: time value of money and risk. The time value of money is represented by the risk-free (rf) rate in the formula and compensates the investors for placing money in any investment over a period of time. The other half of the formula represents risk and calculates the amount of compensation the investor needs for taking on additional risk. This is calculated by taking a risk measure (beta) that compares the returns of the asset to the market over a period of time and to the market premium (Rm-rf).

The CAPM says that the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat the required return, then the investment should not be undertaken. The security market line plots the results of the CAPM for all different risks (betas).

Using the CAPM model and the following assumptions, we can compute the expected return of a stock in this CAPM example: if the risk-free rate is 3%, the beta (risk measure) of the stock is 2 and the expected market return over the period is 10%, the stock is expected to return 17% (3%+2(10%-3%)).

No matter how much we diversify our investments, it's impossible to get rid of all the risk. As investors, we deserve a rate of return that compensates us for taking on risk. The capital asset pricing model (CAPM) helps us to calculate investment risk and what return on investment we should expect. Here we look at the formula behind the model, the evidence for and against the accuracy of CAPM, and what CAPM means to the average investor.

Birth of a Model

The capital asset pricing model was the work of financial economist (and, later, Nobel laureate in economics) William Sharpe, set out in his 1970 book "Portfolio Theory And Capital Markets." His model starts with the idea that individual investment contains two fundamental types of risk:

1. *Systematic Risk* - These are market risks that cannot be diversified away. Interest rates, recessions and wars are examples of systematic risks.
2. *Unsystematic Risk* - Also known as "specific risk," this risk is specific to individual stocks and can be diversified away as the investor increases the number of stocks in his or her portfolio. In more technical terms, it represents the component of a stock's return that is not correlated with general market moves.

Modern portfolio theory shows that specific risk can be removed through diversification. The trouble is that diversification still doesn't solve the problem of systematic risk; even a portfolio of all the shares in the stock market can't eliminate that risk. Therefore, when calculating a deserved return, systematic risk is what plagues investors most. CAPM, therefore, evolved as a way to measure this systematic risk.

The Formula

Sharpe found that the return on an individual stock, or a portfolio of stocks, should equal its cost of capital. The standard formula remains the CAPM, which describes the relationship between risk and expected return.

Here is the formula:

$$\bar{r}_a = r_f + \beta_a (\bar{r}_m - r_f)$$

Where:

r_f = Risk free rate

β_a = Beta of the security

$\bar{r}_m$ = Expected market return

$(\bar{r}_m - r_f)$ = Equity market premium

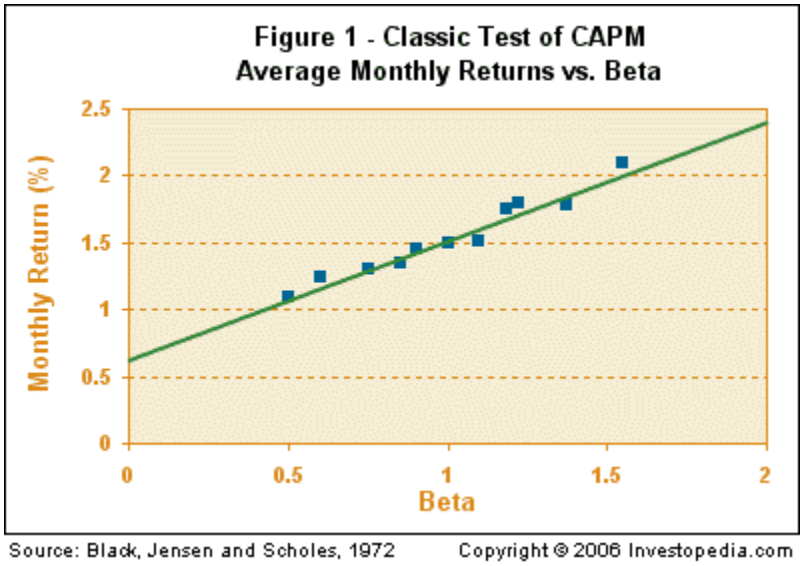
CAPM's starting point is the risk-free rate - typically a 10-year government bond yield. To this is added a premium that equity investors demand to compensate them for the extra risk they accept. This equity market premium consists of the expected return from the market as a whole less the risk-free rate of return. The equity risk premium is multiplied by a coefficient that Sharpe called "beta."

Beta

According to CAPM, beta is the only relevant measure of a stock's risk. It measures a stock's relative volatility - that is, it shows how much the price of a particular stock jumps up and down compared with how much the stock market as a whole jumps up and down. If a share price moves exactly in line with the market, then the stock's beta is 1. A stock with a beta of 1.5 would rise by 15% if the market rose by 10%, and fall by 15% if the market fell by 10%.

Beta is found by statistical analysis of individual, daily share price returns, in comparison with the market's daily returns over precisely the same period. In their classic 1972 study titled "The Capital Asset Pricing Model: Some Empirical Tests," financial economists Fischer Black, Michael C. Jensen and Myron Scholes confirmed a linear relationship between the financial returns of stock portfolios and their betas.

They studied the price movements of the stocks on the New York Stock Exchange between 1931 and 1965.



Beta, compared with the equity risk premium, shows the amount of compensation equity investors need for taking on additional risk. If the stock's beta is 2.0, the risk-free rate is 3% and the market rate of return is 7%, the market's excess return is 4% (7% - 3%). Accordingly, the stock's excess return is 8% (2 X 4%, multiplying market return by the beta), and the stock's total required return is 11% (8% + 3%, the stock's excess return plus the risk-free rate).

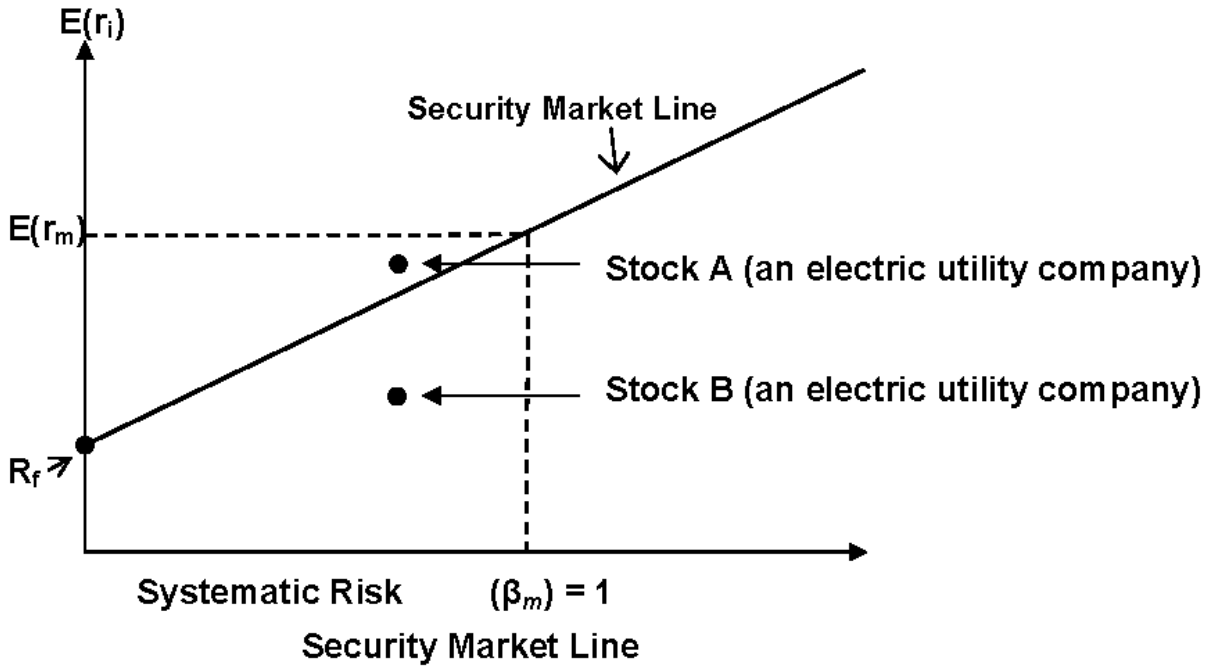
What this shows is that a riskier investment should earn a premium over the risk-free rate - the amount over the risk-free rate is calculated by the equity market premium multiplied by its beta. In other words, it's possible, by knowing the individual parts of the CAPM, to gauge whether or not the current price of a stock is consistent with its likely return - that is, whether or not the investment is a bargain or too expensive.

This model presents a very simple theory that delivers a simple result. The theory says that the only reason an investor should earn more, on average, by investing in one stock rather than another is that one stock is riskier. Not surprisingly, the model has come to dominate modern financial theory. While some studies raise doubts about CAPM's validity, the model is still widely used in the investment community. Although it is difficult to predict from beta how individual stocks might react to particular movements, investors can probably safely deduce that a portfolio of high-beta stocks will move more than the market in either direction, or a portfolio of low-beta stocks will move less than the market. This is

important for investors - especially fund managers - because they may be unwilling to or prevented from holding cash if they feel that the market is likely to fall. If so, they can hold low-beta stocks instead. Investors can tailor a portfolio to their specific risk-return requirements, aiming to hold securities with betas in excess of 1 while the market is rising, and securities with betas of less than 1 when the market is falling.

Not surprisingly, CAPM contributed to the rise in use of indexing - assembling a portfolio of shares to mimic a particular market - by risk averse investors. This is largely due to CAPM's message that it is only possible to earn higher returns than those of the market as a whole by taking on higher risk (beta).

The security market line ("SML" or "characteristic line") graphs the systematic (or market) risk versus the return of the whole market at a certain time and shows all risky marketable securities. The SML essentially graphs the results from the capital asset pricing model (CAPM) formula. The x-axis represents the risk (beta), and the y-axis represents the expected return. The market risk premium is determined from the slope of the SML. The security market line is a useful tool for determining whether an asset being considered for a portfolio offers a reasonable expected return for risk. Individual securities are plotted on the SML graph. If the security's risk versus expected return is plotted above the SML, it is undervalued because the investor can expect a greater return for the inherent risk. A security plotted below the SML is overvalued because the investor would be accepting less return for the amount of risk assumed.



Conclusion

The capital asset pricing model is by no means a perfect theory. But the spirit of CAPM is correct. It provides a usable measure of risk that helps investors determine what return they deserve for putting their money at risk.

(Source: Investopedia)