Security Analysis and Portfolio Management (SAPM)

There are many **objectives of Security Analysis**. They are - Capital appreciation, Regular Income, the Safety of Capital, Hedge against Inflation, and Liquidity.

Fundamental analysis

It is a method of evaluating the intrinsic value of an asset and analyzing the factors that could influence its price in the future. This form of analysis is based on external events and influences, as well as on financial statements and industry trends. Fundamental Analysis is essential because it provides consistent and reliable information. With its help, we can evaluate a security's intrinsic value. The discounted cash flow model is a common valuation method used to determine a company's intrinsic value. Fundamental analysis consists of three main parts: Economic analysis, Industry analysis, Company analysis.

Objectives of Fundamental Analysis

- ✓ To conduct an asset valuation and predict where its price will go
- ✓ To make a projection on its business performance
- ✓ To evaluate the management of the property and make internal financial decisions
- ✓ To help determine future prices and market developments

Steps in Fundamental Analysis

Step 1: Economic and Market Analysis
Step 2: Analysis of Financial Statements
Step 3: Forecasting relevant payoffs
Step 4: Formulating a security value
Step 5: Making a recommendation

In security selection process, a traditional approach of **Economic- Industry- Company analysis** is employed. **EIC analysis** is the abbreviation of Economic, Industry, and Company. In this, finally the most attractive companies within the attractive industries are pointed out by the analyst.

1) Economic Analysis

Stock prices react favorably to the low inflation, earnings growth, a better balance of trade, increasing Gross National Product (GNP) and other positive macroeconomic news. Indications that unemployment is rising, inflation is picking up or earnings estimates are being revised downward, negatively affects the stock prices. Thus, the implications of market risk should be clear to the investor. When there is recession in the economy, the prices of stocks moves downward. All the companies suffer the effects of recession despite of the fact that those are high performing companies or low performing ones. Conversely, the stock prices are positively affected by the boom period of the economy.

2) Industry Analysis

It is clear there is certain level of market risk faced by every stock and the stock price decline during recession in the economy. Another point to be remembered is that the defensive kind of stock is affected less by the recession as compared to the cyclical category of stock. In the industry analysis, such industries are highlighted that can stand well in front of adverse economic conditions.

In 1980, **Michael Porter** proposed a standard approach to industry analysis which is referred to as **competitive analysis frame work**.

Threats of new entrants evaluate the expected reaction of current competitors to new competitors and obstacles to entry into the industry. In certain industries it is quite difficult for new company to compete successfully. The growth in the industry is slowed down through the **rivalry among the current competitors.** Profits of the company are reduced when it tries to cover more market share because under existing rivalry the company has to invest a large portion of its earnings in this enhancing market share. Another threat faced by company in industry is the **threat of substitutes** which prevents the companies to enhance the price of their products. When there is much increase in the price of particular product, then the consumer simply switches to other alternative product which has lower price.

Another aspect of the industry analysis is the **bargaining power of buyers** which can greatly influence the large percentage of sales of seller. In this condition the profit margins are lower. Concessions are necessary to be offered by the seller because it is not affordable for him to lose customer. Finally, the **bargaining power of suppliers** has also substantial influence over the

profitability of the company. The supplies for manufacturing products are required by the company and it does not have sufficient control over the costs. It is not possible for the company to increase the price of its finished products in order to cover the increased costs due to the presence of powerful buyer groups in market of substitute products. So while conducing industry analysis, the presence of powerful suppliers should be considered as negative for the company.

3) Company Analysis

Company analysis is a process carried out by investors to evaluate securities, collecting information related to the company's profile, products and services as well as profitability. In company analysis different companies are considered and evaluated from the selected industry so that most attractive company can be identified.

Company analysis is also referred to as security analysis in which stock picking activity is done. Different analysts have different approaches of conducting company analysis like:

1. Value Approach to Investing
2. Growth Approach to Investing

In company analysis, analysts consider the basic financial variables for the estimation of the intrinsic value of the company. These variables contain sales, profit margin, tax rate, depreciation, asset utilization, sources of financing and other factors. A common method to analyzing a stock is studying its price-to-earnings ratio.

We can calculate the P/E ratio by dividing the stock's market value per share by its earnings per share. To determine the value of a stock, investors compare a stock's P/E ratio to those of its competitors and industry standards.

The reference points used for Company Analysis are:

1) Price-to-Earnings Ratio (P/E)
2) PEG Ratio.
4) Price-to-Book Ratio (P/B)
5) Dividend Yield.
6) Dividend Payout Ratio.
7) Return on Assets (ROA)
8) Return on Equity (ROE)
9) Profit Margin.

4) Technical Analysis

Technical analysis existed and was practiced before computers were common, and some of the pioneers in technical analysis were long-term investors and traders, not day traders. Technical analysis is used by traders on all time frames, from 1-minute charts to weekly and monthly charts.

Charles Dow (1851-1902) was the first to reintroduce and comment on it in recent times. He is considered the **father of "modern" technical analysis.**

A **core principle of technical analysis** is that a market's price reflects all relevant information impacting that market. A technical analyst therefore looks at the history of a security or commodity's trading pattern rather than external drivers such as economic, fundamental and news events.

Hence, 1) while **Fundamental Analysis** aims at ascertaining the true intrinsic value of the stock, **Technical Analysis** is used to identify the right time to enter or exit the market, and 2) Fundamental Analysis is based on financial statements, whereas Technical Analysis is based on charts with price movements. 3) Fundamental analysis is most often used when determining the quality of long-term investments in a wide array of securities and markets, while Technical Analysis is used more in the review of short-term investment decisions such as active trading of stocks.

A major premise of fundamental analysis is that a stock's price is based on its past cash flows, rather than on anticipated future cash flows. Using a **"Bottom Up" Approach for Fundamental Analysis** means beginning your analysis on a microeconomic level right from the start, typically starting with a particular company itself. You would then move to consecutive wider economic levels until you reach global economic analysis.

5) Efficient Market Theory

Efficient Market Theory holds that markets operate efficiently because at any given time, all publicly known information is factored into the price of any given asset. This means that an investor can't get ahead of the market by trading on new information because every other trader is doing the same thing.

The **Efficient Market Hypothesis (EMH)**, alternatively known as the efficient market theory, is a hypothesis that states that share prices reflect all information and consistent alpha generation is

impossible. According to the EMH, stocks always trade at their fair value on exchanges, making it impossible for investors to purchase undervalued stocks or sell stocks for inflated prices. Therefore, it should be impossible to outperform the overall market through expert stock selection or market timing, and the only way an investor can obtain higher returns is by purchasing riskier investments.

Highlights of EMT

- The efficient market hypothesis (EMH) or theory states that share prices reflect all information.
- The EMH hypothesizes that stocks trade at their fair market value on exchanges.
- Proponents of EMH posit that investors benefit from investing in a low-cost, passive portfolio.
- Opponents of EMH believe that it is possible to beat the market and that stocks can deviate from their fair market values.

Proponents of the Efficient Market Hypothesis conclude that, because of the randomness of the market, investors could do better by investing in a low-cost, passive portfolio.

There are **three forms of EMH:** weak, semi-strong, and strong.

1) **Weak Form EMH:** Suggests that all past information is priced into securities. Fundamental analysis of securities can provide an investor with information to produce returns above market averages in the short term, but there are no "patterns" that exist. Therefore, fundamental analysis does not provide long-term advantage and technical analysis will not work.
2) **Semi-Strong Form EMH:** Implies that neither fundamental analysis nor technical analysis can provide an advantage for an investor and that new information is instantly priced in to securities.
3) **Strong Form EMH:** Says that all information, both public and private, is priced into stocks and that no investor can gain advantage over the market as a whole. Strong Form EMH does not say some investors or money managers are incapable of capturing abnormally high returns because that there are always outliers included in the averages.

If you believe that the stock market is unpredictable with random movements in price up and down, you would generally support the efficient market hypothesis. However, a short-term trader might reject the ideas put forth from EMH because they believe that an investor can predict movements in stock prices. Hence, **for most investors, a passive, buy-and-hold, long-term strategy is appropriate because capital markets are mostly unpredictable** with random movements in price up and down.

PORTFOLIO MANAGEMENT

1) Portfolio Management

Portfolio Management is defined as the art and science of making decisions about the investment mix and policy, matching investments to objectives, asset allocation for individuals and institutions, and balancing risk against performance. It is mainly concerned with allocating assets while downsizing risk.

TYPES OF PORTFOLIO MANAGEMENT

1) **Active Portfolio Management**

   The aim of the active portfolio manager is to make better returns than what the market dictates. Active managers buy stocks when they are undervalued and start selling when they climb above the norm.

   Active portfolio management involves the quantitative analysis of companies to determine the cost of stock in relation to its potential. To do this, the active manager shuns the efficient market hypothesis and instead relies on ratios to support his claim. To downsize risk, the active manager prefers to diversify investments amongst the various sectors.

   The issue with active portfolio management is that it all comes down to the manager's skill. But should you find one with the necessary know how, the value investing method will likely bring in good gains.

2) **Passive Portfolio Management**

   At the opposite end of active management comes the passive investing strategy. Those who subscribe to this theory believe in the efficient market hypothesis. The claim is that the fundamentals of a company will always be reflected in the price of the stock. Therefore, the passive manager prefers to dabble in index funds which have a low turnover, but good long-term worth. With index funds, your cash is invested percentage-wise in proportion to the market capitalization. The point of opting for the lower yield is to combat the cost of management fees, while profiting through stability.

3) **Discretionary Portfolio Management**

   A discretionary manager is given full leeway to make decisions for the investor. While the individual goals and time-frame are taken into account, the manager adopts whichever strategy he thinks best. Once the cash has been handed to the professional, the investor sits back and trusts that the profits will roll in.

4) **Non-Discretionary Portfolio Management**

The non-discretionary manager is simply a financial counselor. He advises the investor in which routes are best to take. While the pros and cons are clearly outlined, it is up to the investor to choose his own path. Only once the manager has been given the go ahead, does he make a move on the investor's behalf. Whether you decide to use a portfolio manager or you choose to take on the role yourself, it is important to opt for a viable strategy and ensure that it is put forward in a logical way. The merit of maintaining a sensible portfolio is that it cuts down the confusion while providing investments that fit the individual's goals.

2) Capital Market Theory

The **Capital Market Theory (CMT)** is a major extension of the Modern Portfolio Theory of Markowitz. Portfolio theory is a description of how rational investors should built efficient portfolios. Capital market theory tells how assets should be priced in the capital markets if, indeed, everyone behaved in the way portfolio theory suggests.

Assumptions made regarding Capital Market Theory include:

- ✓ All investors are Markowitz efficient investors who choose investments on the basis of expected return and risk.
- ✓ Investors can borrow or lend any amount at a risk-free rate of interest.
- ✓ All investors have homogeneous expectations for returns.
- ✓ All investments are infinitely divisible.
- ✓ No transactions costs or taxes, no inflation or any change in interest rates and capital markets are in equilibrium.

3) Portfolio Selection and its Models

Portfolio Selection, as a theory, was published in March 1952 in The Journal of Finance, by the American Finance Association. In it, **Markowitz** argued that portfolios should optimize expected return relative to volatility. He considered volatility could be measured as the variance of return. He also suggested a limit to it, that he called the "efficient frontier."

The **Portfolio Theory** deals with portfolios of risky assets. According to the theory, an investor faces an efficient frontier containing the set of efficient portfolios of risky assets.

Now it is assumed that there exists a riskless asset available for investment. A riskless asset is one whose return is certain such as a government security. Since the return is certain, the variability of return or risk is zero. The investor can invest a portion of his funds in the riskless

asset which would be equivalent to lending at the risk free asset's rate of return. He would then be investing in a combination of risk free asset and risky assets.

Similarly, it may be assumed that an investor may borrow at the same risk free rate for the purpose of investing in a portfolio of risky assets. He would then be using his own funds as well as some borrowed funds for investment.

The fundamental notions of **Portfolio Theory** are as under:

1) Return and risk are two important characteristics of every investment. Investors base their investment decisions on the expected return and risk of investments. Risk is measured by the variability in returns.
2) Investors attempt to reduce the variability of returns through diversification of investment. This results in creation of a portfolio. With a given set of securities, any number of portfolios may be created by altering the proportion of funds invested in each security. Among these portfolios some dominate others, or some are more efficient than the vast majority of portfolios because of lower risk or higher returns. Investors identify this efficient set of portfolios.
3) Diversification helps to reduce risk, but even a well diversified portfolio does not become risk free. If we construct a portfolio including all the securities in the stock market, that would be the most diversified portfolio. Even such a portfolio would be subject to considerable variability. This variability is undiversifiable and known as the market risk or systematic risk because it affects all the securities in the market.
4) The real risk of a security is the market risk which cannot be eliminated through diversification. This is indicated by the sensitivity of a security to the movements of the market and is measured by the beta coefficient of the security.

4) Markovitz Portfolio theory

Modern Portfolio Theory is Markowitz's theory regarding maximizing the return investors could get in their investment portfolio considering the risk involved in the investments. MPT asks the investor to consider how much the risk of one investment can impact their entire portfolio.

Modern Portfolio Theory (MPT) was first espoused by American economist **Harry Markowitz**. For his work, Markowitz was awarded the Nobel Prize in Economics in 1990. In his 1952 paper published by The Journal of Finance, he first proposed the theory as a means to create and construct a portfolio of assets to maximize returns within a given level of risk, or to devise one with a desired, specified, and expected level of return with the least amount of risk. Markowitz theorized that investors could design a portfolio to maximize returns by accepting a quantifiable amount of risk.

In other words, **investors could reduce risk by diversifying their assets and asset allocation of their investments using a quantitative method**. MPT is a mathematical justification for asset allocation within a portfolio, as it amounts to a weighted average of the expected returns on individual assets.

To begin with, Markowitz **assumed that most investors are risk-averse**. That means they are more personally comfortable with less risk, and nervous and anxious with increased risk. This also translates into the belief that it is better to not lose money than to find or gain it. So, given a choice between a higher return possibility with greater risk, and a lower return possibility with less risk, most people will naturally prefer the portfolio with the least risk, even if it means a lower return.

This gets to the heart of Markowitz's theory. Given two portfolios, an investor will naturally prefer one that indicates the highest return possibility with the least risk.

Criticism:

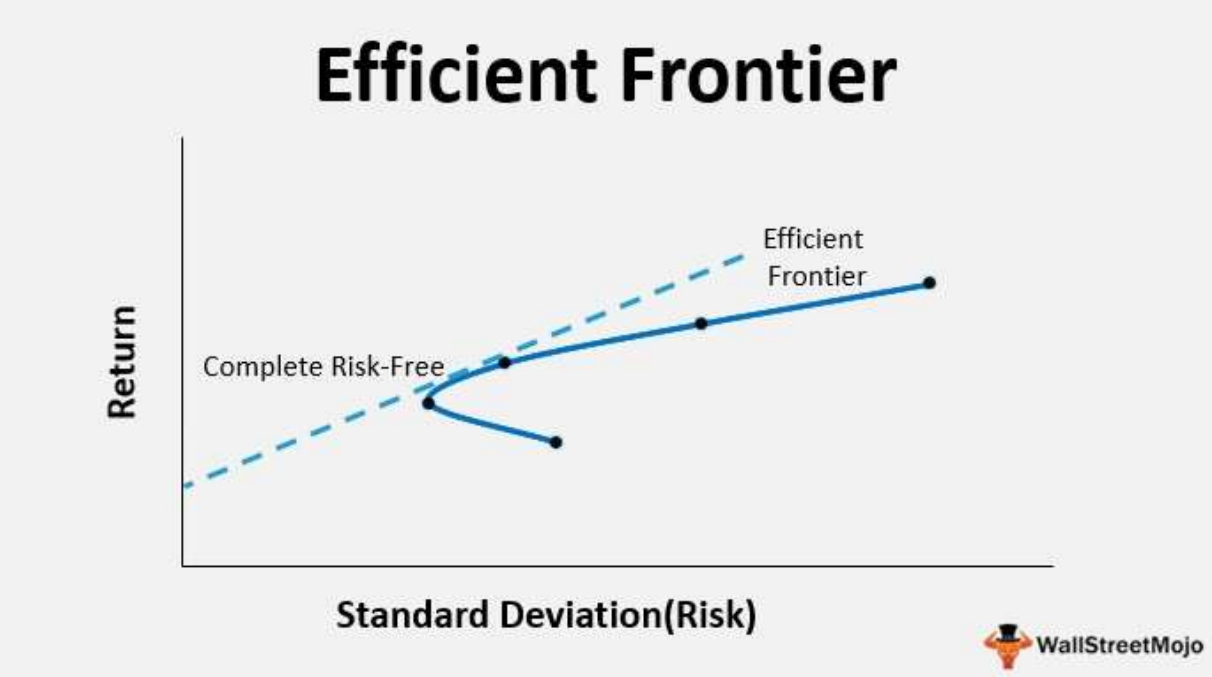
- Critics contend MPT doesn't deal with the real world, because all the measures used by MPT are based on projected values, or mathematical statements about what is expected rather than real or existing.
- Investors have to use predictions based on historical measurements of asset returns and volatility in the equations, which means they are subject to be changed by variables currently not known or considered at the time of the equation.
- Investors have to estimate from past market data because MPT tries to model risk in terms of the likelihood of losses, without a rationale for why those losses could occur. That makes the risk assessment probabilistic, but not structural.
- The mathematical model of MPT makes investing appear orderly when its reality is far less so.

5) Efficient Frontier

The **Efficient Frontier** is the set of optimal portfolios that offer the highest expected return for a defined level of risk or the lowest risk for a given level of expected return.
Portfolios that lie below the efficient frontier are sub-optimal because they do not provide enough return for the level of risk. The Efficient Frontier arising **from a feasible set of portfolios of risky assets is concave in shape**.

The **efficient frontier is curved** because there is a **diminishing marginal return to risk**. Each unit of risk added to a portfolio gains a smaller and smaller amount of return.

When an investor is assumed to use **riskless lending and borrowing** in his investment activity the **shape of the efficient frontier transforms into a straight line**.



6) Sharpe Single Index Model

The **Single-Index Model (SIM)** is a simple asset pricing model to measure both the risk and the return of a stock. The model has been developed by William Sharpe in 1963.

Markowitz Model had serious practical limitations due to the rigors involved in compiling the expected returns, standard deviation, variance, covariance of each security to every other security in the portfolio.

Sharpe Model has simplified this process by relating the return in a security to a single Market Index. Firstly, this theoretically reflects all well-traded securities in the market. Secondly, it reduces and simplifies the work involved in compiling elaborate matrices of variances as between individual securities.

Thus, if the Market Index is used as a surrogate for other individual securities in the portfolio, the relation of any individual security with the Market Index can be represented in a Regression line or characteristic line.

This optimal portfolio of **Sharpe** is called the **Single Index Model**. The method involves selecting a cut-off rate for inclusion of securities in a portfolio. For this purpose, excess return to Beta ratio given above has to be calculated for each stock and rank them from highest to lowest.

The **Simple Index Model** is based on the following **assumptions:**

- Most stocks have a positive covariance because they all respond similarly to macroeconomic factors.
- However, some firms are more sensitive to these factors than others, and this firm-specific variance is typically denoted by its beta (β), which measures its variance compared to the market for one or more economic factors.
- Co-variances among securities result from differing responses to macroeconomic factors. Hence, the covariance of each stock can be found by multiplying their betas and the market variance

Casual observation of the stock prices over a period of time reveals that most of the stock prices move with the market index. When the Sensex increases, stock prices also tend to increase and then vice – versa. This indicates that some underlying factors affect the market index as well as the stock prices. Sharpe assumed that the return of a security is linearly related to a single index like the market index. Stock prices are related to the market index and this relationship could be used to estimate the return of stock.

7) Capital Assets Pricing Model

The **Capital Asset Pricing Model (CAPM)** was developed in mid-1960s by three researchers William Sharpe, John Lintner and Jan Mossin independently. Consequently, the model is often referred to as **Sharpe-Lintner-Mossin Capital Asset Pricing Model**.

The Capital Asset Pricing Model (CAPM) is a relationship explaining how assets should be priced in the capital markets. It gives the nature of the relationship between the expected return and the systematic risk of a security.

The relationship between risk and return established by the Security Market Line (SML) is known as the Capital Asset Pricing Model. It is basically a simple linear relationship. The higher the value of beta, higher would be the risk of the security and therefore, larger would be the return expected by the investors.

In other words, all securities are expected to yield returns commensurate with their riskiness. This relationship is valid not only for individual securities, but is also valid for all portfolios

whether efficient or inefficient. The expected return on any security or portfolio can be determined from the CAPM formula if we know the beta of that security or portfolio.

The specific **assumptions** underlying Capital Asset Pricing Model are:

1) Investors make decisions based solely upon risk-and-return assessments. These judgments take the form of expected values and standard deviation measures.
2) The purchase or sale of a security can be undertaken in infinitely divisible units. Investors can short sell any amount of shares without limit.
3) Purchases and sales by a single investor cannot affect prices i.e. there is perfect competition where investors in total determine prices by their actions. Otherwise, monopoly power could influence prices (returns).
4) There are no transaction costs. Where there are transaction costs, returns would be sensitive to whether the investor owned a security before the decision period.
5) The purchase or sale of securities is done in the absence of personal income taxes i.e. investors are indifferent to the form in which the return is received (dividends or capital gains).
6) The investor can borrow or lend any amount of funds desired at an identical riskless rate (example: the Treasury bill rate).
7) Investors share identical expectations with regard to the relevant decision period, the necessary decision inputs, their form and size. Thus investors are presumed to have identical planning horizons and to have identical expectations regarding expected returns, variances of expected returns, and covariances of all pairs of securities. Otherwise, there would be a family of efficient frontiers because of differences in expectations.

   CAPM describes the expected return for all assets and portfolios of assets in the economy. The difference in the expected returns of any two assets can be related to the difference in their betas. The model postulates that systematic risk is the only important ingredient in determining expected return. As investors can eliminate all unsystematic risk through diversification, they can be expected to be rewarded only for bearing systematic risk. Thus, the relevant risk of an asset is its systematic risk and not the total risk.

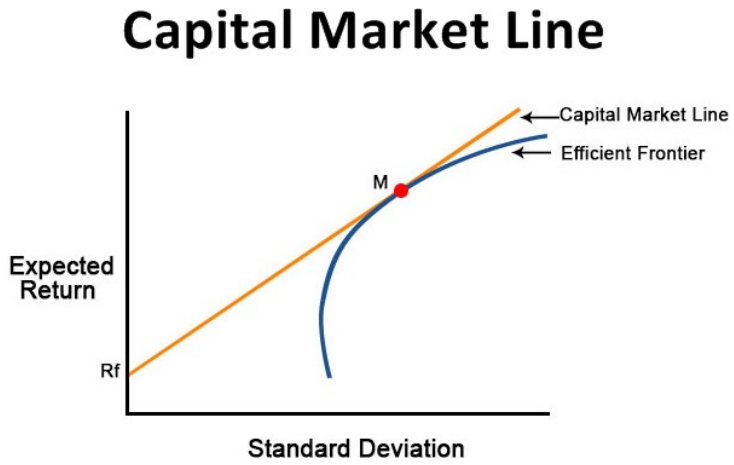
   The **CAPM** lets investors quantify the expected return on investment given the risk, risk-free rate of return, expected market return, and the beta of an asset or portfolio. The **Arbitrage Pricing Theory** is an alternative to the CAPM that uses fewer assumptions and can be harder to implement than the CAPM.

   The **CAPM** has serious **limitations** in real world, as most of the assumptions, are unrealistic. Many investors do not diversify in a planned manner. Besides, Beta

coefficient is unstable, varying from period to period depending upon the method of compilation. They may not be reflective of the true risk involved.

8) Characteristic Lines

1) **Capital Market Line (CML)**: It is the graph of the required return and risk (as measured by standard deviation) of a portfolio of a risk-free asset and a basket of risky assets that offers the best risk-return trade-off.



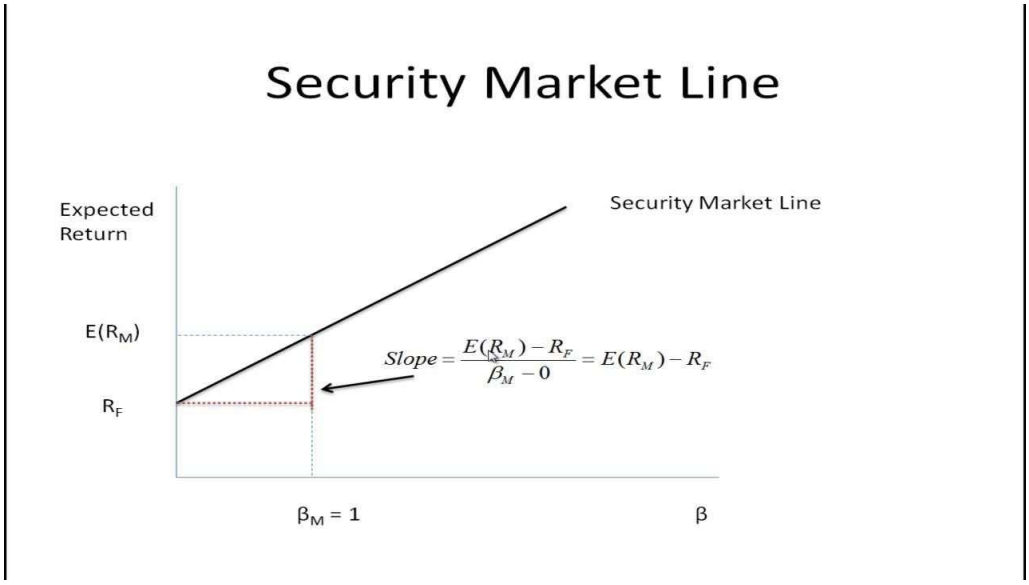
All investors are assumed to have identical (homogeneous) expectations. Hence, all of them will face the same efficient frontier. Every investor will seek to combine the same risky portfolio with different levels of lending or borrowing according to his desired level of risk. Because all investors hold the same risky portfolio, then it will include all risky securities in the market. This portfolio of all risky securities is referred to as the market portfolio M. Each security will be held in the proportion which the market value of the security bears to the total market value of all risky securities in the market. All investors will hold combinations of only two assets, the market portfolio and a riskless security. All these combinations will lie along the straight line representing the efficient frontier.

This line formed by the action of all investors mixing the market portfolio with the risk free asset is known as the capital market line (CML). All efficient portfolios of all investors will lie along this capital market line.

The CML provides a risk return relationship and a measure of risk for efficient portfolios. The appropriate measure of risk for an efficient portfolio is the standard deviation of return of the portfolio. There is a linear relationship between the risk as measured by the standard deviation and the expected return for these efficient portfolios.

CML shows the risk-return relationship for all efficient portfolios. They would all lie along the capital market line. All portfolios other than the efficient ones will lie below the capital market line. The CML does not describe the risk-return relationship of inefficient portfolios or of individual securities.

2) **Security Market Line (SML):** It is a line drawn on a chart that serves as a graphical representation of the Capital Asset Pricing Model (CAPM), which shows different levels of systematic, or market, risk of various marketable securities plotted against the expected return of the entire market at a given point in time.



The Capital Asset Pricing Model specifies the relationship between expected return and risk for all securities and all portfolios, whether efficient or inefficient. The total risk of a security as measured by standard deviation is composed of two components: systematic risk and unsystematic risk or diversifiable risk. As an investment is diversified and more and more securities are added to a portfolio, the unsystematic risk is reduced. For a very well diversified portfolio, unsystematic risk tends to become zero and the only relevant risk is systematic risk measured by beta. Hence, it is argued that the correct measure of a security's risk is beta.

It follows that the expected return of a security or of a portfolio should be related to the risk of that security or portfolio as measured by Beta which is a measure of the security's sensitivity to changes in market return.

Beta value greater than one indicates higher sensitivity to market changes, whereas beta value less than one indicates lower sensitivity to market changes. A value of one indicates that the security moves at the same rate and in the same direction as the market.

It is necessary to **contrast SML and CML**. Both postulate a linear (straight line) relationship between risk and return.
1) **In CML the risk is defined as total risk and is measured by standard deviation**, while **in SML the risk is defined as systematic risk and is measured by beta**.
2) Capital market line is **valid only for efficient portfolios** while security market line **is valid for all portfolios and all individual securities** as well.
3) CML is the basis of the **Capital Market Theory** while SML is the basis of the **Capital Asset Pricing Model.**

9) Optimum Portfolio

An **Optimal Portfolio** is one that minimizes your risk for a given level of return or maximizes your return for a given level of risk. The optimal portfolio concept falls under the portfolio theory. The theory assumes that investors fanatically try to minimize risk while striving for the highest return.

Optimal portfolio is a term used in portfolio theory to refer to the one portfolio on the Efficient Frontier with the highest return-to-risk combination given the specific investor's tolerance for risk. It's the point where the Efficient Frontier (supply) and the Indifference Curve (demand) meet.

10) Arbitrage Pricing Theory

Arbitrage Pricing Theory (APT) is a general theory of asset pricing that holds that the expected return of a financial asset can be modeled as a linear function of various factors or theoretical market indices, where sensitivity to changes in each factor is represented by a factor-specific beta coefficient. The **theory was proposed by** the economist **Stephen Ross in 1976.**

The model-derived rate of return will then be used to price the asset correctly - the asset price should equal the expected end of period price discounted at the rate implied by the model. If the price diverges, arbitrage should bring it back into line.

Arbitrage Pricing Theory (Apt) is a multi-factor asset pricing model based on the idea that an asset's returns can be predicted using the linear relationship between the asset's expected return and a number of macroeconomic variables that capture systematic risk.

Assumptions of APT:

1) Asset returns are explained by systematic factors.
2) Investors can build a portfolio of assets where specific risk is eliminated through diversification.
3) No arbitrage opportunity exists among well-diversified portfolios

The lack of clarity for the risk factors is a major **weakness of the APT**. Unsystematic risk can be completely diversified away. This implies that unsystematic risk is not priced (has zero premium).

A big **difference between CAPM and the Arbitrage Pricing Theory (APT)** is that APT does not spell out specific risk factors or even the number of factors involved. While CAPM uses the expected market return in its formula, APT uses the expected rate of return and the risk premium of a number of macroeconomic factors.

The **APT** focuses on risk factors rather than assets, so it has an **advantage over the CAPM** in that it does not have to create an equivalent portfolio to assess risk. The CAPM assumes that there is a linear relationship between the assets, whereas the APT assumes that there is a linear relationship between risk factors.

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